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Foreword

This *Survey* is published on the responsibility of the Economic and Development Review Committee of the OECD, which is charged with the examination of the economic situation of member countries.

The economic situation and policies of New Zealand were reviewed by the Committee on 8 and 9 November 2021. The draft report was then revised in light of the discussions and given final approval as the agreed report of the whole Committee on 22 December 2021.

The Secretariat's draft report was prepared for the Committee by David Carey, Naomitsu Yashiro and Axel Purwin, under the supervision of Vincent Koen. Research assistance was provided by Axel Purwin and Natia Mosiashvili, and editorial support by Sisse Nielsen and Gemma Martinez. The thematic chapter, Boosting Productivity by Unleashing Digitalisation, was authored by Naomitsu Yashiro, David Carey and Axel Purwin and benefitted from research collaboration with Lynda Sanderson and Garrick Wright-McNaughton (the Ministry of Business, Innovation and Employment), as well as technical advice from Ellie Avery and Emily Gray.

The previous *Survey* of New Zealand was issued in June 2019.

Information about the latest as well as previous Surveys and more details about how *Surveys* are prepared is available at www.oecd.org/eco/surveys

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Glossary of acronyms

ACC	Accident Compensation Corporation
ALMPs	Active labour market policies
ASIC	Australian Securities and Investments Commission
BOS	Business Operations Survey
CCC	Climate Change Commission
CERT	Computer Emergency Response Team
CoVE	Centre of Vocational Excellence
CPF	COVID-19 Protection Framework
CRRF	COVID-19 Response and Recovery Fund
DHBs	District Health Boards
DIRA	Dairy Industry Restructuring Act 2001
D-SIBs	Domestically-Systemically Important Banks
DTI	Debt-to-income
EPL	Employment protection legislation
ESA	Education Service Agency
ETS	Emissions Trading Scheme
EV	Electric Vehicle
GETS	Government Electronic Tenders Service
GHG	Greenhouse gas
GTAGA	Global Trade and Gender Arrangement
GVCs	Global value chains
IACCC	International Anti-Corruption Control Centre
ICT	Information communications technology
ICU	Intensive Care Unit
IoT	Internet of Things
LSAP	Large Scale Asset Purchase
LVR	Loan-to-value-ratio

M&A	Mergers and acquisitions
MBIE	Ministry of Business, Innovation and Employment
MBSF	Mobile Black Spot Fund
MESA	Mathematics, Engineering, Science Achievement
MIQ	Managed Isolation and Quarantine
NAIRU	Non-accelerating inflation rate of unemployment
NBA	Natural and Built Environment Act
NCEA	National Certificate of Education Achievement
NCSC	National Cyber Security Centre
NDC	Nationally Determined Contribution
NMSSA	National Monitoring Study of Student Achievement
NPSUD	National Policy Statement on Urban Development 2020
NZCC	New Zealand Commerce Commission
NZCO	New Zealand Companies Office
NZ ETS	New Zealand Emissions Trading Scheme
NZTE	New Zealand Trade and Enterprise
NZVIF	New Zealand Venture Investment Fund
OIO	Overseas Investment Office
R&D	Research and development
RBI	Rural Broadband Initiative
RBNZ	The Reserve Bank of New Zealand
RCEP	Regional Comprehensive Economic Partnership
RCG	Rural Connectivity Group
RMA	Resource Management Act 1991
SFO	Serious Fraud Office
SPVs	Special Purpose Vehicles
TFP	Total factor productivity
The Elevate Fund	Elevate NZ Venture Fund
TVEC	Terrorist and violent extremist content
UFB	Ultra-fast broadband
UGA	Urban Growth Agenda
UNFCCC	United Nations Framework Convention on Climate Change
WSOS	Washington State Opportunity Scholarship

BASIC STATISTICS OF NEW ZEALAND, 2019*

(Numbers in parentheses refer to the OECD average)**

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million)	5.0		Population density per km² (2018)	18.9	(38.4)
Under 15 (%)	19.6	(17.9)	Life expectancy at birth (years, 2018)	81.7	(80.2)
Over 65 (%)	16.0	(17.1)	Men (2018)	80.0	(77.6)
International migrant stock (% of population)	22.3	(13.3)	Women (2018)	83.5	(82.9)
Latest 5-year average growth (%)	2.0	(0.6)	Latest general election	October 2020	
ECONOMY					
Gross domestic product (GDP)			Value added shares (%, 2018, OECD: 2019)		
In current prices (billion USD)	211.0		Agriculture, forestry and fishing	6.4	(2.7)
In current prices (billion NZD)	320.1		Industry including construction	22.3	(26.6)
Latest 5-year average real growth (%)	4.0	(2.2)	Services	71.3	(70.8)
Per capita (000 USD PPP)	44.6	(47.4)			
GENERAL GOVERNMENT (Per cent of GDP)					
Expenditure	38.7	(40.6)	Gross financial debt	36.3	(108.9)
Revenue	38.2	(37.5)	Net financial debt	0.8	(68.0)
EXTERNAL ACCOUNTS					
Exchange rate (NZD per USD)	1.52		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	1.44		Food and live animals	58.9	
In per cent of GDP			Crude materials, inedible, except fuels	12.0	
Exports of goods and services	27.4	(53.6)	Machinery and transport equipment	6.0	
Imports of goods and services	27.4	(50.4)	Main imports (% of total merchandise imports)		
Current account balance	-2.9	(0.3)	Machinery and transport equipment	39.2	
Net international investment position	-54.8		Miscellaneous manufactured articles	13.7	
			Manufactured goods	11.1	
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (aged 15 and over, %)	67.7	(57.5)	Unemployment rate, Labour Force Survey (aged 15 and over, %)	4.1	(5.4)
Men	72.6	(65.6)	Youth (aged 15-24, %)	11.3	(11.9)
Women	62.9	(49.9)	Long-term unemployed (1 year and over, %)	0.5	(1.3)
Participation rate (aged 15 and over, %)	70.5	(60.8)	Tertiary educational attainment (aged 25-64, %)	39.1	(38.0)
Average hours worked per year	1,783	(1,743)	Gross domestic expenditure on R&D (% of GDP, 2017, OECD: 2018)	1.4	(2.6)
ENVIRONMENT					
Total primary energy supply per capita (toe)	4.1	(3.9)	CO_2 emissions from fuel combustion per capita (tonnes)	6.4	(8.3)
Renewables (%)	41.8	(10.8)	Water abstractions per capita (1 000 m³, 2015)	2.2	
Exposure to air pollution (more than 10 g/m³ of $PM_{2.5}$, % of population)	0.0	(61.7)	Municipal waste per capita (tonnes)	0.8	(0.5)
SOCIETY					
Income inequality (Gini coefficient, 2014, OECD: 2016)	0.349	(0.318)	Education outcomes (PISA score, 2018)		
Relative poverty rate (%, 2014, OECD: 2016)	10.9	(11.7)	Reading	506	(457)
Median disposable household income (000 USD PPP, 2014, OECD: 2016)	33.5	(23.5)	Mathematics	494	(487)
Public and private spending (% of GDP)			Science	508	(487)
Health care	9.3	(8.8)	Share of women in parliament (%)	40.8	(30.8)
Pensions (2018, OECD: 2017)	5.0	(8.6)	Net official development assistance (% of GNI, 2017)	0.2	(0.4)
Education (% of GNI)	7.4	(4.4)			

* The year is indicated in parenthesis if it deviates from the year in the main title of this table.
** Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 80% of member countries.
Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

Executive summary

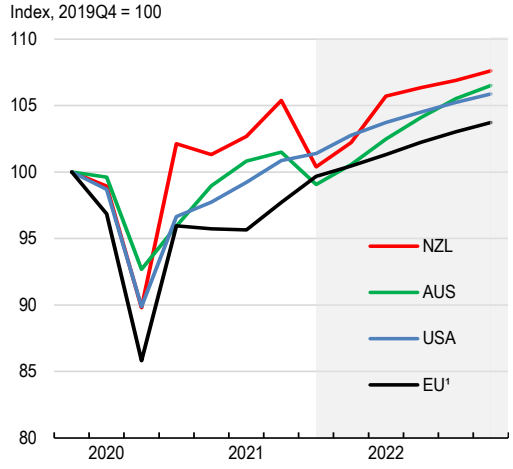
The economy recovered quickly from the COVID-19 shock but is overheating

The economy shrank sharply in the second quarter of 2020 but bounced back quickly thanks to effective virus containment, measures to protect jobs and incomes and highly expansionary macroeconomic policies. Confronted with the highly contagious Delta variant and with high vaccination rates, the government shifted from an elimination strategy to minimisation and protection.

The strict confinement measures taken at the outset of the COVID-19 shock contributed to a relatively large fall in GDP in the second quarter of 2020 (Figure 1). However, New Zealand succeeded in eliminating the coronavirus and was able to re-open the economy with the exception of international tourist-related activities. The economy regained the pre-pandemic GDP level in the third quarter of 2020 and remained above this level despite shrinking by 3.7% in the third quarter of 2021 owing to the reimposition of strict containment measures in August 2021, when community transmission of the Delta variant broke out.

Figure 1. The economy rebounded strongly

Real GDP



1. EU countries that are members of the OECD.

Source: OECD (2021), *OECD Economic Outlook 110* (database).

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Macroeconomic stimulus has been so powerful and the elimination strategy so effective that major labour market indicators are now stronger than before the pandemic. The unemployment rate fell to 3.4% in the third quarter of 2021, the lowest rate since 2007, and the employment rate increased to the highest rate on record. Wage growth has returned to the pre-pandemic level. With employers reporting record hiring intentions, the labour market is likely to tighten further, putting upward pressure on wages.

Inflation soared to 5.9% in the year to the fourth quarter of 2021, well above the Reserve Bank's 1-3% target band, and core inflation measures increased to above the upper bound of the band. Five-year ahead inflation expectations have increased for households but less so for businesses.

The containment measures reintroduced in August 2021 were maintained in Auckland until early December, when the government shifted to a minimisation and protection strategy. The new COVID-19 Protection Framework has three settings (red, amber and green) that take into account health system preparedness and population public health dynamics. Individuals who are vaccinated against COVID-19 face fewer restrictions on their movement and activities, as in many other OECD countries. The government also announced its intention to open the border progressively to vaccinated travellers by April 2022 subject to a negative COVID-19 test result on arrival and after seven days of self-isolation but delayed implementation owing to the arrival of the Omicron variant. The government also announced an expansion in intensive-care-unit capacity with ventilators.

Macroeconomic policy tightening will slow growth towards sustainable rates

The Reserve Bank of New Zealand (RBNZ) is tightening monetary and macroprudential policies with a view to achieving its price and financial stability objectives. Government budget deficits have begun to fall from the high levels reached during the first wave of the COVID-19 shock and will decline gradually from 2022. Macroeconomic policy tightening will contribute to slowing growth from almost 5% in 2021 to 2.5% in 2023.

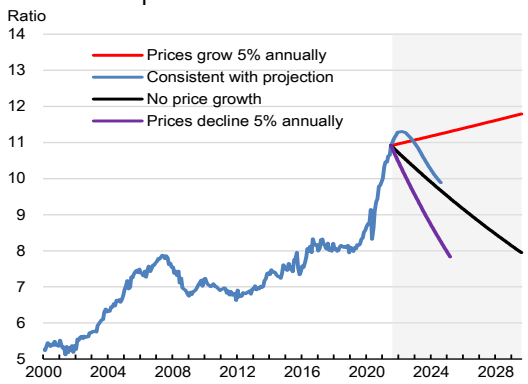
The RBNZ hiked the policy rate by 25 basis points in October and again in November 2021 to 0.75%, and projected further increases to 2.6% by end-2023. It halted its Large Scale Asset Purchases programme in July 2021 and is working on a strategy to manage its large government bond holdings (16% of GDP).

Highly expansionary monetary policy and the suspension of loan-to-value ratio (LVR) restrictions in 2020 spurred mortgage lending, pushing up

household debt to 169% of disposable income and house prices to levels that the RBNZ judges to be unsustainable (Figure 2). To limit financial stability risks, the RBNZ has increased LVR restrictions and has begun a public consultation on introducing debt-servicing-to-income or debt-to-income restrictions. Tightening monetary and macro-prudential policies, lower migration inflows and the March 2021 tax measures to discourage investment in rental properties have reduced housing demand. This, together with policy measures underway or planned to increase housing supply should eliminate shortages and increase affordability.

Figure 2. House prices have soared relative to incomes[1]

Median house price-to-income ratio



1.Reserve Bank of New Zealand scenario projections.

Source: Reserve Bank of New Zealand (2021), *Monetary Policy Statement, August 2021.*

StatLink https://stat.link/ob9u1e

Following a 9.7% of GDP fall in the government's preferred fiscal balance measure to a deficit of 7.3% of GDP in 2019-20 (fiscal years end 30 June), the deficit remains high but is projected to be almost eliminated in 2022-23 as large COVID-related spending is phased out. Steadily rising surpluses are projected through 2025-26 as such spending continues to be phased out.

Economic growth is projected to slow in response to macroeconomic policy tightening and the stabilisation of commodity export prices, albeit at high levels (Table 1). Consumption growth will fall to a more sustainable pace as housing wealth gains diminish and employment growth slows. The unemployment rate will remain at very low levels and inflation will fall back to within the Reserve Bank's target band by 2023.

The main downside risks to the outlook include a delay in border re-opening caused for instance by the emergence of more virulent COVID variants against which vaccines are less effective and a large and sudden house price correction. The main upside risks include stronger demand for New Zealand's agricultural exports and public health conditions that permit a more rapid phasing out of restrictions on economic activities than assumed.

Table 1. Economic growth will slow

(Annual growth rates, %, unless specified)

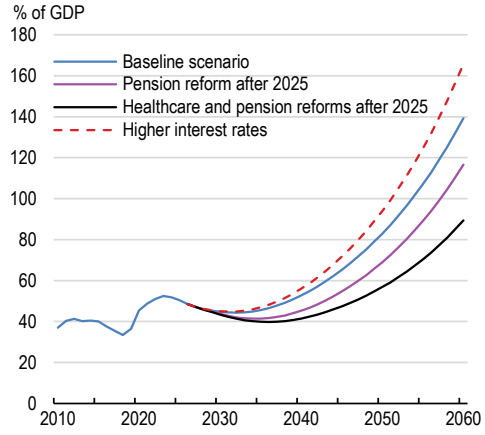
	2021	2022	2023
Gross domestic product	4.7	3.8	2.5
Private consumption	6.0	2.4	1.9
Government consumption	9.2	4.3	1.4
Gross fixed capital formation	8.3	6.3	4.1
Exports	-1.4	8.9	5.8
Imports	14.8	7.8	4.5
Unemployment rate (%)	3.8	3.2	3.3
Consumer price index (yearly average)	3.9	4.5	2.7
Current account balance (% of GDP)	-5.0	-5.5	-5.4
General government fiscal balance (% of GDP)	-5.7	-4.4	-3.7
General government gross debt (% of GDP)	51.7	55.0	57.8

Source: OECD (2021), *OECD Economic Outlook 110* (database), updated for 2021Q3.

The fiscal measures taken to support the economy during the COVID-19 crisis have substantially increased the government debt-to-GDP ratio. On unchanged policies, the debt-to-GDP ratio will rise considerably over coming decades owing to population ageing (Figure 3). Additional measures are needed to put public finances on a sustainable medium-term path, including linking the pension eligibility age to life expectancy.

Figure 3. Public debt will rise in the long run

Gross general government debt



Source: OECD computation based on NZ Treasury (2021), *Statement on the Long-term Fiscal Outlook and Long-term Insights Briefing*

StatLink https://stat.link/q4r2u1

Boosting productivity by enhancing diffusion of digital technologies

New Zealand has considerable scope to boost productivity by fostering growth of its digital sector and stimulating digital innovation. This requires strengthening the domestic pipeline of digital skills, making sure that regulations evolve with technological change and enhancing exports by firms exploiting digital technologies.

New Zealand is relatively advanced in some aspects of digitalisation, such as the high share of small firms selling online or use of the Internet of Things. However, the digital sector is smaller than in other OECD countries and has relied heavily on skilled migrants to fill jobs requiring advanced digital skills. It is now facing a severe skills shortage caused by border restrictions in the short term and competition from other countries in the longer term. The domestic pipeline of graduates with advanced ICT skills is narrowing, as weak mathematics and science achievement by students in primary- and lower secondary schools closes the door to tertiary studies in ICT-relevant fields.

The diffusion of digital technologies is also held back by a copyright regime that does not accommodate the use of some digital technologies, the cost of adopting digital tools for small businesses and the difficulty of reaping high returns on investment in digital technologies by exporting.

The government has been developing several policy initiatives on digitalisation, including the Industry Transformation Plans to foster the development of digital technology and agritech sectors. It recently embarked on the production of a national digitalisation strategy, which aims to promote trust, inclusiveness and growth in the digital economy and society. This strategy would help stakeholders in a wide range of policy areas to work together in a coherent way.

The introduction of unemployment insurance would help to make the diffusion of digital technologies more equitable by reducing the burden on workers displaced by digitalisation - most displaced workers do not qualify for the means-tested unemployment benefit.

Further measures are needed to reduce greenhouse gas emissions

New Zealand is not on track to meet either its 2030 abatement commitment or its 2050 net zero carbon emissions target. It has a solid institutional framework but needs to implement abatement measures. The carbon price is too low and efficient complementary measures, which address market failures not corrected by carbon pricing alone, still need to be taken.

The zero carbon amendments to the Climate Change Response Act 2002 require a fall in net carbon emissions to zero and a 24-47% decline in biogenic emissions from agriculture (currently almost half of total emissions) by 2050. The amendments create the Climate Change Commission (CCC) to advise on measures to achieve these objectives and to monitor progress. NZ Emissions Trading Scheme (ETS) reforms in 2020 placed a hard cap on permits in the scheme and created a cost containment reserve that can be used to limit price increases and a price floor below which permits will not be sold into the scheme. Taking into account actual and recommended complementary abatement measures, the CCC estimates that inflation-adjusted carbon prices will need to rise from NZD 68 per tonne of CO_2-e in early December 2021 to NZD 140 by 2030 and NZD 250 by 2050 for New Zealand to meet its abatement objectives from domestic sources.

The government has already taken various complementary abatement measures, notably in the areas of urban development, building codes and the provision of public/active transport infrastructure and the CCC has recommended others. New measures will need to complement carbon pricing and avoid the risk of high-cost abatement in situations where lower-cost abatement would be forthcoming through the ETS.

The government is preparing an Emissions Reduction Plan for publication in 2022 outlining policies and actions to help bridge the gap between the current emissions trajectory and the one required to meet the 2050 targets.

MAIN FINDINGS	KEY RECOMMENDATIONS
Making growth more sustainable in the wake of the COVID-19 crisis	
Faced with the Delta coronavirus variant, the government has moved from an elimination to a minimisation and protection strategy. Intensive Care Unit (ICU) capacity is low.	Increase ICU capacity and vaccination rates among vulnerable groups. Once vaccination rates are high, progressively relax border restrictions, as planned.
The recovery has been rapid and strong and the economy is showing signs of overheating. The government plans to increase the structural budget balance slowly and to reduce medium-term government debt only modestly. In the longer run, population ageing will substantially increase budget deficits and debt on unchanged policies.	Withdraw fiscal stimulus rapidly to reduce the burden of macroeconomic stabilisation on monetary policy. Commit to explicit long-term debt-to-GDP targets. Increase the old-age pension eligibility age by linking it to life expectancy and take measures to limit the impact on disadvantaged groups.
Inflation has increased to well above the Reserve Bank's 1-3% target band but business five-year ahead inflation expectations remain anchored.	Tighten monetary policy to the extent necessary to bring inflation back within the target band and to ensure that inflation expectations remain anchored.
Household mortgage debt is high. The Reserve Bank has reduced loan-to-value limits and is consulting on introducing debt-servicing restrictions.	Complement loan-to-value restrictions by requiring banks to use minimum interest rates for assessing borrowers' debt servicing capacity or by introducing debt-to-income restrictions.
Productivity is low by international comparison owing to muted product market competition, weak international linkages and innovation, and skills and qualifications mismatches. The comprehensive FDI screening regime was streamlined in 2021. Effective corporate tax rates are high by international comparison, holding back capital investment and FDI.	Remove barriers to competition in the retail grocery sector. Monitor the effect of reforms in the FDI screening regime and streamline the procedure further if needed. Complement R&D tax credits with targeted grants subject to strict evaluation and enhance knowledge transfer from research institutions. Consider the appropriateness of the current corporate tax rate.
The government has improved the legal framework for reducing greenhouse gas emissions but is not on track to reach net zero by 2050.	Complement rising carbon prices from progressively tightening the supply of emissions permits with targeted measures that address market failures not corrected by carbon pricing alone.
No progress has been made in increasing user charging for water, which is limited to Auckland, Nelson and Tauranga, or introducing congestion charging, although it is being considered in Auckland for 2024, when major improvements in public transport will be completed.	Ensure that the new water service delivery entities, which are to be established by 2024, are enabled and encouraged to apply volumetric charging for water and wastewater. Introduce congestion charging in Auckland.
Increasing housing affordability and better protecting displaced workers	
The Infrastructure Funding and Financing Act 2020 gives municipalities greater access to infrastructure financing through special purpose vehicles (SPVs) but no deals have yet been made.	Identify and remove unwarranted barriers to SPV deals. Give city councils greater incentives to accommodate growth, for example by sharing local goods and services tax receipts.
Most displaced workers do not qualify for the means-tested unemployment benefit. The government will consult on introducing unemployment insurance to reduce the burden on displaced workers.	Introduce the Social Insurance Scheme being developed and incorporate design features that encourage a rapid return to employment.
Boosting productivity by unleashing digitalisation	
New Zealand embarked on the production of a national digitalisation strategy, which aims to promote trust, inclusiveness and growth in the digital economy and society.	Advance the national digitalisation strategy by providing a strong mandate for strategic coordination across all relevant policy areas and by collecting the data needed to support it.
The domestic pipeline of advanced ICT skills is weak. Poor mathematics achievement limits the proportion of school students who can obtain the university qualifications needed for ICT careers. Employers have preferred to recruit experienced workers with advanced ICT skills rather than offer career paths that lead to these posts.	Improve mathematics and science teaching in primary schools, including by putting more emphasis on inquiry plus guided teaching using well-articulated knowledge bases for both the student and the teacher. Develop digital apprenticeships and internships and expand the GOVTechTalent graduate programme to all public sector organisations. Develop programmes to help Māori and women pursue digital careers.
Some of New Zealand's regulations lack flexibility to accommodate disruptive digital innovation, a framework to support data portability, and agility to prevent anticompetitive mergers and acquisitions in digital services.	Move toward goal-based regulations that stipulate regulatory objectives while allowing flexibility in technologies used. Empower the NZ Commerce Commission to order merger parties to apply for its clearance, to halt integration between parties during its investigation and to order merger parties that are overseas entities to produce information for its investigation.
Policy support for digital innovation and export promotion measures are not well linked.	Provide seamless support to innovative digital start-ups for their early global expansion through better coordination between Callaghan Innovation and New Zealand Trade Enterprise.
The digital platforms for managing irrigation, fertilisers and tracking animals are not necessarily inter-operational, nor do they produce data that can be easily combined.	Ensure interoperability across digital tool platforms by requiring agritech players to adopt common standards, while letting them choose the most suitable common standards to converge to.

1 Key Policy Insights

David Carey, OECD

Naomitsu Yashiro, OECD

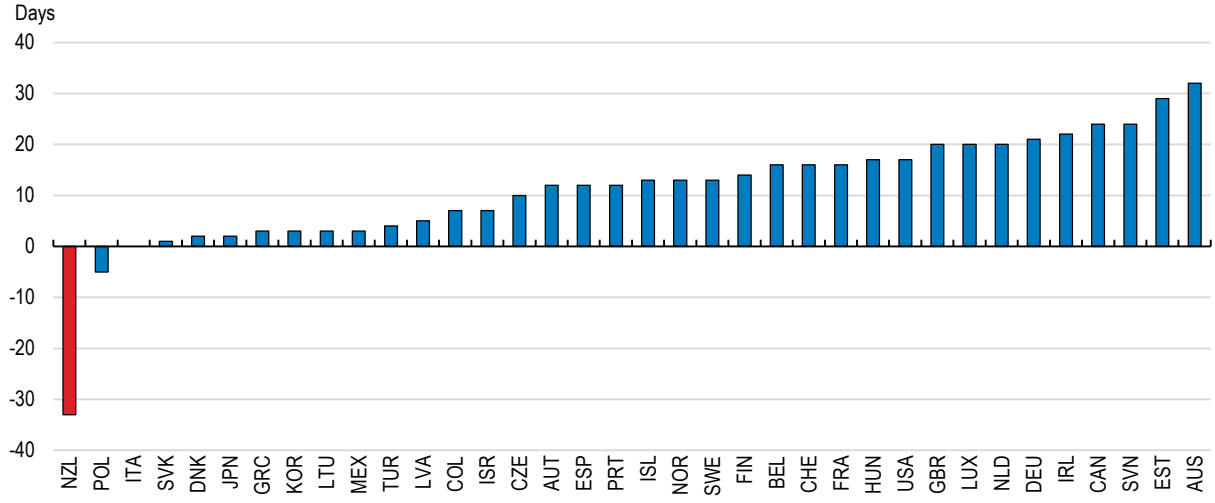
Axel Purwin, OECD

The New Zealand economy recovered quickly from the COVID-19 shock thanks to effective virus containment, measures to protect jobs and incomes and highly expansionary macroeconomic policies but is now overheating and house prices have soared. The Reserve Bank has begun to tighten monetary and macroprudential policies with a view to achieving its price and financial stability objectives. Together with policy measures to increase housing supply, this should help moderate housing price inflation. While the fiscal deficit has begun to fall from the highs reached during the first wave of the COVID-19 shock, additional consolidation measures will be needed to put public finances on a sustainable path, including an increase in the pension eligibility age. New Zealand has a solid institutional framework to reduce greenhouse gas emissions but needs to implement additional abatement measures to meet its objectives. The carbon price needs to increase substantially and complementary measures taken that address market failures not corrected by carbon pricing alone.

New Zealand's coronavirus elimination strategy has paid off so far. Strict confinement measures were implemented quickly (Figure 1.1), helping to limit the COVID-19 health toll. This strategy, together with measures to protect jobs and incomes and highly expansionary macroeconomic policies, laid the foundations for a rapid recovery from the deep downturn in the second quarter of 2020. Thus, by the third quarter of 2020, real GDP had already recovered to the pre-COVID-19 level, earlier than in any other OECD country. Stimulus has been so effective that employment may have reached its maximum sustainable level, unemployment has fallen considerably below the OECD's estimate of the non-accelerating inflation rate (4.5%) and inflationary pressures have increased. The border restrictions needed to support the virus elimination strategy are increasingly creating challenges for the economy. They tend to exacerbate skills shortages, put export markets that require physical contact at risk and prevent recovery in the large tourism sector (Box 1.1). Lockdowns to crush sporadic community outbreaks have also taken their toll.

Figure 1.1. New Zealand's initial response to COVID-19 infection was exceptionally swift

Number of days between the number of COVID-19 cases surpassing one per million persons and introduction of confinement measures, 2020



Source: Computed by the Secretariat from the *OECD COVID-19 Policy Tracker*; OurWorldInData.org

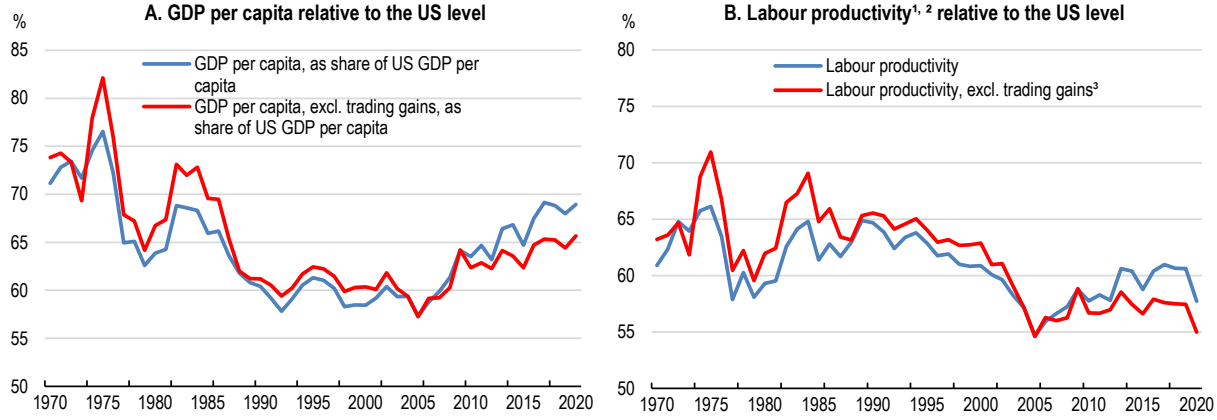
StatLink https://stat.link/1crzxe

New Zealand has partially recovered from a long-term widening in the gap in living standards relative to the leading OECD countries. New Zealand's GDP per capita (at purchasing power parity) declined from approximately 75% of the US level in the mid-1970s to around 60% from the early 1990s to late 2000s before steadily recovering to around 70% in recent years (Figure 1.2, Panel A). The decline would have been greater and the subsequent partial recovery smaller had the terms of trade not increased. Labour productivity followed a similar pattern but at a lower level: it fell from around 65% of the US benchmark in the mid-1970s to 55% in the mid-2000s before recovering to around 60% in the late 2010s and again, terms of trade increases attenuated the decline and strengthened the recovery. The shortfall in GDP per capita reflects low productivity levels (Panel B), which have persisted despite catch-up potential and substantial improvements in policy settings (de Serres, Yashiro and Boulhol, 2014[1]).

Economic and policy developments since the previous *Survey* have been dominated by COVID-19 and measures taken to minimise its health and economic impact. As noted above, the elimination strategy and significant macroeconomic stimulus enabled the economy to bounce back quickly to the pre-COVID level. However, policy stimulus has contributed to overheating the economy, a house price boom from already elevated levels and substantial increases in household- and government debt. The Reserve Bank of New

Zealand has rightly begun a monetary policy tightening cycle. It has also indicated that house prices are unsustainable and has tightened macro-prudential policies. The government continues to implement reforms to reduce regulatory and infrastructure financing barriers to increasing housing supply. In March 2021, it announced a package of measures to increase new housing supply, especially of affordable housing, including by providing more finance for the associated urban infrastructure development and for developing vacant or underutilised land for housing, and to discourage investment in rental properties other than new builds. Border restrictions have drastically reduced net migration, reducing the inflow of an important source of labour for some industries, and the government is implementing a migration policy reset to reduce lower-skilled immigration permanently. The government plans to reduce public debt slowly, eventually increasing room to support the economy should future adverse shocks strike and to cope with the budgetary costs of population ageing, although not to pre-COVID levels. Policy changes will be needed if population ageing is not to result in large increases in public debt.

Figure 1.2. The declines in GDP per capita and labour productivity relative to US levels have been attenuated by terms-of-trade gains



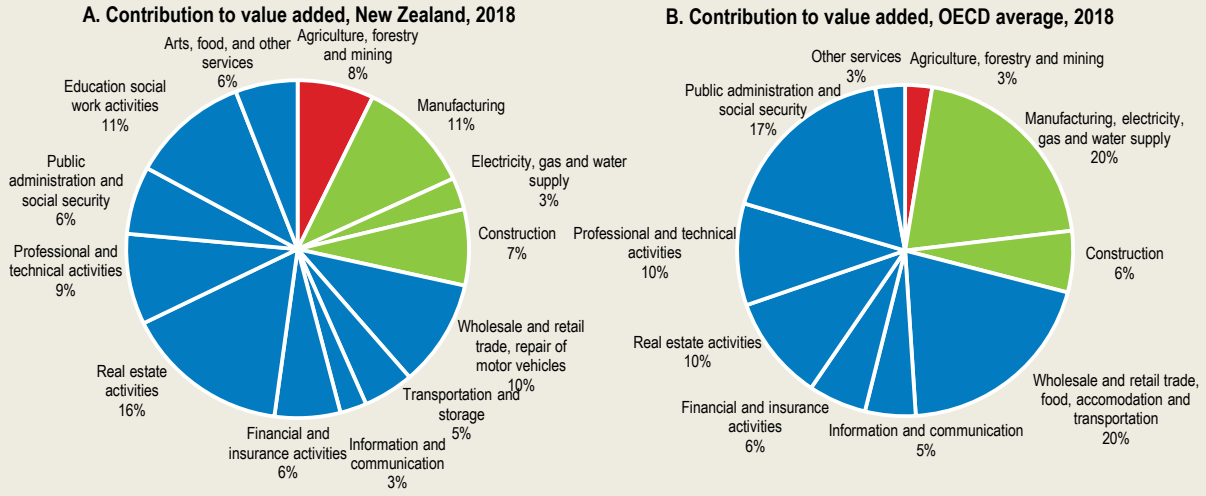
1. At current PPP exchange rates.
2. Labour productivity is measured using total employment rather than hours worked, as data on hours worked only stretches back to 1986. There should not, however, be a big difference in evolution between the two measures of labour productivity. The United States is used as a benchmark because it has long been the productivity leader across a wide range of industries and because there is little difference between values for the United States and the population-weighted upper half of OECD countries.
3. Trading gains, or losses, equal the current trade balance deflated by a single price index, minus real exports, plus real imports. Trading gains thus capture the difference between real GDI and real GDP.
Source: OECD (2021), *Economic Outlook 110* (database).

StatLink https://stat.link/73gy0u

Box 1.1. Key features of the New Zealand economy

New Zealand has a small population (5.1 million) but a relatively large land mass (268 thousand square kilometres − a little bigger than England and a little smaller than Japan). Services account for the same share of value added as the OECD average, but primary industries are larger and goods-producing industries smaller (Figure 1.3). The largest service activities are real estate, education and social work activities, and wholesale and retail trade. By far the largest primary industry is dairy.

Figure 1.3. New Zealand's service sector is large, as in other countries, but agriculture is larger and manufacturing smaller than elsewhere

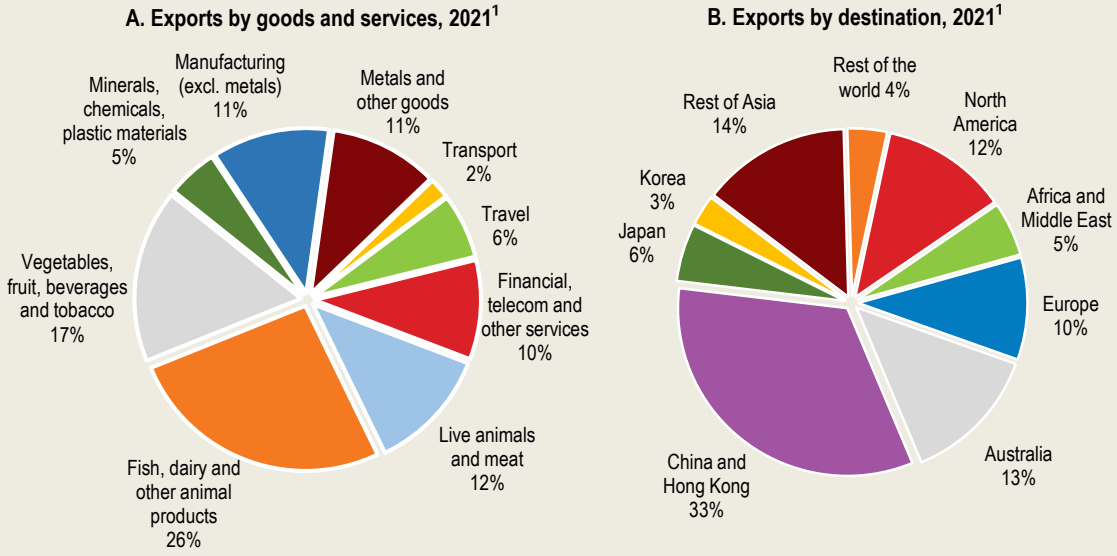


Source: Stats NZ; OECD (2021), *National Accounts* (database)

StatLink https://stat.link/mndy5a

New Zealand's largest categories of exports are agricultural, tourism and horticultural (Figure 1.4, Panel A). It is highly dependent on Asian and Australian export markets, which take two thirds of its exports (Panel B). China (including Hong Kong) is by far New Zealand's biggest export market, followed by Australia and the United States. New Zealand's export intensity (27%) is the lowest among small OECD economies (population less than 20 million), largely owing to the country's geographical isolation (Figure 1.5); import protection is low. New Zealand is poorly integrated in global value chains (GVCs), partly as a result of its geographical isolation (Figure 1.6).

Figure 1.4. The largest export categories are agriculture and tourism and the largest export markets China and Australia

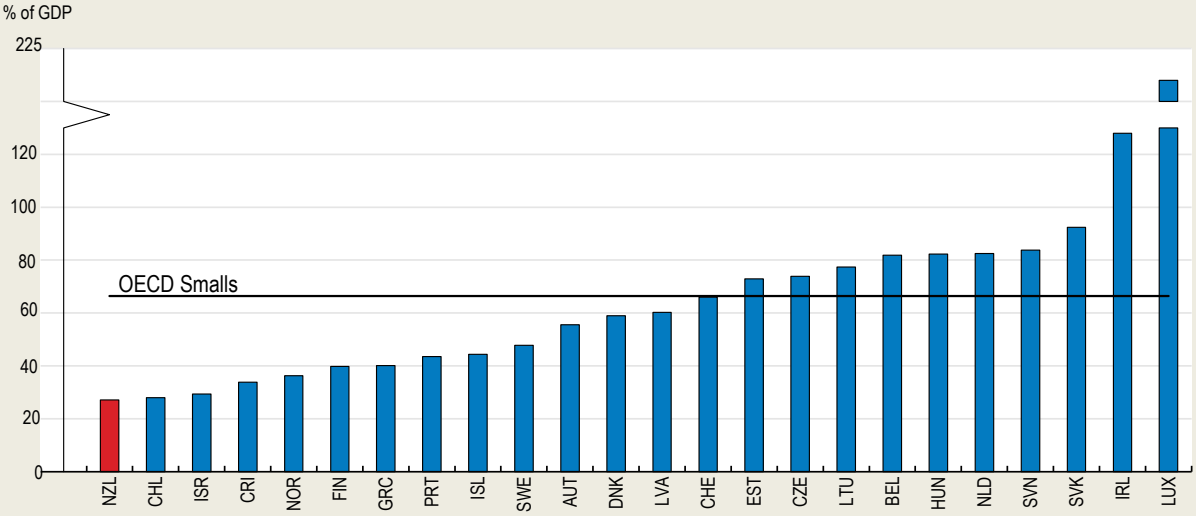


1. Year to June 2021.
Source: Stats NZ.

StatLink https://stat.link/8wfvm3

Figure 1.5. New Zealand's export intensity is low for a small country

Exports of goods and services, 2019



Note: The OECD Smalls line refers to the average for OECD countries with a 2019 population of less than 20 million.
Source: OECD (2021), Trade in goods and services (indicator), doi: 10.1787/0fe445d9-en, 2021.

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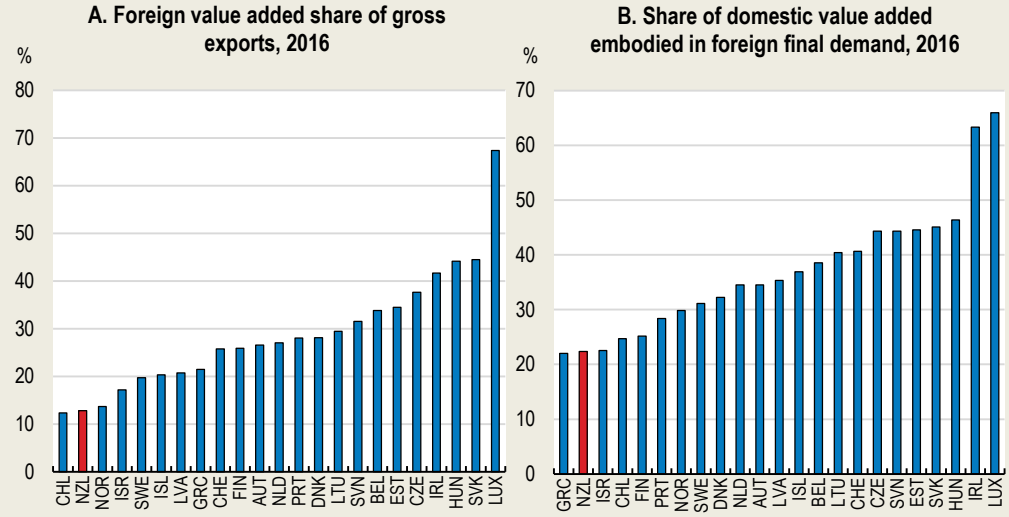
Figure 1.6. New Zealand is not well integrated in global value chains



Source: OECD (2021), *Trade in Value Added* (database).

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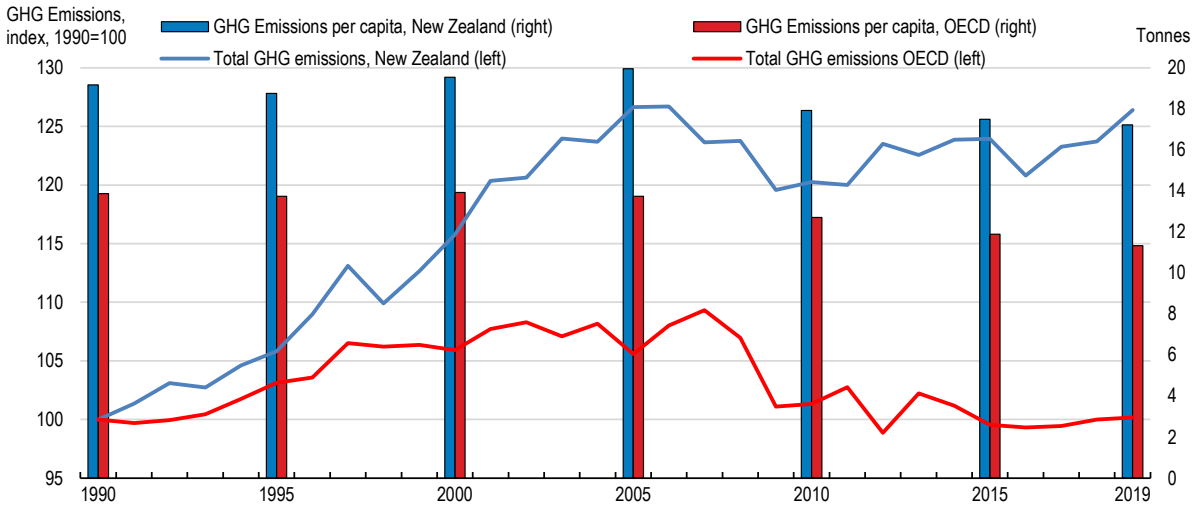
The government is also laying the groundwork to make economic growth more environmentally sustainable. New Zealand has recorded the second largest increase in greenhouse gas (GHG) emissions amongst OECD countries since 1990 and emissions per capita are high (Figure 1.7). The zero carbon amendments to the Climate Change Response Act 2002 were legislated in 2020 with multi-party support and commit New Zealand to reducing domestic non-biological greenhouse gas emissions to net zero by 2050 and biological emissions by almost one half. The amended Act also makes New Zealand's Emissions Trading Scheme more effective, notably by imposing five-year rolling caps on emissions and limiting the extent to which caps can rise owing to additional units entering the scheme from auctions and free allocations. Action is also being taken to improve water quality, which has been degraded by the huge

expansion of the dairy industry and inadequate urban water infrastructure. Minimum standards for water quality have recently been set at the national level, with communities free to choose by how much they want to exceed them. The government has also decided to implement the Three Waters Reform Programme (drinking water, wastewater and storm water) that will shift water service delivery from local councils to four regional entities that will have greater ability to plan and fund more resilient and reliable water infrastructure across regions and communities than local councils and be more efficient.

Figure 1.7. Greenhouse gas emissions[1] growth and per capita levels are high



1. Greenhouse gas emissions excluding land use, land-use change, and forestry.
Source: OECD (2021), *Environmental Statistics* (database).

StatLink https://stat.link/0jy7se

Against this background, the key messages of the *Survey* are that:

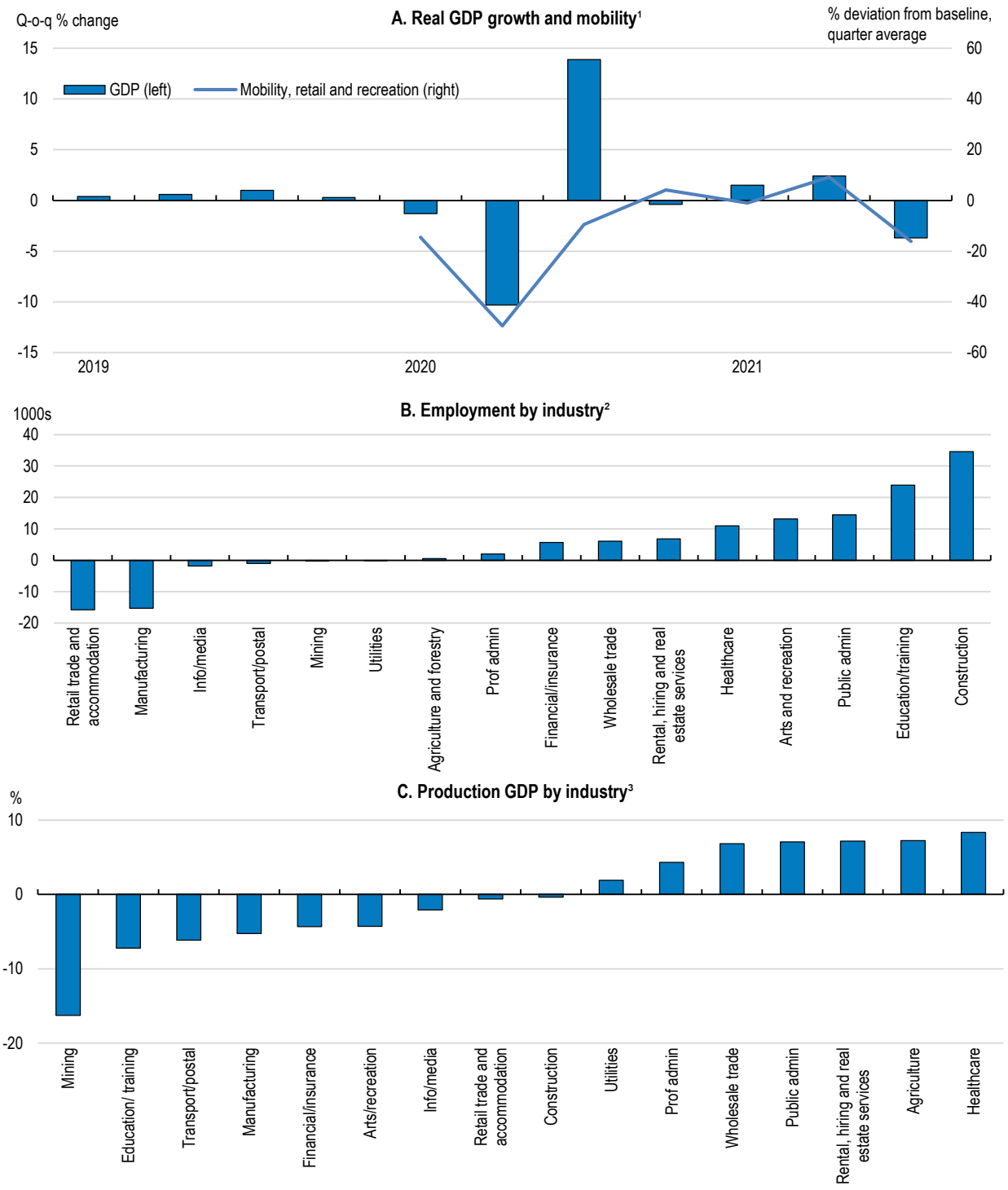
- While terms-of-trade gains and rising labour utilisation rates have limited the long-term decline in GDP per capita relative to the richest countries, they cannot be relied upon indefinitely. The only long-term solution to sustain high living standards is to boost productivity, notably through making better use of digital technologies, which is the subject of this *Survey's* thematic chapter.
- House prices have soared from already high levels relative to fundamentals, affordability for first homebuyers has fallen to extremely low levels and the risk of a housing market correction has increased further, making it vital to complete reforms to ease constraints on housing supply and to tighten macro-prudential regulations.
- While the strong economic recovery has accelerated reductions in budget deficits from the high levels reached during the pandemic, structural deficits and medium-term government indebtedness will only decline slowly. Fiscal policy should be tightened in the near term to reduce the stabilisation burden on monetary policy. While this will also reduce the needed future tax increases and/or expenditure cuts to finance long-term expenditure pressures, further measures will be required to ensure fiscal sustainability.
- Ambitious objectives have been set for reducing greenhouse gas emissions. To maintain support for achieving these objectives and maximise wellbeing, it will be important to implement a coherent and equitable package of price and complementary policy measures that minimises costs for achieving a given amount of abatement.

The economy bounced back quickly from the COVID-19 shock but inflationary pressures have increased markedly

New Zealand's economy shrank sharply in the second quarter of 2020 (Figure 1.8, Panel A) owing to the strict lockdown (Alert Level 4) imposed in late March, which shut down businesses considered to be non-essential (Box 1.2). Early virus containment allowed many sectors including construction to re-open in late April under Alert Level 3 and most businesses had returned to full operation by June. The economy rebounded strongly, regaining the pre-pandemic GDP level in the third quarter of 2020 and rising to 4.5% above the pre-COVID level by the second quarter of 2021, one of the strongest recoveries among OECD countries. At this point, economic growth had far exceeded the potential rate (estimated to be around 2 ½ per cent) since the second quarter of 2020, quickly closing the output gap. However, tourism-related sectors, such as transportation or accommodation, had not recovered owing to ongoing tight border restrictions (Panel B and C).

Strict containment measures were reintroduced in August 2021, when community transmission of the Delta variant broke out, and maintained in Auckland until early December, resulting in a 3.7% fall in real GDP in the third quarter of 2021. Confronted with the more contagious Delta variant and with high vaccination rates, the government shifted from an elimination strategy to minimisation and protection in December 2021 (see Box 1.2). It also announced the progressive easing of border restrictions and an expansion in intensive-care-unit capacity but, faced with the even more contagious Omicron variant, deferred the first stage of Managed Isolation and Quarantine (MIQ) free travel. The government is currently reviewing plans for the phased reopening of the border with announcements to be made in early 2022.

Figure 1.8. The economy bounced back quickly from the pandemic-induced contraction



1. Mobility change is a comparison relative to a baseline day before the pandemic outbreak. Baseline days represent a normal value for that day of the week given as median value over the five-week period from 3 January to 6 February 2020.
2. Cumulative change between 2019Q4 and 2021Q3, not seasonally adjusted.
3. Cumulative change between 2019Q4 and 2021Q3, seasonally adjusted.
Source: Stats NZ; Google LLC, *Google COVID-19 Community Mobility Report*

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Box 1.2. New Zealand's public health policy response to COVID-19

From elimination to minimisation and protection

New Zealand's early response was characterised by a swift and stringent lockdown to eliminate community transmission. The government introduced a four-tiered Alert Level system on 20 March 2020 and imposed the most stringent lockdown (Alert Level 4) in the system, which mandated people to stay home and closed schools, universities and non-essential businesses. These lockdown measures were relaxed on 28 April and Alert Level 2 (some restrictions) was imposed from 13 May. With all domestic cases eliminated, nearly all restrictions on social and economic activities were suspended on 9 June although there were more requests for behaviours to limit the spread of the virus should it reappear, such as QR scanning, mask use and self-isolation for people feeling unwell. New Zealand experienced small, localised outbreaks in August 2020 and in February and June 2021, which it stamped out through early lockdowns. The aggressive elimination strategy resulted in sizable fluctuations in economic activity but was effective in saving lives (there were only 23 COVID-19 related deaths by early August 2021). However, the arrival of the highly contagious Delta variant in mid-August 2021 challenged this strategy. Despite the Alert Level 4 nationwide lockdown and the subsequent prolonged lockdown in Auckland (until early December) and nearby regions and businesses and schools in the rest of the country operating under raised Alert Level settings, the number of community infection cases did not fall to zero.

New Zealand's COVID-19 strategy has shifted from elimination to minimisation and protection, the success of which depends on achieving a high vaccination rate across its population. New Zealand started a single-provider-focused (Pfizer/BioNTech) vaccination programme in February 2021, but the early stages of the roll-out were slower than in most other OECD countries. The government initially prioritised the vaccination of individuals at higher risk of contracting COVID-19, such as those working in managed isolation and quarantine- and long-term care facilities, followed by vulnerable groups (for example, persons aged 65 or over). Vaccination of the rest of the population started in late July with those aged 60 or over, and was extended to everyone aged 12 or over on 20 August, at which point only 19% of the population was fully vaccinated (compared to the OECD average of 50% at that time). The vaccination pace accelerated in October, eventually allowing New Zealand to exceed the OECD average (Figure 1.9). However, a delay in take-up among some population groups, such as young Māori, has been a challenge. Strategies to increase these groups' vaccination rates should be strengthened through reducing barriers to access vaccines and more intensive community engagement and information campaigns in partnership with community organisations (OECD, 2021[2]). The government has also mandated workers in health, educational and correctional sectors as well as border workers to be vaccinated.

On 3 December 2021, New Zealand transitioned from the Alert Level system to a new COVID-19 Protection Framework (CPF), which has three settings (red, orange and green) for restrictions on movements and activity that depend on health system preparedness and population public health dynamics and reinforces incentives to be vaccinated.

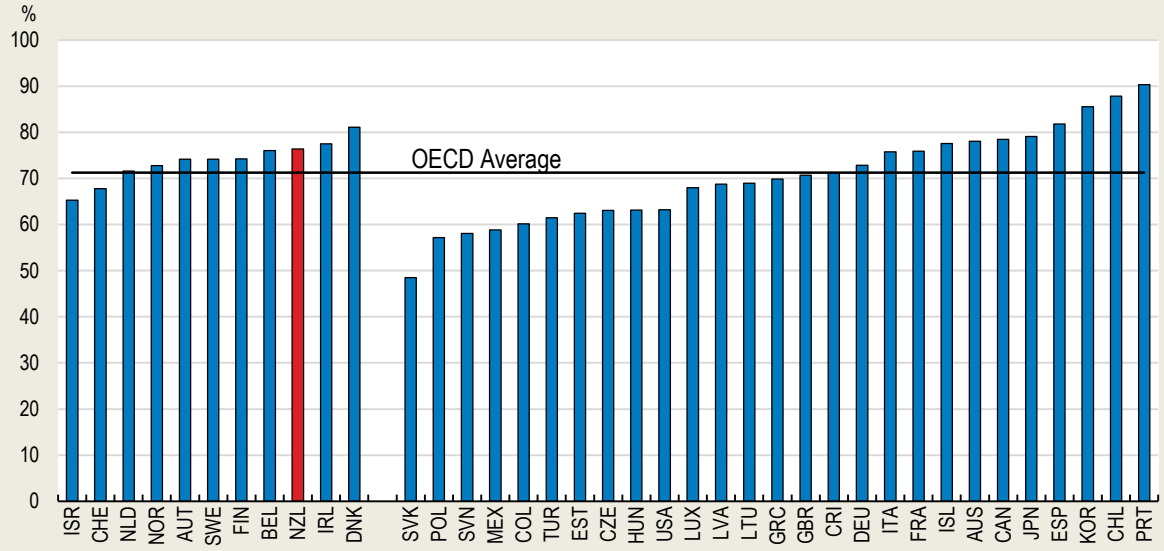
- In the red state, where action is needed to protect the health system and/or protect at-risk population groups, hospitality will remain open for people with vaccination certificates and education and retail will be open with public health measures but gathering limits, physical distancing and mask-wearing mandates will be imposed. Working from home will be encouraged.
- In the orange state, where community transmission is increasing the pressure on the health system and there is increasing risk to at-risk populations, everything remains open for people with vaccination certificates and gathering limits currently applicable in the rest of the country will be lifted. Businesses that choose not to use vaccination certificates will either be closed or be subject to public health measures.

- The green state is where there is limited community transmission of COVID-19, and the health system is ready to respond. There are no restrictions on people with vaccination certificates. Businesses that choose not to use vaccination certificates will face restrictions on numbers and spacing on their premises.

Auckland and some other North Island regions entered the CPF at the red level and the rest of the country at the orange level. Auckland's borders with the rest of the country were opened on 16 December, subject to people crossing the boundary being vaccinated or having proof of a negative COVID-19 test. The whole country moved to the red level on 24 January following the detection of community transmission of the Omicron variant.

Figure 1.9. The vaccination rate is above the OECD average

The share of the total population fully vaccinated, 24 January or latest



Note: Small advanced economies are defined as the OECD countries with populations of 1-20 million and with per capita incomes above USD 30 000.
Source: ourworldindata.org/coronavirus

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Border control measures have been stringent

New Zealand closed its border to foreign non-residents on 19 March 2020, with few exceptions. Citizens and residents returning from abroad needed to be isolated in Managed Isolation and Quarantine (MIQ) facilities for 14 days upon arrival. The number of MIQ places available has fallen far short of demand, preventing many New Zealanders from returning, including those making business trips to support export business, and skilled immigrants from entering the country.

In April 2021, the government introduced a bilateral measure with Australian states that removed the quarantine requirement for Australian and New Zealand residents arriving from Australia and for other travellers who had stayed in Australia for at least 14 days. However, this "travel bubble" was suspended in July 2021 after the outbreak of the Delta variant in the most populous Australian states.

In November 2021, the government reduced the number of days that vaccinated travellers entering New Zealand must spend in MIQ to seven days, followed by a short period of self-isolation at home. It also announced that New Zealand citizens and residents would be exempt from stays in MIQ facilities and would instead self-isolate for seven days from early-2022. Travellers would also have to comply with vaccination and testing requirements in addition to the self-isolation period. The timeline for MIQ-free travel

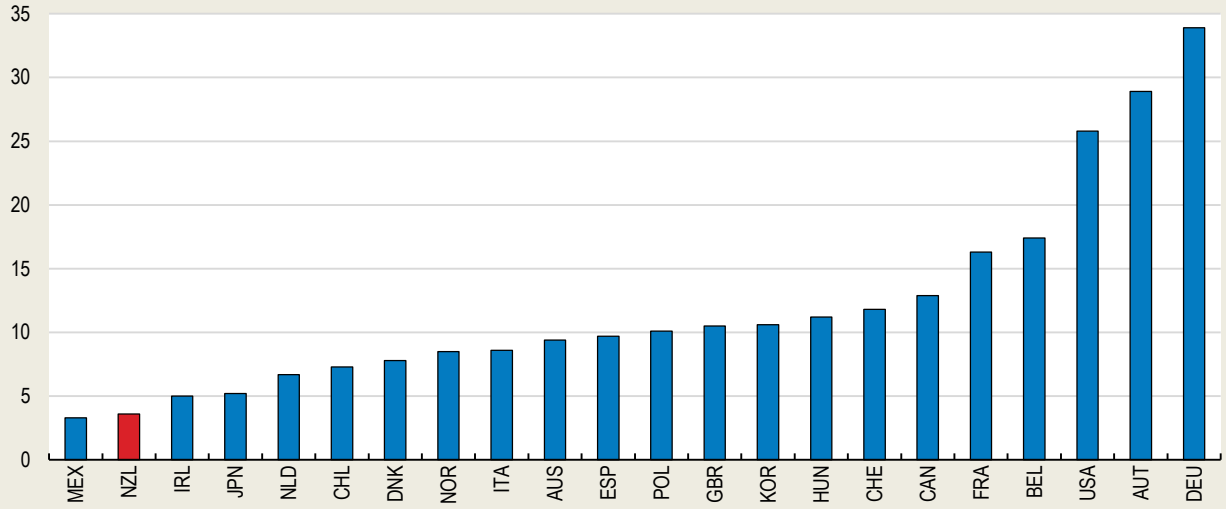
was pushed back in December 2021 due to the global spread of the Omicron variant, which also prompted the government to shorten the period for pre-departure COVID tests for travel to New Zealand and increase the period of MIQ stays to 10 days. The government is reviewing plans for the phased reopening of the border and is expected to make announcements in early 2022.

Health system support

New Zealand's aggressive elimination strategy against COVID-19 was partly motivated by its relatively low capacity to treat acute infection cases: the number of intensive-care beds in New Zealand relative to population is one of the lowest in the OECD (Figure 1.10). The government allocated just over NZD 1.1 billion for the public health response to COVID-19 and an additional NZD 1.4 billion for the COVID-19 Vaccine and Immunisation programme. It also allocated NZD 31.5 million to increase intensive care beds, and an additional NZD 10 million for ventilators to boost Intensive Care Unit (ICU) capacity. Short training programmes were offered to enable health professionals who are not ICU specialists to acquire the skills needed to assist fully trained staff in this area. This, however, has not remedied the fundamental shortage of qualified ICU personnel.

Figure 1.10. New Zealand's intensive care unit capacity is low

Number of intensive care beds per 100 000 population, 2020 or latest year



Source: OECD (2020), *Beyond Containment: Health systems responses to COVID-19 in the OECD*

StatLink https://stat.link/n2sa05

International cooperation

Aside from vaccinating its own population, New Zealand is donating 2.4 million doses of the AstraZeneca vaccine to the COVAX Facility to support vaccination programmes in developing countries like Samoa and Indonesia. Since October 2021, New Zealand has also been giving Pfizer COVID-19 vaccines to the Cook Islands, Niue and Tokelau to support vaccination of their 12-15 year-olds.

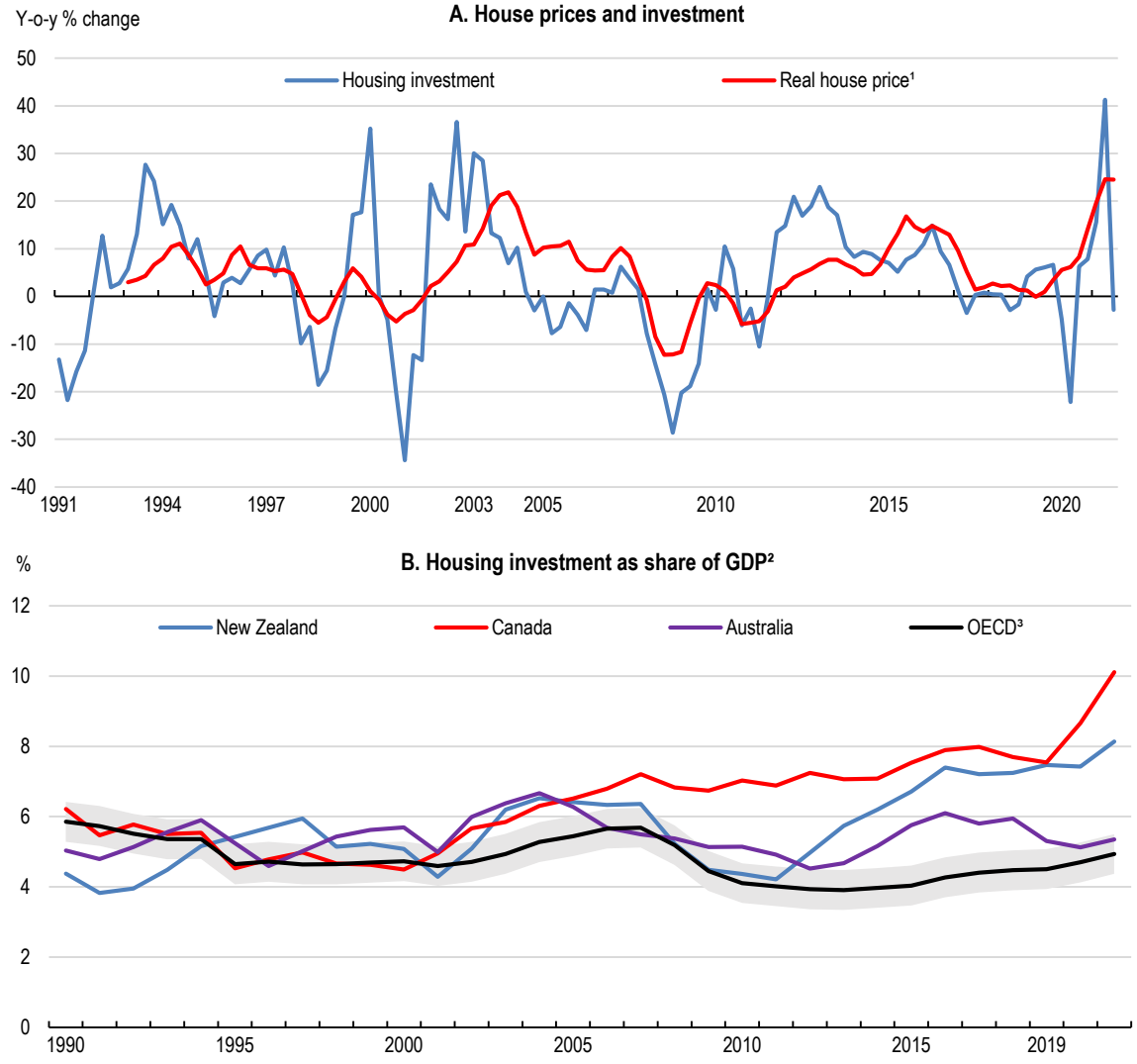
Source: OECD COVID Policy Tracker; Ministry of Health.

The recovery has been led by consumption, residential investment and goods exports. Consumption has been buoyed by strong household income growth, which has been supported by substantial government subsidies and transfers during lockdown periods, high labour income growth and large housing wealth gains (Figure 1.11, Panel A). Residential investment was growing strongly before the pandemic in response to shortages and an easing in regulatory constraints (see below) and has since accelerated

further, reaching the highest share of GDP since the early 1970s. It is also very high by international comparison (Panel B). An increase in domestic tourism has also contributed to the recovery. After having recovered to the long-run average, business confidence has slipped markedly (Figure 1.12, Panel A). Expectations for own growth (Panel A) and business investment intentions (Panel B) have also declined but remain at robust levels.

External demand for New Zealand's commodity exports is buoyant, pushing prices up and maintaining terms of trade at record levels (Figure 1.13, Panel A). However, tourism exports, which accounted for one fifth of exports pre-COVID-19, have collapsed owing to a pandemic-induced reduction in demand and border restrictions (Panel B). The current account deficit fell in 2020, when consumer expenditure was constrained by confinement measures, but has since increased markedly (Figure 1.14, Panel A). New Zealand's net international investment position has improved over the past decade, though net international liabilities remain high by international comparison (Panel B).

Figure 1.11. House prices and residential investment have increased



1. Quarterly average. 2. For 2021, data for the first three quarters were used. 3. The shaded area shows the OECD average plus/minus one standard deviation.

Source: OECD (2021), *National Accounts* (database); Real Estate Institute of New Zealand, *House price index*

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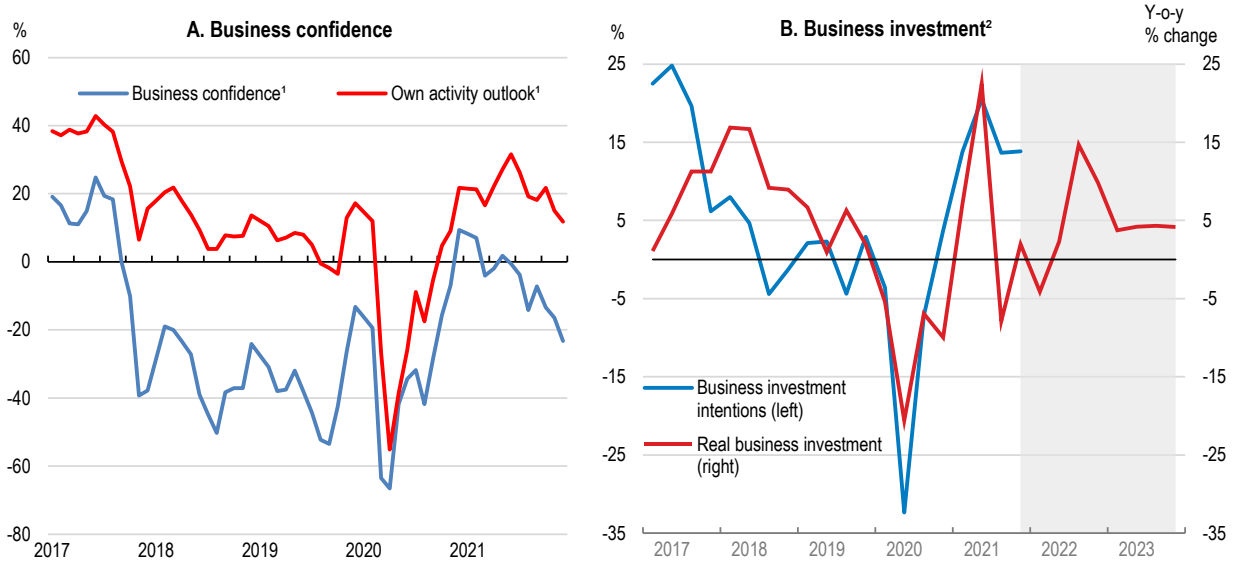
Figure 1.12. Business opinion points to solid economic growth and business investment



1. Percentage expecting improvement minus percentage expecting deterioration.
2. The shaded area indicates the projection period. The business investment intentions is the percentage of firms expecting to increase investment in property, plant and equipment in a year's time less percentage expecting to decrease investment.
Source: ANZ Bank (2021), Business Outlook Survey; OECD (2021), *Economic Outlook 110* (database).

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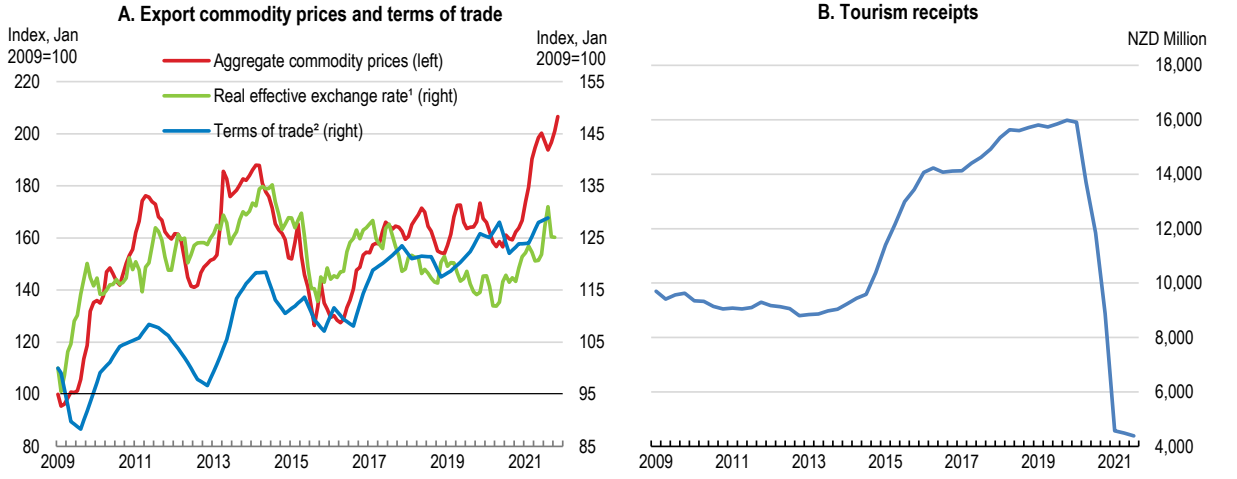
Figure 1.13. Robust commodity demand has boosted the economy but tourism has been hit by the pandemic



1. Real trade-weighted index from the RBNZ. 2. Terms of trade for goods are published on a quarterly basis and have been interpolated to get monthly values.
Source: ANZ Bank (2021), *Commodity price index*; Stats NZ, *Balance of payments statistics*; RBNZ

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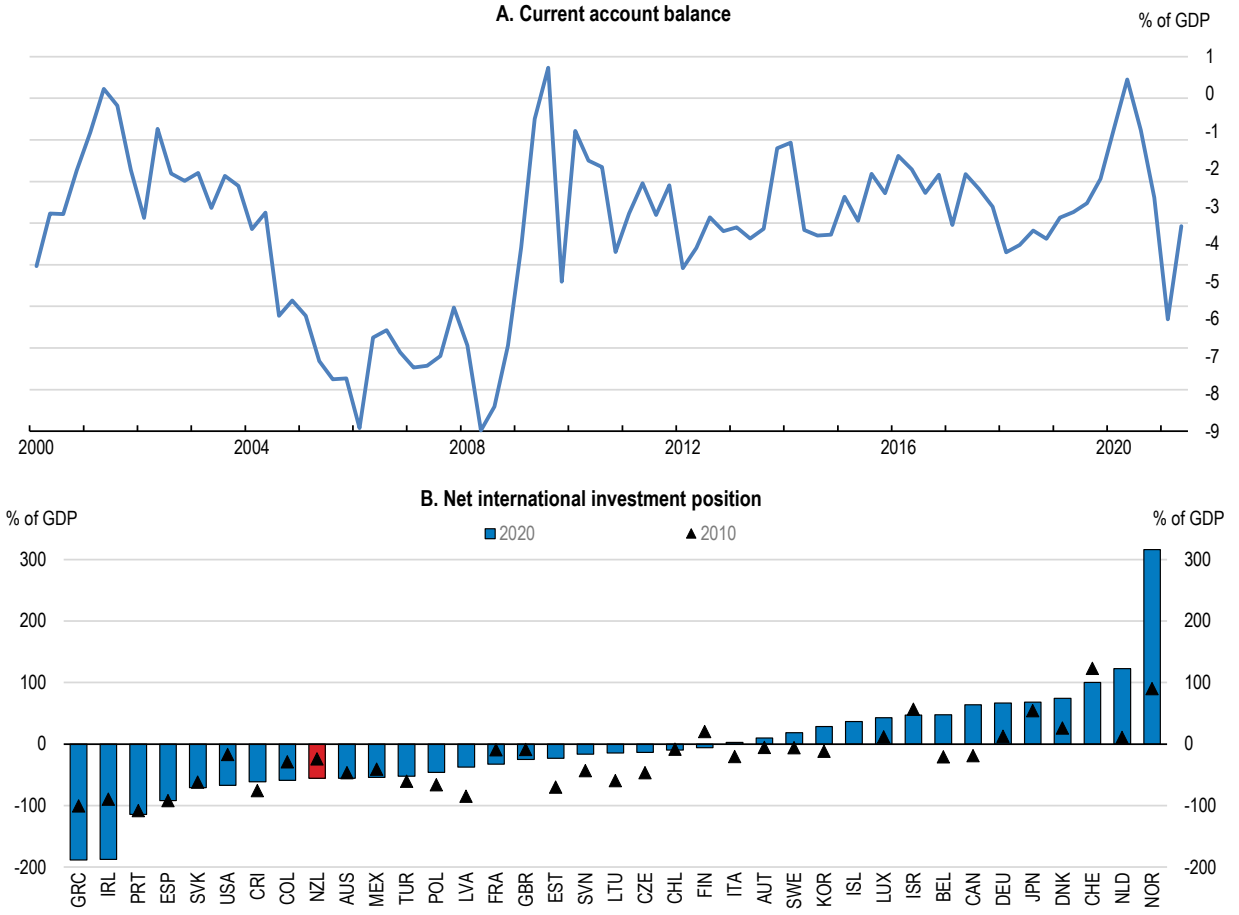
Figure 1.14. The current account deficit has returned to the pre-COVID-19 level and the net international investment position remains low by international comparison



Source: OECD (2021), *Economic Outlook 110* (database); RBNZ

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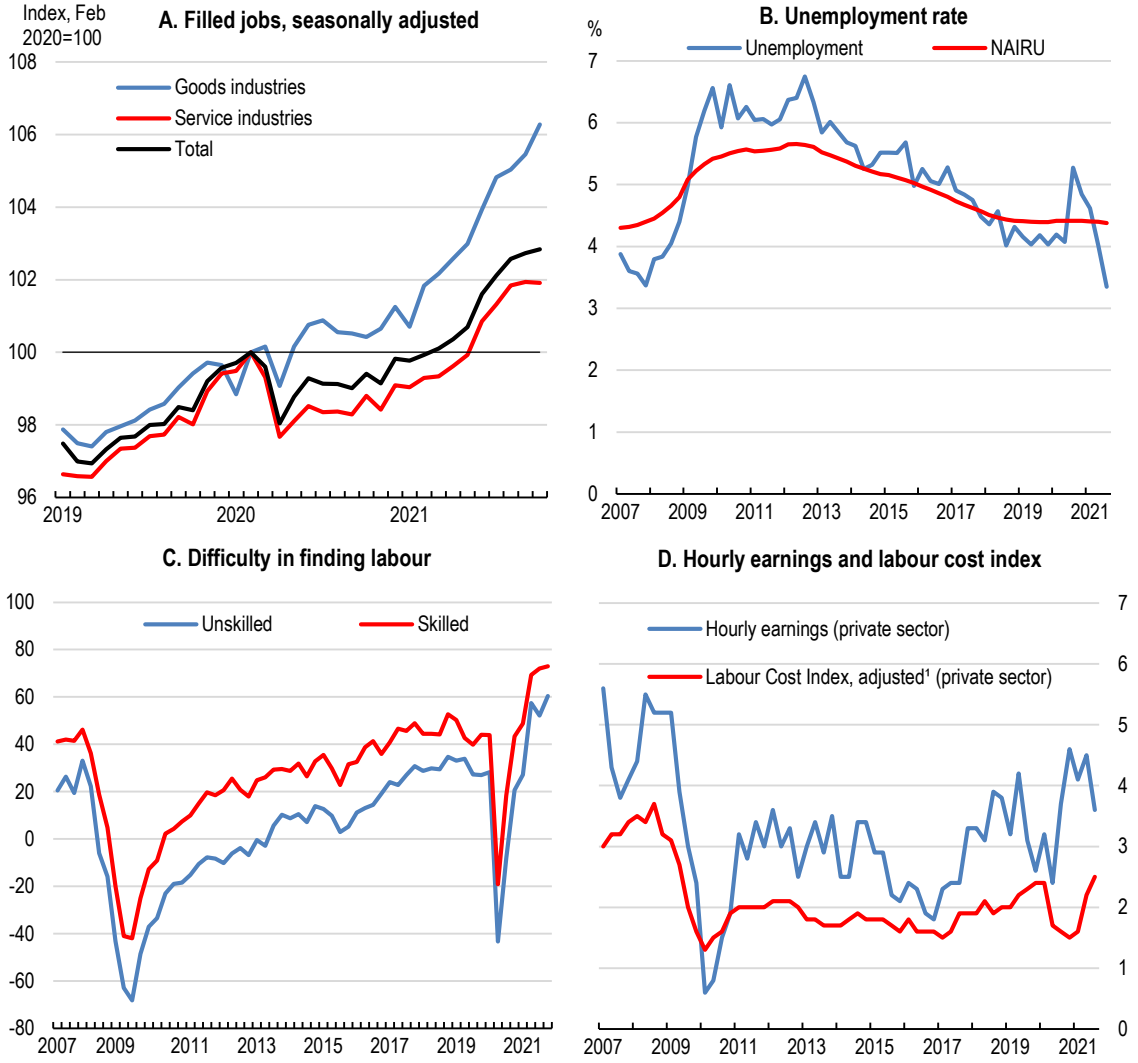
The labour market is tight and there are widespread reported skills shortages. The number of paid employees regained the February 2020 level in early 2021 and has since continued to rise very quickly, especially in goods industries (Figure 1.15, Panel A). Following a short-lived increase, the unemployment rate has been falling since late 2020 and is now well below the 4.5% OECD estimate of the non-accelerating inflation rate of unemployment (NAIRU) (Panel B). Employers report extreme difficulty in finding labour, partly owing to the need to navigate up and down COVID-19 alert levels and to manage supply chain disruptions (Panel C). Tight border restrictions have reduced the inflow of skilled migrants to a trickle – net migration has fallen from 40 000 in 2019 to 1 000 per quarter - aggravating skills shortages. Wage growth has rebounded from the COVID-related slowdown in 2020, especially for private sector hourly earnings, to around pre-COVID levels (Panel D). Overall, labour market indicators suggest that the market is now very tight (Table 1.1). The employment rate is the highest since the Household Labour Force Survey began in 1986 and the unemployment- and underutilisation rates are the lowest since 2007. With a high share of businesses planning to increase recruitment, a further pick-up in employment growth is on the cards, which is likely to boost wage growth further.

Figure 1.15. The labour market is tight



1. The adjusted LCI is a measure of wage inflation. As such, it measures changes in pay rates for a fixed quantity and quality of labour input and thus adjusts for wage increases that are due to the employee being promoted, more experienced or more qualified.
Source: Stats NZ; OECD (2021), *Economic Outlook 110* (database); NZIER (2021), *Quarterly Survey of Business Opinion*

StatLink https://stat.link/8uosg3

Inflation has increased to well above the RBNZ's 1-3% target band, reflecting large increases in both tradables and non-tradables inflation (Figure 1.16, Panel A). The increase in non-tradables inflation reflects a lack of spare capacity in the domestic economy. Capacity constraints in trading-partner economies have also contributed to the increase in tradables inflation as have commodity price increases. Insofar as capacity constraints reflect supply-chain disruptions, including to freight services, they are likely to be temporary. Underlying inflation has also increased to above the target band (Panel B). Household and two-year business inflation expectations have increased and the proportion of firms planning to increase selling prices has soared (Panel C). However, five-year business inflation expectations remain anchored. Interest rates have increased but remain very low (Panel D).

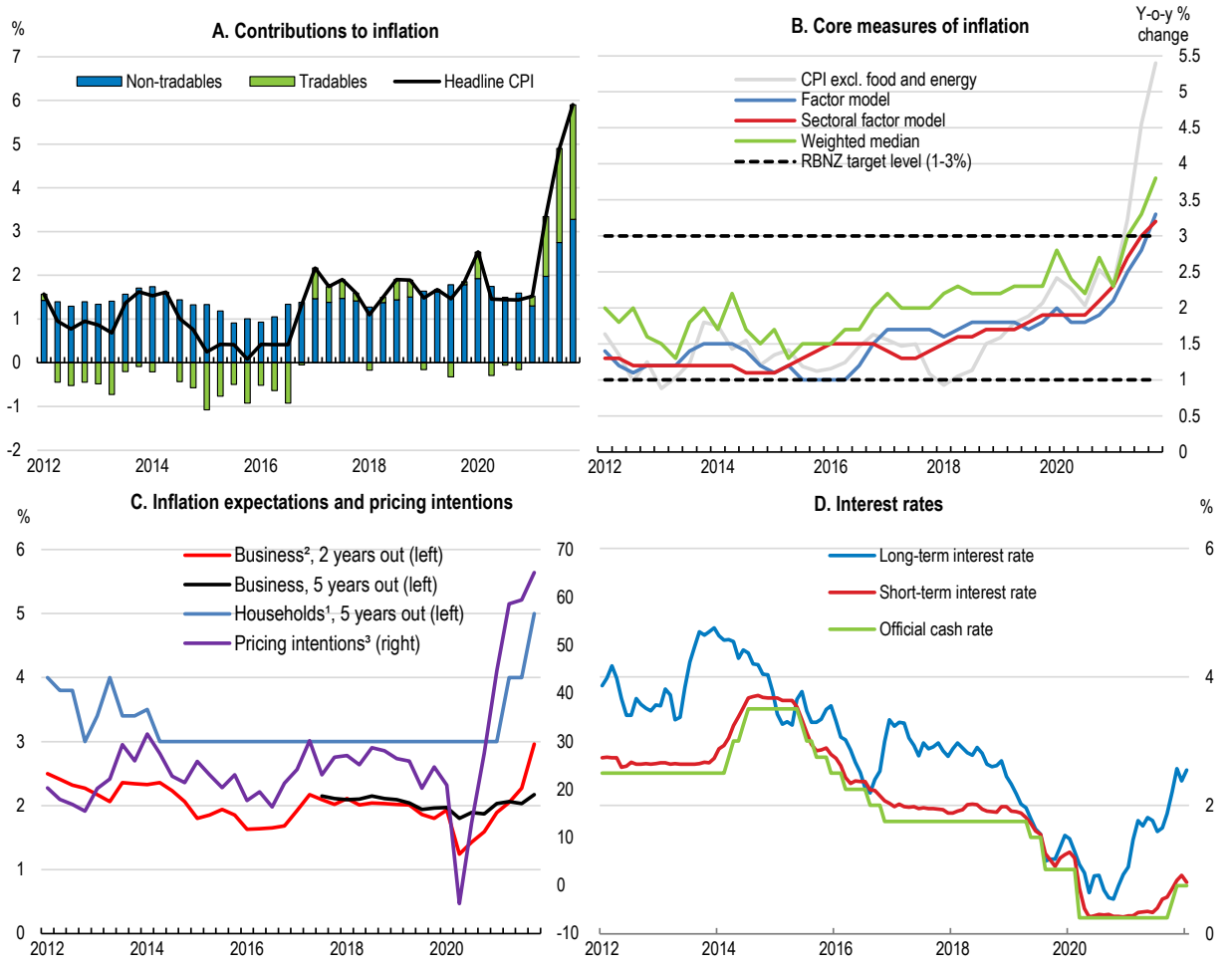
Table 1.1. Labour market indicators are back to pre-COVID-19 levels

	September 2019 quarter	September 2020 quarter	September 2021 quarter
Unemployment rate[1.2]	4.2	5.3	3.4
Underutilisation rate[1.2]	10.4	13.2	9.2
Employment rate[2.3]	67.7	66.4	68.8
Labour force participation rate[2.3]	70.7	70.1	71.2
Employed[4]	3.2	0.4	4.2
Adjusted LCI[4]	2.4	1.9	2.4
Unadjusted LCI[4]	3.9	2.8	3.8
Hourly earnings[4.5]	3.4	4.2	3.5
Average weekly paid hours[5]	38.5	37.9	38.9

1. As a percentage of the labour force.
2. The working age population is defined as the population aged 15 or over.
3. As a percentage of the working-age population.
4. Year-on-year percentage change.
5. Data from the Quarterly Employment Survey.

Source: Stats NZ.

Figure 1.16. Inflation has increased



1. The RBNZ Survey of expectations covers a mixture of business leaders and professional forecasters. 2. Median value. 3. Quarterly average.

Source: Stats NZ; OECD (2021), *Economic Outlook 110* (database); ANZ Bank (2021), Business Outlook Survey; RBNZ

StatLink https://stat.link/4il216

Cyclical core inflation has increased since the onset of the COVID-19 recession (Box 1.3). While this has also occurred in other countries, it contrasts with the significant decline that normally occurs in a recession. Indeed, in contrast to a typical recession, the COVID-19 recession was driven less by demand than supply. As the pandemic-related constraints on mobility have eased, economic activity has bounced back quickly. With little economic slack to absorb, there is unlikely to be a long period of cyclically strong, non-inflationary growth. As in other countries, the purging of excesses, such as high indebtedness and misguided investments, that typically occurs in recessions has not occurred. If anything, such excesses have increased.

Assuming that the underlying primary deficit falls by 1.1% of potential GDP between 2021 and 2023, that the overnight cash rate progressively rises by 200 basis points by early 2023 and that the border gradually re-opens from early 2022, economic growth is projected to ease from an estimated 4.7% in 2021 to 2.5% in 2023 (Table 1.2). The slowdown reflects the passing of rebound effects from the COVID-19 shock, tighter macroeconomic policy settings and much reduced gains in housing wealth and the terms of trade. Inflationary pressure will remain strong even after temporary effects from high fuel prices and supply chain disruptions pass, as the economy continues to grow faster than potential and the unemployment rate remains well below the natural rate, which the OECD estimates to be 4.5%. Re-opening of the border will help to ease labour shortages only gradually as inflows of migrant workers will be limited by new immigration rules. It will nevertheless support export business that requires physical contact and allow the tourism sector (comprising 6% of GDP, or 9% including related activity, before the pandemic) to recover.

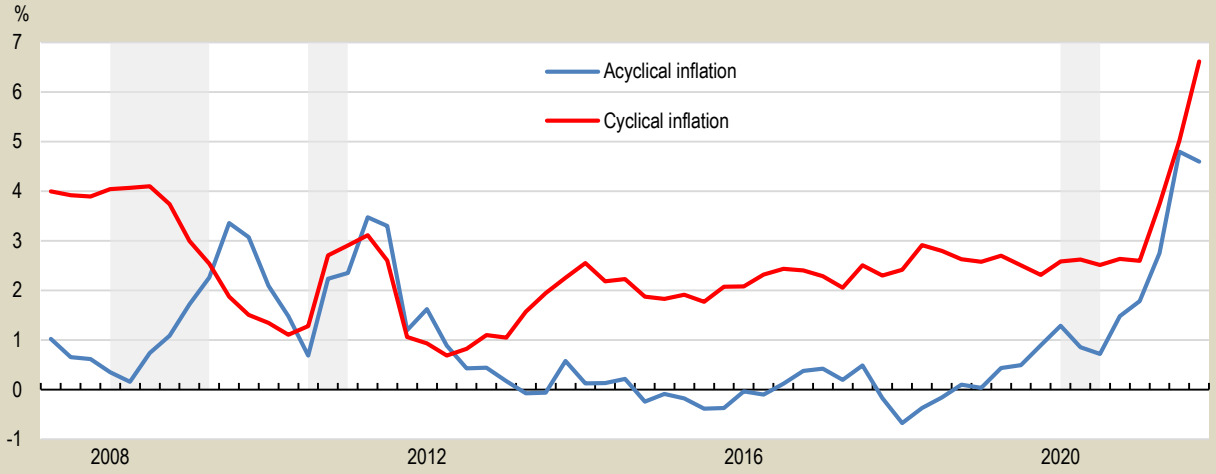
Box 1.3. Cyclical inflation has increased since the start of the COVID-19 recession, in contrast to declines in past recessions

Inflation often follows the direction of the overall economy. As the economy expands, demand for labour and goods is high relative to supply, causing wages and prices to rise. In recessions, the situation is reversed and excess supply causes inflation to decline. The prices of some goods (shorthand for goods and services) are, however, less sensitive to general economic activity and instead depend more on industry-specific factors.

Core inflation can be decomposed into a cyclical component, which reflects goods that are sensitive to the current state of the economy, and an acyclical component, which reflects goods that are less sensitive to the state of the economy. Following Mahedy and Shapiro (2017[3]), goods with prices that exhibit a statistically significant negative relationship with the unemployment gap (the gap between the unemployment rate and the NAIRU) are classified as cyclical and others acyclical; examples of cyclical goods are restaurant meals, housing rentals and telecom services.

During the global financial crisis years 2008-2009, cyclical inflation in New Zealand dropped off whereas acyclical inflation started to increase (Figure 1.17). The shorter recession in 2010 was followed by a decline in both cyclical and acyclical inflation and subsequently by a longer period where cyclical inflation was at a higher rate than acyclical inflation. The recent economic crisis, triggered by the Covid-19 pandemic, has not, however, been followed by a decline in cyclical inflation. Rather, cyclical inflation remained unchanged in the first two quarters of 2020, only to rise as fiscal stimulus packages were launched and economic activity resumed. It thus seems as if this crisis, due to the very fast course of events and the prompt actions taken by the government and central bank, will not be followed by the usual phase of economic recovery, in which low cyclical inflation allows for non-inflationary growth. This development mirrors that in the United States (Federal Reserve Bank of San Francisco, 2021[4]) and in many other OECD economies.

Figure 1.17. Cyclical inflation has increased since the onset of the COVID-19 recession[1], in contrast to declines in past recessions



1. The shaded areas in the figure indicate recessions, defined as periods between a peak and a trough in economic activity. The recession period should also contain successive quarters of negative growth.

Source: Own calculations using the Mahedy and Shapiro (2017[3]) methodology; Stats NZ.

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The main downside risk to the outlook is that the phasing-out of coronavirus-related border restrictions is delayed, for instance owing to the emergence of new COVID variants against which vaccines are less effective. A delayed border reopening would postpone the entry of migrants needed to ease skills shortages as well as recovery in the tourism sector. On the other hand, the removal of border restrictions in other countries, especially Australia, could encourage New Zealand residents to emigrate, aggravating skills shortages, especially in the construction sector. A sharp slowdown in China, New Zealand's largest trade partner, would reduce commodity export prices, lowering farmers' incomes and consumption. There is also a risk of a large fall in house prices from current elevated levels, given the outlook for an easing in shortages, higher interest rates and more restrictive prudential policies (Figure 1.18). Were this to occur, there would be a large negative effect on private consumption owing to the high level of household debt (Figure 1.19). Continued or worsening global supply chain disruptions would fuel higher inflation for a prolonged period, weighing on private consumption, and constrain economic activities through shortages of imported materials. The main upside risks include stronger than foreseen global demand for New Zealand's agricultural products and public health conditions that permit a more rapid phasing-out of restrictions on economic activities than assumed. Events that could entail major changes in the outlook are identified in Table 1.3.

Table 1.2. Macroeconomic indicators and projections

Annual percentage changes unless specified, volume (2009/10 prices)

	2018	2019	2020	2021	2022	2023
	Current prices (NZL billion)					
Gross domestic product (GDP)	**303**	**3.2**	**-1.0**	**4.7**	**3.8**	**2.5**
Private consumption	175	3.1	-1.1	6.0	2.4	1.9
Government consumption	55	4.6	6.9	9.2	4.3	1.4
Gross fixed capital formation	71	4.4	-7.0	8.3	6.3	4.1
Housing	22	5.6	-3.2	10.9	3.8	4.0
Business	33	4.8	-9.7	8.0	6.4	4.1
Government	16	2.0	-6.8	4.4	8.0	4.1
Final domestic demand	300	3.7	-1.0	7.2	3.7	2.3
Stockbuilding[1]	3	-0.5	-0.9	2.2	-0.1	0.0
Total domestic demand	303	3.1	-1.9	9.4	3.6	2.2
Exports of goods and services	84	2.4	-12.7	-1.4	8.9	5.8
Imports of goods and services	84	2.1	-16.1	14.8	7.8	4.5
Net exports[1]	-0.8	0.1	0.9	-3.7	0.1	0.2
Other indicators (growth rates, unless specified)						
Real GDI		3.2	-1.2	5.5	3.8	2.5
Potential GDP		3.2	2.7	2.5	2.3	2.2
Output gap[2]		0.7	-2.9	-0.8	0.6	0.9
Employment		1.3	1.3	2.5	1.9	1.0
Working-age population (15-74)		1.7	1.8	1.4	0.9	0.5
Unemployment rate[3]		4.1	4.6	3.8	3.2	3.3
GDP deflator		2.5	2.2	3.5	3.9	2.5
Consumer price index		1.6	1.7	3.9	4.5	2.7
Core consumer prices[4]		1.8	2.3	3.8	4.3	2.7
Household saving ratio, net[5]		2.9	5.8	5.0	3.6	2.8
Terms of trade		0.2	1.5	-0.9	1.4	0.0
Trade balance[6, 7]		0.0	1.3	-2.5	-2.1	-1.8
Current account balance[7]		-2.9	-1.1	-5.0	-5.5	-5.4
General government fiscal balance[7]		-0.6	-7.4	-5.7	-4.4	-3.7
Structural balance[8]		-0.4	-4.9	-4.5	-4.0	-3.4
General government gross debt[7, 9]		36.3	46.6	51.7	55.0	57.8
General government net debt[7, 9]		0.8	8.9	13.8	17.2	20.1
Three-month money market rate, average		1.5	0.5	0.5	1.7	2.5
Ten-year government bond yield, average		1.6	0.9	1.8	2.8	3.7

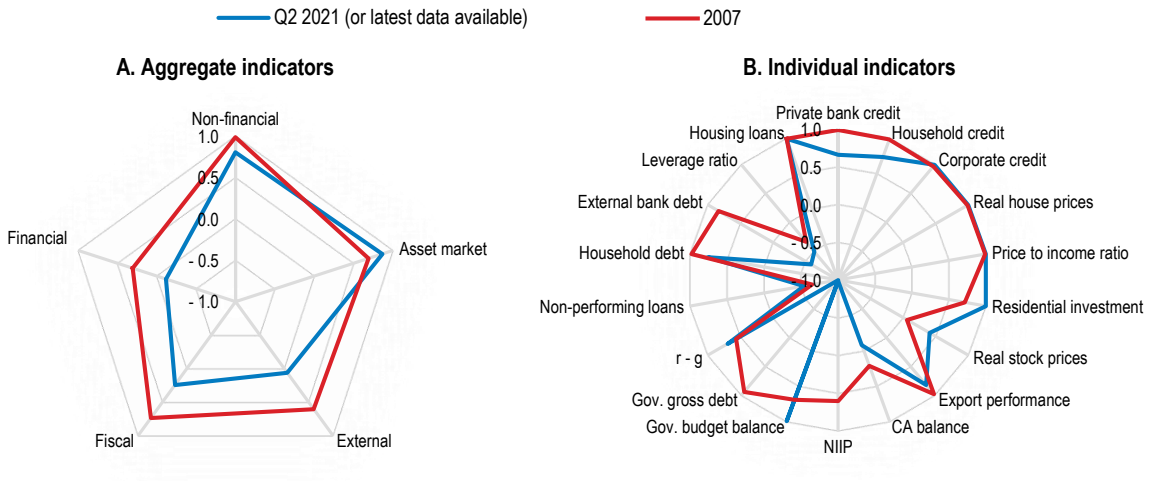
1. Contribution to changes in real GDP; 2. As a percentage of potential GDP; 3. As a percentage of the labour force; 4. Consumer price index excluding food and energy; 5. As a percentage of household disposable income; 6. Goods and services; 7. As a percentage of GDP; 8. As a percentage of potential GDP; 9. National Accounts basis excluding unfunded liabilities of government-employee pension funds.
Source: OECD (2021), *Economic Outlook 110* (database), *updated for 2021Q3.*

Table 1.3. Events that could entail major changes to the outlook

Shock	Possible impact
New COVID variant(s)	Emergence of more virulent COVID-19 variants would make border reopening more difficult and reduce New Zealand's exports by denting the recovery of the global economy.
Disorderly housing market correction	A large and abrupt fall in house prices would likely dampen household consumption, given high household indebtedness.
Natural disaster	The recurrence of a natural disaster like the 2016 Kaikoura and 2010-11 Canterbury earthquakes could disrupt economic activity and entail significant fiscal and private costs.

Figure 1.18. Asset price correction is a major macro-financial risk

Index scale of -1 to 1 from lowest to greatest potential vulnerability, where 0 refers to long-term average



Note: Each aggregate macro-financial vulnerability indicator is calculated by aggregating (simple average) normalised individual indicators. Non-financial includes: private bank credit, household credit and corporate credit. Asset market includes real house prices, price to income ratio, residential investment and real stock prices. External position includes the current account (CA) balance as a percentage of GDP, export performance and net international investment position (NIIP) as a percentage of GDP. Fiscal includes the difference between the interest rate on the government bondsand expected growth rate (r-g), government budget balance and government gross debt, both expressed as a percentage of GDP. Financial includes household debt, the share of non-performing loans in total loans, external bank debt as percentage of total banks' liabilities, housing loans, and capital and reserves as a proportion of total liabilities (leverage ratio).
Source: OECD calculations based on Refinitiv; OECD, *Economic Outlook 110* (database); Reserve Bank of New Zealand; Stats NZ.

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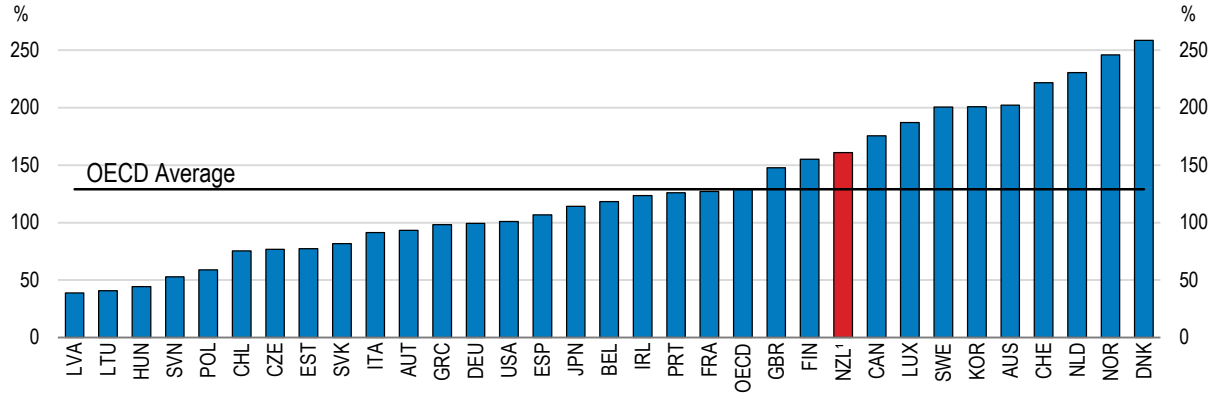
Figure 1.19. Household indebtedness is high

Household debt as percentage of net disposable income, 2020 or latest year available



Note: 2019 data for Chile, Estonia and the United States, 2018 data for Japan.
1. Reserve Bank of New Zealand data, including debt on rental properties.
Source: OECD (2021), *Economic Outlook 110* (database); OECD, *National Accounts* (database); RBNZ.

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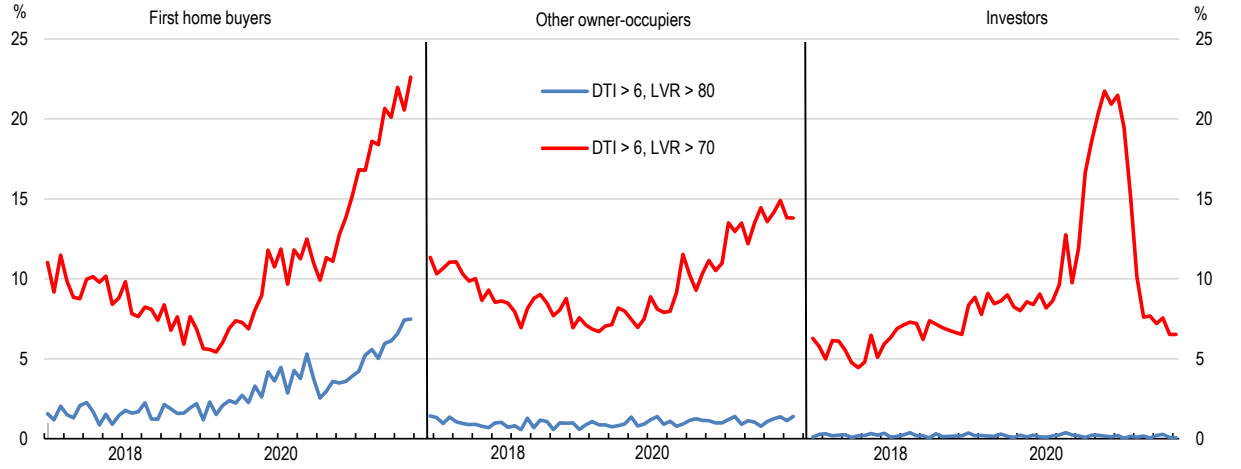
Monetary and financial stability policies were relaxed in response to the COVID-19 crisis but now need to be tightened further

Monetary policy responded promptly to the COVID-19 shock (Box 1.4). The Large Scale Asset Purchase (LSAP) programme boosted credit supply and is estimated by the RBNZ to have reduced long-term

government bond yields by around 1 percentage point. This abundant credit supply, combined with the temporary removal of loan-to-value-ratio (LVR) restrictions and low mortgage interest rates, resulted in strong growth in mortgage lending (12% in the year to July 2021), particularly to investors; household debt rose from 159% of net disposable income in the December quarter of 2019 to 169% in the June quarter of 2021. The share of high-risk lending characterised by high LVR and debt-to-income (DTI) rose rapidly (Figure 1.20).

Figure 1.20. Mortgage lending has accelerated, including more high-risk lending

High-risk shares of new mortgage lending by buyer type



Note: Investors covers all lending to borrowers where at least one investment property secures the loan.
Source: The Reserve Bank of New Zealand (2021), *Financial Stability Report, November 2021*

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Highly leveraged borrowers are more exposed to future increases in interest rates than others, especially as mortgage interest rates are only fixed for short periods in New Zealand - 78% of outstanding mortgages will have their interest rates reset within one year (Reserve Bank of New Zealand, 2021[5]). The RBNZ estimates that an increase in the one-year mortgage rate from around 2.5% currently to 5% would increase a typical recent owner-occupier's debt-servicing ratio from around 30% currently to above 40% (Reserve Bank of New Zealand, 2021[6]). Highly indebted households may reduce their consumption sharply in response to higher mortgage interest rates, which would dent economic growth.

The RBNZ reinstated LVR restrictions at pre-pandemic levels in March 2021, and further tightened them for investors in May 2021. This slowed down new lending to investors with high LVRs but lending to first-home buyers and other owner-occupiers remained strong. LVR restrictions were tightened in November 2021 when the cap on the share of new lending to owner occupiers with LVRs above 80% was cut from 20% to 10%. In August 2021, the Minister of Finance agreed to allow the RBNZ to impose debt serviceability restrictions, including debt-to-income and debt-servicing-to-income ratio restrictions, in a Memorandum of Understanding with the RBNZ should it decide that they are warranted. These restrictions, if introduced, would potentially limit further debt increases as house prices rise and protect borrowers from the risk of becoming unable to service their debt. They would complement loan-to-value ratio restrictions, which protect banks from losses in case of large declines in house prices, in boosting the resilience of the financial system. To wit, in 2017 Norway introduced a limit on mortgage lending of five times the gross annual income of borrowers, bringing down the share of mortgage lending exceeding this threshold from 8% in 2016 to 3% in 2018 (Finanstilsynet, 2018[7]). The RBNZ has not decided on whether to implement debt serviceability restrictions. Implementation of a debt-to-income cap could take six to nine months but a regulation on the minimum test interest rates banks use in their serviceability assessments could be put in place sooner. RBNZ analysis indicates that a debt-to-income cap would bite most on investors, followed

by higher-income owner occupiers, as these groups borrow at the highest debt-to-income multiples on average. Other options such as a test interest rate floor or debt-servicing-to-income cap would have larger impacts on low-income households and first-time home buyers (Reserve Bank of New Zealand, 2021[8]).

In response to faster than anticipated economic recovery and rising inflation pressure, the RBNZ halted the Large Scale Asset Purchase programme in July 2021 (Box 1.4) and is mulling a strategy on how to manage its substantial government bond holdings, which amount to 16% of annual GDP. The Funding for Lending Programme, which has disbursed about NZD 3 billion so far, is to remain in place until its expiration at the end of 2022. The RBNZ increased the policy rate by 25 basis points in October 2021 and again in November 2021, taking the rate to 0.75%, and projects further increases to 2% by end-2022, which is the RBNZ's estimate of the neutral nominal rate, and to 2.6% by end-2023 (Reserve Bank of New Zealand, 2021[9]). This is likely to slow housing demand as an increase in the policy rate is fully passed through to mortgage lending rates in six to seven months, albeit with some variation among banks (Bernhard, Graham and Markham, 2021[10]). The government bonds operation strategy may result in the RBNZ reducing its bond holdings by not replacing maturing bonds or selling bonds directly to the Treasury. The revised monetary policy stance is appropriate in light of the overheating economy and rising inflation expectations (Reserve Bank of New Zealand, 2021[6]). At the same time, the RBNZ should stand ready to adjust the tightening cycle and support the economy, should the economic shock from the Delta variant be greater than expected.

Box 1.4. Monetary policy response to the COVID-19 shock

Reduction in the policy rate

In March 2020, the Reserve Bank of New Zealand (RBNZ) cut its policy rate (the overnight cash rate) by 75 basis points to 0.25%, and committed to maintain this rate for at least 12 months. The cut followed the two cuts totalling 75 basis points in May and August 2019.

Increasing credit supply

The RBNZ also announced in March 2020 a Large Scale Asset Purchase (LSAP) programme of New Zealand government bonds amounting to NZD 30 billion (about 10% of annual GDP) over 12 months (quantitative easing). The programme limit was subsequently expanded to NZD 100 billion over two years. The LSAP was halted in July 2021, one year ahead of schedule, after NZD 55 billion of government bonds (16 % of GDP) had been purchased.

The RBNZ also introduced the Funding for Lending Programme in December 2020, providing up to NZD 26 billion worth of low-cost funding to banks based on their outstanding credit to New Zealand borrowers and increases in lending.

Relaxing macro-prudential regulations and postponing increases in capital adequacy requirements

The RBNZ temporarily removed loan-to-value ratio (LVR) restrictions in April 2020, so that banks could smoothly implement a six-month principal and interest payment holiday for mortgage holders. The RBNZ also postponed the beginning of the seven-year transition period for achieving the new capital ratio requirements that was planned in 2020 (see below), to July 2022.

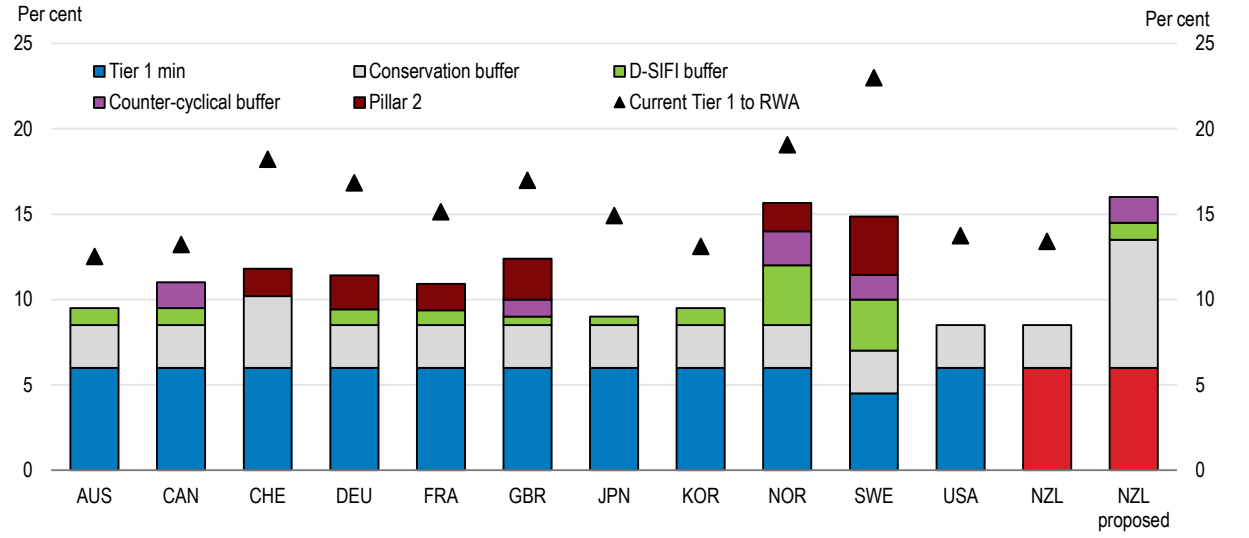
New capital requirements risk tightening business lending

In order to increase the resilience of New Zealand's banking sector to be able to withstand a once in 200 years scale financial shock, the RBNZ decided in late 2019 to increase banks' capital adequacy requirements to 18% of risk-weighted assets for the four Domestically-Systemically Important Banks (D-SIBs) and to 16% for the other, smaller banks. Such ratios are among the highest in OECD countries (Figure 1.21). The new capital regulation requires banks to increase the minimum capital requirement from

8% currently to 9% by July 2023, and build up a large prudential capital buffer equivalent to 9% of risk-weighted assets for D-SIBs and 7% for other banks by July 2028. Capital must be mainly Tier 1 capital, while additional Tier 1 capital and Tier 2 capital can comprise only 2.5 and 2% of the required capital ratios, respectively. The prudential capital buffer is composed of the countercyclical capital buffer (1.5% out of 7%), which the RBNZ can release during economic downturns in order to allow more lending, and the capital conservation buffer (5.5%), whose breach triggers supervisory measures by the RBNZ.

Figure 1.21. Proposed new capital requirements exceed those in other OECD economies

Tier 1 capital requirements, as a percentage of risk-weighted assets



Note: For banks judged to be domestically systemically important but not globally systemically important. D SIFI (domestically systemically important financial institution) buffer is the average across banks to which it currently applies. Pillar 2 requirements are averaged across systemically important banks where data are available. For Switzerland, Pillar 2 requirements are based on the highest total capital required among non-globally systemically important banks. For Sweden, data are based on common equity tier 1 requirements averaged across the three major banks. For Australia, APRA will require major Australian banks to hold 10.5% Core Equity Tier 1 capital by 1 January 2020 and is currently proposing further increases in total capital requirements for major banks. Rules on risk weighting of assets vary across countries.
Source: Bank of England; European Systemic Risk Board; Australian Prudential Regulation Authority; Bank for International Settlements; The Office of the Superintendent of Financial Institutions (Canada); Financial Services Agency (Japan); Norges Bank (Norway); Financial Services Commission (Korea); Finansinspektionen (Sweden); and FINMA (Switzerland).

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While this reform will eventually strengthen the resilience of the banking sector, it requires banks to raise large amounts of additional capital or reduce riskier assets, such as lending to small businesses. However, the impact of the capital requirement on credit growth and the risk of credit rationing are substantially reduced by allowing a transition period of seven years, according to the Reserve Bank of New Zealand (2019[11]). The bankruptcy rate has remained low so far (Figure 1.22), thanks to the financial support provided in response to the COVID-19 shock, notably via credit guarantees and the robust economic recovery that improved firms' cash flow. Overall, firms are using positive cash flows to deleverage and improve their balance sheets, which is resulting in growing deposits and declining loan balances even in sectors most affected by the pandemic (Reserve Bank of New Zealand, 2021[5]). Nevertheless, bankruptcies may surge once financial support schemes are withdrawn completely, especially in the tourism sector. The RBNZ should carefully monitor the impact of new capital requirements on business lending, particularly during economic downturns. It is also important that an effective operational framework for the countercyclical capital buffer be established following the consultation the RBNZ will carry out in 2022.

Figure 1.22. The number of bankruptcies remains low for now

Number of bankruptcy adjudications, 6-months moving average

Source: New Zealand Insolvency Trustee Service (2021), *Insolvency procedure statistics*

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The monetary and financial stability policy framework is being updated

In 2017, the government initiated a review of the Reserve Bank of New Zealand Act 1989 that has now been partially completed and legislated. The first tranche of the Reserve Bank of New Zealand (RBNZ) reforms concerns monetary policy and was enacted in 2018, replacing the previous Policy Targets Agreement with a Monetary Policy Remit, adding 'supporting maximum sustainable employment' to the economic objectives of the RBNZ and providing for the creation of a Monetary Policy Committee (MPC) with responsibility for formulating monetary policy, in lieu of the former model in which the RBNZ Governor alone had this responsibility. Most foreign central banks have monetary policy committees and some, notably the Federal Reserve and the Reserve Bank of Australia, have dual mandates. In February 2021, the Minister issued a Remit to the Monetary Policy Committee instructing it to assess the effect of its monetary policy decisions on the government's objective to support more sustainable house prices. The Remit only requires the RBNZ to assess and communicate the impact of its decisions on this objective, not to add it to the other monetary policy objectives.

The second tranche concerns institutional and accountability reforms and was enacted in 2021, replacing the single decision-maker model with a governance board tasked with all RBNZ responsibilities other than those given to the MPC, strengthening reporting and accountability requirements, reframing and clarifying the financial policy objective of the RBNZ by changing it from 'soundness and efficiency' to 'financial stability', and providing for a Financial Policy Remit issued by the Minister of Finance.

The third tranche concerns prudential regulation and supervision of deposit takers and the introduction of deposit insurance. These reforms are included in the Deposit Takers Bill to be submitted to Parliament in early 2022 and that is expected to be enacted in early 2023 and to become fully operational after a long transition period. The Bill creates a uniform regulatory framework for all deposit-taking institutions and provides the framework for regulating and supervising them and for managing and resolving any deposit taker in financial distress. The Bill also creates a deposit insurance scheme, as recommended in past *OECD Surveys* (Table 1.4). The crisis management and resolution framework is being brought more into line with international arrangements, including by having a 'No Creditor Worse off' provision and introducing contractual bail-ins, which will only come into effect once the RBNZ has completed its Capital Review. Planned deposit insurance coverage is up to NZD 100 000 per depositor, per institution. This is a

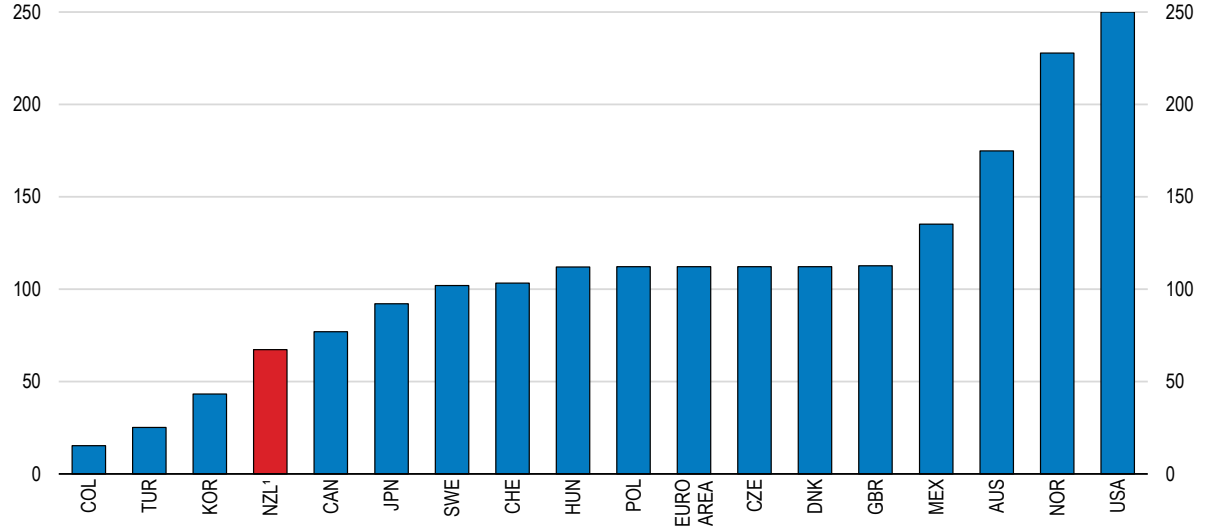
big improvement on the current absence of such insurance. It would still be lower than in many other countries (Figure 1.23) but New Zealand's comparatively high capital ratios offer greater protection.

Table 1.4. Past OECD recommendations on financial stability and actions taken

Recommendations in past Surveys (key ones in bold)	Actions taken since the previous *Survey*
Introduce deposit insurance up to a specified limit.	The Deposit Takers Act, which introduces a uniform regulatory framework for all deposit-taking institutions and a deposit insurance covering up to NZD 100 000 per depositor per institution, will be submitted to Parliament in 2022, with the aim of providing deposit insurance from 2023.
Increase bank capital requirements, as warranted by the Reserve Bank's forthcoming cost-benefit analysis, and carefully monitor the impacts.	The Reserve Bank decided to increase banks' capital ratio requirements to 18% of risk-weighted assets for the four Domestically-Systemically Important Banks and 16% for the other smaller banks. The seven-year transition period for achieving the new capital ratio requirements will begin in July 2022.
Add a debt-to-income limit to the Reserve Bank's macro-prudential instruments to increase the resilience of bank balance sheets, with attention to benefits exceeding costs.	In August 2021, the Minister of Finance and the Governor of the RBNZ agreed to changes to the Macro-prudential Memorandum of Understanding that add a debt-to-income ratio, a debt-servicing-to-income ratio and/or interest rate floors on the rates banks use to assess mortgage serviceability to the RBNZ's macro-prudential toolkit. The Reserve Bank consulted in November 2021 on implementing these measures to tighten mortgage lending standards.

Figure 1.23. The proposed deposit insurance coverage is relatively low

Depositor protection limits, per depositor per institution (thousand USD), as of end 2019



1. Proposed protection limit (NZD 100 000).

Source: *International Association of Deposit Insurers 2020 Annual Survey*

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Fiscal policy and debt sustainability

Fiscal policy will be mildly contractionary

The fiscal balance deteriorated sharply in the wake of the pandemic, owing to reduced fiscal revenue and the massive fiscal response to COVID-19 (Box 1.5). The Total Crown balance, the government's preferred fiscal measure that includes operating activities of the central government, state-owned enterprises and the RBNZ but excludes those of local governments, fell from a surplus of 2.4% of GDP in FY 2019 (fiscal

years end 30 June) to a deficit of 7.3% in FY 2020. The Total Crown deficit narrowed to 1.3% of GDP in FY 2021 as the economic impact of confinement measures diminished along with their budgetary costs but jumped to 5.7% of GDP in FY 2022 mainly owing to COVID-19 related expenditure to support the economy through the outbreak of the Delta variant. The New Zealand Treasury projects the fiscal deficit to be almost eliminated in FY 2023 as this expenditure eases, followed by steadily growing surpluses over the next few years as COVID-related spending continues to be phased out. From FY 2023 onwards, fiscal expenditure will continue to decline as a share of GDP but will increase in nominal terms, not least because the government set an increase in cumulative fiscal spending allowances amounting to NZD 6.0 billion in FY 2023, NZD 10.0 billion in FY 2024 and NZD 13.0 billion in FY 2025.

Following the highly expansionary stance in FY 2020, fiscal policy was strongly contractionary in FY 2021 but highly expansionary in FY 2022 (Table 1.5). The fiscal stance will again be strongly contractionary in FY 2023 as COVID-related expenditure falls and turn mildly contractionary afterwards abstracting from large infrastructure investments yet to be approved. The government earmarked NZD 12 billion prior to the pandemic to the New Zealand Upgrade Programme to invest in transport, hospitals, schools and regional communities. Furthermore, "shovel-ready" infrastructure investment projects amounting to NZD 2.6 billion are to be rolled out by FY 2022. The Housing Acceleration Fund, announced in March 2021, will allocate NZD 3.8 billion to investment in critical infrastructure that supports large housing developments.

Table 1.5. The fiscal stance is projected to become contractionary

Per cent of GDP (except where noted), Fiscal Year ending on 30 June

	Actual		Projections				
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26
Core Crown tax revenue	26.8	28.8	28.3	28.9	29.0	29.2	29.5
Core Crown expenditure	34.3	31.7	35.3	30.5	30.1	29.5	29.3
of which: Social security and welfare	13.9	10.8	11.9	10.2	10.0	10.0	10.0
Health	6.3	6.7	7.7	6.1	5.7	5.4	5.2
Education	5.1	4.7	5.0	4.7	4.3	4.3	3.8
Capital spending			5.8	6.2	2.4	0.1	-0.2
Core Crown balance[1,2]	-5.3	-0.8	-4.8	0.5	1.1	1.9	2.3
Total Crown balance[1,2]	-7.3	-1.3	-5.7	-0.2	0.5	1.4	1.8
Cyclically adjusted total crown balance[3]	-7.5	-1.5	-6.7	-1.1	-0.1	0.9	1.6
Fiscal impulse[3] (core Crown plus Crown entities)[4]	6.5	-4.2	5.6	-4.9	-1.5	-1.1	-0.5
Net core Crown debt	26.3	30.1	37.6	40.1	39.9	34.6	30.2
Gross core Crown debt[5]	39.1	38.6	44.5	46.4	45.7	40.1	35.5
Memorandum items (Treasury projections)							
Real GDP growth (production based)	-1.4	5.1	0.8	4.9	2.2	2.3	2.3
Nominal GDP growth (expenditure based)	2.2	7.1	6.8	8.6	5.3	5.1	4.8
CPI (annual per cent change)	1.5	3.3	5.1	3.1	2.7	2.4	2.2
Ten-year government bond (per cent)	0.8	1.7	2.6	2.9	3.2	3.4	3.4

1. Core Crown includes government departments, offices of parliament, the New Zealand Superannuation Fund and the Reserve Bank. Total Crown consists of core Crown plus Crown entities (such as the Accident Compensation Commission and Callaghan Innovation) and State-owned enterprises.
2. Based on operating balance before gains and losses.
3. % of potential nominal GDP.
4. Excluding Earthquake Commission and Southern Response payments and receipts related to the Canterbury and Kaikoura earthquakes.
5. Including Reserve Bank settlement cash and bank bills.

Source: Treasury (2021), *Half Year Economic and Fiscal Update 2021*

With little slack left in the economy, the fiscal stance should be tightened more rapidly to avoid concentrating the burden of macroeconomic stabilisation on monetary policy. To reduce the risk of large

public investment overheating the economy and accelerating inflation further, the government should avoid concentrating infrastructure investment in the near term and instead spread it over a longer horizon.

Box 1.5. Fiscal response package against the COVID-19 shock

The fiscal package amounted to 20% of GDP

The government announced its initial support package of NZD 12 billion in March 2020, followed by the NZD 50 billion COVID-19 Response and Recovery Fund (CRRF) in May. The massive fiscal response included not only fiscal stimulus but also sizable expenditure on public health measures (see Box 1.2). The largest budgetary measure was the Wage Subsidy, which initially was paid to businesses that lost at least 30% of revenue due to the COVID-19 crisis so that they could continue to employ and pay their staff. The scheme cost NZD 14 billion (4.5% of GDP) and covered 71% of businesses and 60% of employment at one point. While the first wave of the Wage Subsidy expired in November 2020, the Government has continued to use the Wage Subsidy during subsequent lockdowns, though the eligibility conditions have been tightened over time. The fiscal package also included infrastructure investment in transportation, environment, housing and community development amounting to NZD 3 billion, NZD 2.6 billion of which was allocated to "shovel-ready" projects that can start within a year.

Support measures for households and workers

The main measures included a non-means tested Covid-19 Income Relief Payment (CIRP) for individuals who lost their job or self-employment because of COVID-19. Benefits payments were increased as well, including a doubling of the winter energy payment. A fund for boosting trades and apprenticeship training was launched aimed at retraining about 10,000 hospitality and aviation sector workers for jobs in other sectors.

Support measures for businesses

The main measures included the Business Finance Guarantee Scheme, where the government bears 80% of the risk of loans for solvent SMEs, and the Small Business Cashflow Scheme, a public loan scheme allowing small businesses to borrow up to NZD 100 thousand plus NZD 1 800 for each full-time equivalent employee without interest during the first year. The Resurgence Support Payment provides cash support to businesses or organisations experiencing a revenue decline of over 30% due to an increase in the COVID-19 alert level. Measures to alleviate financial stress for highly indebted businesses, such as a six-month interest and principal payment holiday for mortgage holders and SMEs and debt hibernation were also introduced. Regarding taxation, a tax loss carry-back scheme was introduced and corporate income tax changes such as an increase in the provisional tax threshold and the reintroduction of depreciation charges for commercial buildings were implemented.

A clearer fiscal consolidation plan is needed to ensure long-term debt sustainability

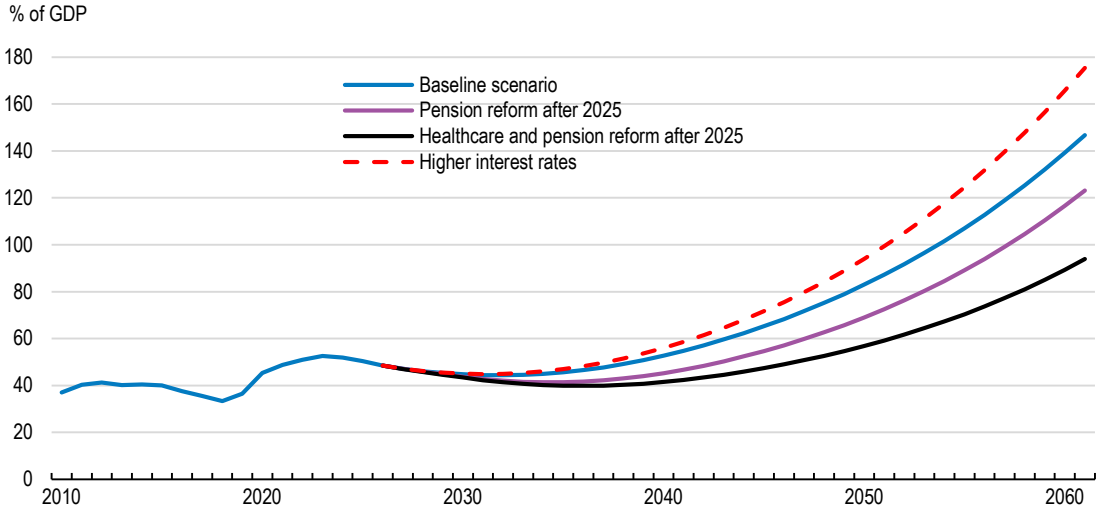
In the *Half Year Economic and Fiscal Update 2021*, the Treasury projects net Core Crown debt to peak at 40% of GDP in mid-2023 and to decline afterwards (Table 1.5). In the longer run, however, the debt-to-GDP ratio is likely to increase substantially, driven by population ageing and healthcare expenditure growth. The share of the population aged 65 or above will rise from 16% in 2020 to 25% by 2060 (Stats NZ, 2021[12]). As a result, the Treasury projects that old-age pension expenditure will increase to 7.7% of GDP in 2060 from 5% in 2021. The Treasury also projects a large increase in health-care expenditure, from 6.9% of GDP in 2021 to 10.6% of GDP in 2060, owing to excess cost growth as more effective but expensive treatments become available and to population ageing (The Treasury, 2021[13]). Based on these increases, the OECD projects that gross general government debt would increase from 49% of GDP in 2021 to around 140% of GDP in 2060 (baseline projection) and continue rising rapidly thereafter

(Figure 1.24); the increase would be greater if it were not for drawings after 2050 from the New Zealand Superannuation Fund, which was established to help pre-fund population-ageing-related growth in pension expenditure (The Treasury, 2021[13]). Reforms to slow growth in health-care and pension-related expenditure would reduce increases in the debt-to-GDP ratio while higher interest rates would accentuate them.

The government's long-term fiscal strategy announced in early 2021 is to stabilise net core Crown debt as a share of GDP by the mid-2020s, which will be met according to the latest fiscal projections (see Table 1.5), and then reduce it as conditions permit. The government will run an operating balance consistent with meeting this long-term debt objective. While this strategy is vague compared to the one prior to the COVID-19 pandemic, which was to reduce net core Crown debt to 20% of GDP by 2022, large uncertainties surrounding the economic outlook make it difficult to commit to specific numerical targets in the short term. The government also considers current debt levels as prudent and is oriented more toward addressing long-standing infrastructure gaps, for instance in healthcare, than engaging in imminent debt reduction. Nevertheless, there is a case for issuing a clearer commitment to improving the long-term fiscal position, for instance by providing an explicit long-term debt-ratio target. Such a commitment would bolster New Zealand's strong reputation for fiscal prudence, which is essential for a small open economy running current account deficits and exposed to global shocks and natural disasters. It also helps avoid large increases in government debt interest costs, which would substantially reduce room for discretionary spending and/or necessitate tax increases (The Treasury, 2021[13]).

Figure 1.24. Reforms are needed to prevent population-ageing fiscal pressures from pushing up government debt

Gross general government debt, SNA basis, % of GDP



Note: The baseline scenario corresponds to the case where healthcare and pension spending grows along the historical trend. In the pension reform scenario, the eligibility age for New Zealand Superannuation is raised from 65 to 67 over 4 years from FY2025/26 to 2029/30. The healthcare and pension reforms scenario corresponds to the case where healthcare expenditure growth is reduced by 0.5 percentage point from the baseline in addition to the pension reform. The higher interest scenario assumes that nominal interest rates rise faster than in the baseline and reach 5.5% in 2060 (as opposed to 4.3%).

Source: OECD computation based on information in NZ Treasury (2021), Statement on the Long-term Fiscal Outlook and Long-term Insights Briefing

StatLink https://stat.link/nxal5w

Extending working lives, namely by linking the pension eligibility age to life expectancy, as recommended in the *2017 Economic Survey of New Zealand* (Table 1.6), is essential for credibly ensuring pension sustainability; estimates of the impact of selected reforms on GDP (Table 1.7) and the government budget

balance (Table 1.8) are shown in Box 1.6. This could be done in such a way that the proportion of adult life expected to be spent in retirement remains constant, as in Finland. The government is opposed to increasing the pension eligibility age from 65, where it has been for the past quarter century, partly out of concern that groups with shorter life expectancy, notably Māori and Pasifika, would be disadvantaged. It would be preferable to address these concerns through measures to limit the impact on these groups instead of freezing the eligibility age for everyone. One such measure could be to provide the pension on a means-tested basis from age 65 until the life expectancy-linked eligibility age, at which point the pension would no longer be means tested; New Zealand had such a system before the current system (flat-rate, non-means-tested pension available from a single eligibility age subject to residency qualifications) was introduced in 1977 and again temporarily during the 1990s when the pension eligibility age was being increased from 60 to 65.

The government has announced profound health-care reforms that are expected to reduce administrative costs and disparities in care but have ambiguous effects on government expenditure. The reforms include replacing 20 District Health Boards (DHBs) with a new Crown entity (Health New Zealand) that runs hospitals and commissions primary and community health services. A new Māori Health Authority will monitor the state of Māori health, which has been worse than for other New Zealanders, and commission health services and develop policy focused on Māori. The impact on government expenditure is ambiguous because the cost of granting universal access to uniform health care services could easily outweigh the savings from increased efficiency. The government aims to alleviate health-care costs and the burden faced by hospitals by strengthening preventive care, in line with a recommendation in the 2015 OECD *Economic Survey of New Zealand*.

More rigorous planning in public investment and more transparent and competitive procurement would enhance efficiency and ensure timely and on-budget delivery of infrastructure assets (OECD, 2021[14]). For instance, the Ministry of Transportation and the Treasury reported that some NZD 5.5 billion worth of transport infrastructure projects funded by a NZD 6.8 billion envelope under the New Zealand Upgrading Programme lacked robust execution plans and risk assessment, thereby exposing their delivery to significant risks (Ministry of Transport and The Treasury, 2021[15]). Their cost estimates also turned out to be optimistic, and an additional NZD 2 billion was required. While the envelope was meant to prioritise projects that contribute to transit-oriented housing development and emissions reductions, few projects were aligned with these priorities. In order to ensure good value for money, the government should guard against implementing large infrastructure investments that are not based on thorough planning and cost-benefit analysis. Planning capabilities by the government agencies tasked with delivering large projects also need to be enhanced to ensure the efficient use of infrastructure funds.

Competitive tendering is essential for cutting costs and ensuring value-for-money in procurement. At 37%, the weight of procurement in New Zealand's fiscal expenditure is relatively large, as is its weight in the economy (Figure 1.25). Any procurement contract by government departments, non-public service departments (such as New Zealand Police and the New Zealand Defence Force) and most Crown entities that exceeds NZD 100 000 must be openly advertised on the Government Electronic Tenders Service (GETS) and contracts awarded must be posted with expected expenditure. Yet, only NZD 1 billion worth of contracts were published on GETS in 2020, a tiny fraction of the NZD 42 billion in total procurement (Millar, 2021[16]). Some procurement, such as many of the COVID-19-related emergency procurement contracts, is exempt from open advertising. Also exempt is what is called secondary procurement, where a government agency purchases from a panel of pre-approved suppliers or under an All-of-Government and other contracts specified in the Government Procurement Rules. Government agencies purchase from a panel of suppliers to save time and screening costs. However, panel members are often large incumbent firms and while there is a chance for new firms to be selected as new members, the selection process only takes place every few years. This reduces competition and therefore pressure for delivering better products and services at lower cost. Furthermore, it deprives young innovative firms of the opportunity to grow by tapping into large demand, hampering diffusion of new technologies (see Chapter 2). The exemption to

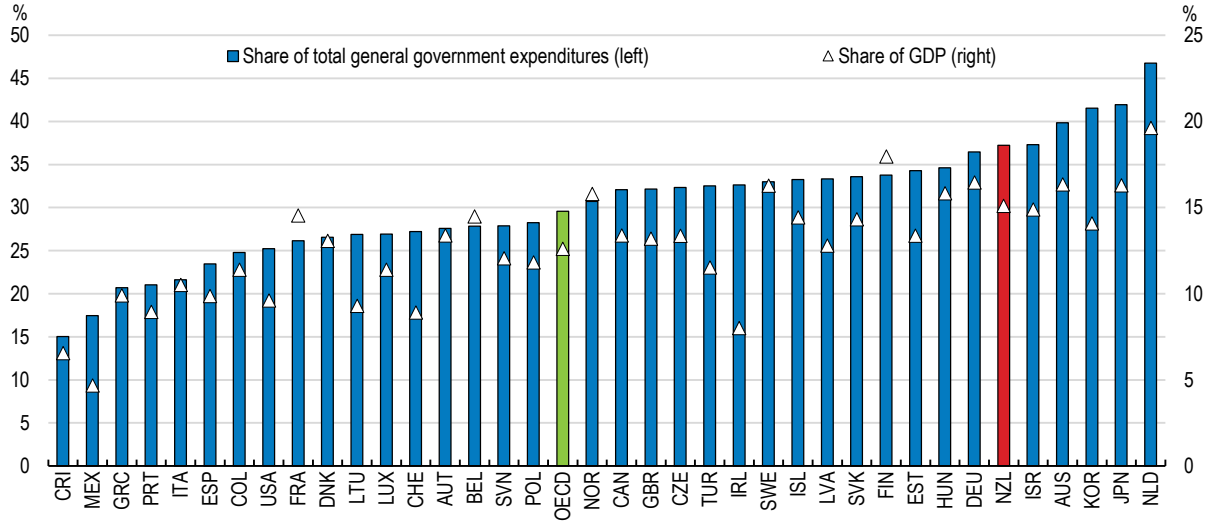
open procurement through purchasing from a panel of suppliers should be removed, while strengthening the screening capabilities of government agencies.

Table 1.6. Past OECD recommendations on fiscal policy and actions taken

Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous Survey
Continue to support wellbeing through prudent fiscal policy, keeping net public debt on the path defined in the government's fiscal strategy.	In face of the COVID-19 crisis, the previous target of reducing net core Crown debt to 20% of GDP by 2022 was abandoned and replaced by an objective to stabilise net core Crown debt as a percentage of GDP by the mid-2020s and then reduce it as conditions permit.
Gradually reduce net public debt in line with the government's fiscal strategy. Increase spending that enhances wellbeing and reduce taxes within the constraints of this strategy.	Net Core Crown debt is projected to peak at 40% of GDP in mid-2023. The government boosted social benefit payments to support poor households and re-introduced depreciation charges for commercial buildings within the fiscal response to COVID-19.
Create an Independent Fiscal Council, focused on providing policy advice and analysis on the fiscal stance.	The government is developing its final proposal as it considers submissions made in response to its initial proposal.
Bring forward the increase in the pension age from 65 to 67, lengthen the transition period and then index the pension age to life expectancy.	No action taken.
Grant District Health Boards greater spending autonomy, resolve their conflicts of interest, allow capitation payments to better follow the patient, widen private health insurance coverage, and determine doctors' salaries within hospitals' budget envelopes set by the output-based payment system.	The government announced in April 2021 the health-care reform that replaces 20 District Health Boards (DHBs) with a new Crown entity (Health New Zealand) that runs hospitals and commissions primary and community health services.
Reduce further the costs (including transport and childcare) of access to primary health care for the poor.	The health-care reform will introduce locality networks of primary and community providers, which will provide seamless and accessible preventive care.

Figure 1.25. The weight of procurement in fiscal spending is relatively large

The weight of government procurement as % of general government expenditure and GDP, 2019



Source: OECD (2021), *Government at a Glance 2021*

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Box 1.6. GDP and fiscal impacts of this Survey's key recommendations

This box summarises the potential long-term impacts of selected key recommendations in this Survey on GDP and the fiscal balance. Because it is often impossible to estimate the impacts of the exact

reforms recommended due to the lack of suitable theoretical or empirical models, the quantification is based on scenarios that only capture some aspects of these reforms. The quantified impacts are merely illustrative and are subject to large uncertainties. The estimated fiscal impacts describe only the direct impacts and do not include indirect impacts on fiscal revenue and spending stemming from households and firms' responses to policy changes.

Table 1.7. GDP impact of selected key recommendations

Recommendation	Scenario	Impact
Monitor the effect of reforms in the FDI screening regime and streamline the procedure further if needed.	Barriers to FDI captured by the OECD FDI Restrictiveness index are reduced to the level in Australia.	4% increase in GDP per capita after 10 years.
Consider the appropriateness of the current corporate tax rate.	The share of corporate income tax revenue as % of GDP (5.1% in 2018) is aligned to the OECD average (3.1%).	1% increase in GDP capita after 10 years.

Source: OECD simulation based on the framework by Égert and Gal (2017[17]).

Table 1.8. Fiscal impact of selected key recommendations

Recommendation	Scenario	Impact
Expenditure		
Increase the old-age pension eligibility age by linking it to life expectancy and take measures to limit the impact on disadvantaged groups.	The eligibility age for NZ Superannuation is raised from 65 to 67 over fiscal years 2026 to 2029, with the age increasing by six months every year.	Annual fiscal saving of 0.7% of GDP once fully implemented.
Introduce the Social Insurance Scheme being developed and incorporate design features that encourage a rapid return to employment.	The unemployment insurance scheme is such that it replaces 80% of labour earnings for up to seven months. Pre-unemployment earnings are the median labour earnings in the year to the June 2021 quarter (NZD 1,093 weekly). The number of unemployed is the annual average during 2012-2020 (132 thousand).	Annual expenditure amounting to 0.8% of GDP.
Taxes		
Consider the appropriateness of the current corporate tax rate.	The share of corporate income tax revenue in GDP (5.1% in 2018) is aligned to the OECD average (3.1%).	Fiscal revenue loss equivalent to 2% of GDP.

Source: NZ Treasury (2021[13]); OECD simulation based on the framework by Égert and Gal (2017[17]).

Structural policy reforms to improve wellbeing

Improving wellbeing in the aftermath of the COVID-19 shock

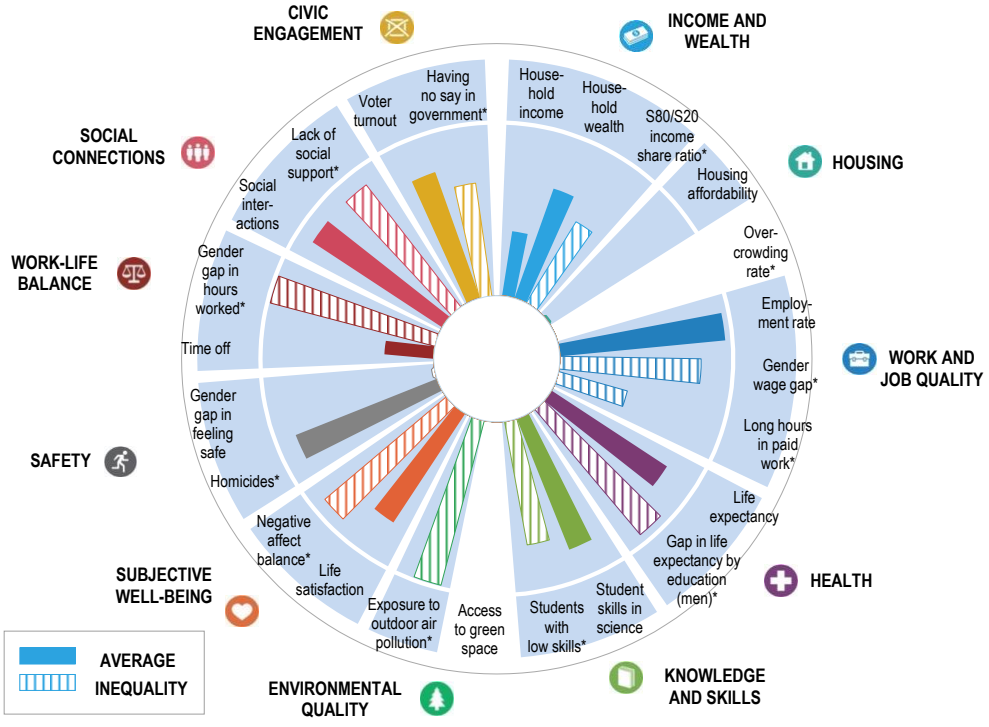
Wellbeing remained resilient during the pandemic but existing challenges were exacerbated

Before the pandemic, New Zealanders enjoyed generally high levels of wellbeing. Compared with other OECD countries, overall outcomes were particularly good for employment, air quality, social support and the gap in life expectancy by education level (Figure 1.26, Panel A). However, household disposable income was low, despite a large share of people usually working long hours or not having much time off work, housing affordability was poor and the gender gap in feelings of safety very high. In terms of the four capitals – natural, economic, human and social – that underpin future wellbeing, New Zealand ranked among the top third of OECD countries for government net financial worth and trust in government and in

others in 2018 but ranked amongst the bottom third for greenhouse gas (GHG) emissions per capita and endangered species (Figure 1.26, Panel B).

Figure 1.26. New Zealand performed well on several OECD How's Life indicators before the pandemic

A. New Zealand's well-being, 2018 or latest available year



B. Capitals for future well-being

Natural Capital			Economic Capital			Human Capital			Social Capital		
Greenhouse gas emissions per capita	3	↗	Produced fixed assets	2	↗	Educational attainment of young adults	2	↗	Trust in others	1	…
Material footprint	2	↘	Financial net worth of government	1	↔	Premature mortality	2	↔	Trust in government	1	↔
Red List Index of threatened species	3	↘	Household debt	2	↔	Labour underutilisation rate	2	↗	Gender parity in politics	2	↔

Note: This chart shows New Zealand's relative strengths and weaknesses in wellbeing compared to other OECD countries. Longer bars always indicate better outcomes (i.e. higher wellbeing), whereas shorter bars always indicate worse outcomes (lower wellbeing) – including for negative indicators, marked with an *, which have been reverse-scored. Inequalities (gaps between top and bottom, differences between groups, people falling under a deprivation threshold) are shaded with stripes, and missing data in white. For the future well-being dashboard: ❶ = top-performing OECD tier, ❷ = middle-performing OECD tier, ❸ = bottom-performing OECD tier. ↗ indicates consistent improvement; ↔ indicates no clear or consistent trend; ↘ indicates consistent deterioration, and "…" indicates insufficient time series to determine trends since 2010. For methodological details, see the Reader's Guide of How's Life? 2020.

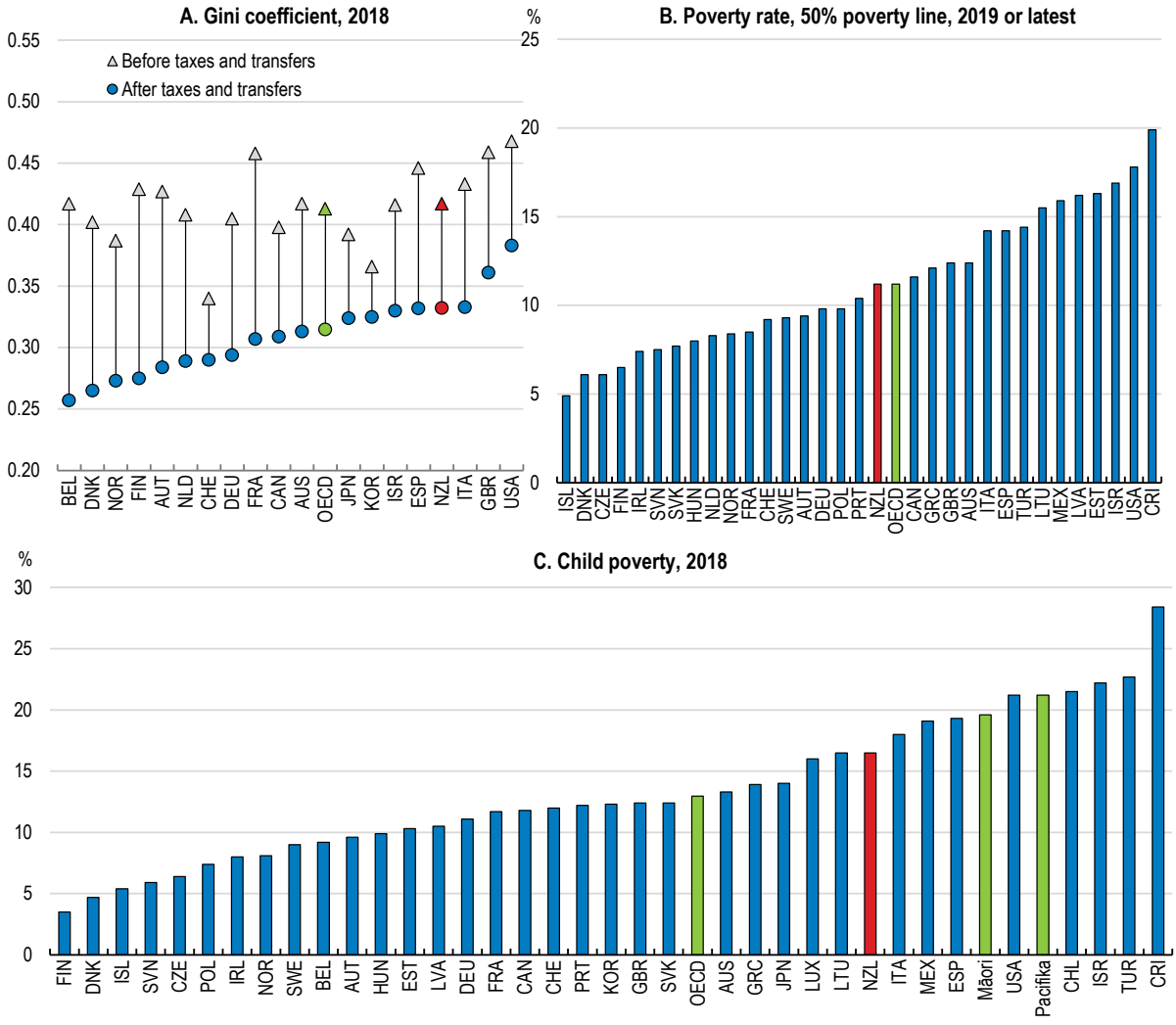
Source: OECD calculations based on *OECD How's Life? 2020*

StatLink https://stat.link/zql1ux

Disposable income inequality was higher than the OECD average despite market income inequality being around the OECD average, owing to below-average redistribution through taxes and transfers (Figure 1.27, Panel A). Income inequality has widened over time as high-income households have enjoyed faster income growth than others in recent decades (OECD, 2020[18]). The relative poverty rate (the share of households with incomes less than 50% of the median) was close to the OECD average (Panel B), but

the child poverty rate, which is one of the government's main wellbeing objectives, was higher than the OECD average in 2018, especially among certain groups, namely Māori and Pasifika (Panel C). The child poverty rate (both before- and after housing costs) had been declining before the onset of the COVID-19 shock but was stable in the first half of 2020 (the latest period for which data are available) (Figure 1.28). The share of children living in households with less than 50% of the median household income after housing costs are deducted was 18.4% just before the COVID-19 shock, but 21% for Māori and Pasifika children (Stat NZ Child Poverty Statistics).

Figure 1.27. Income inequality is above the OECD average and child poverty is high



Source: Stats NZ; OECD (2021), *Income Distribution* (database).

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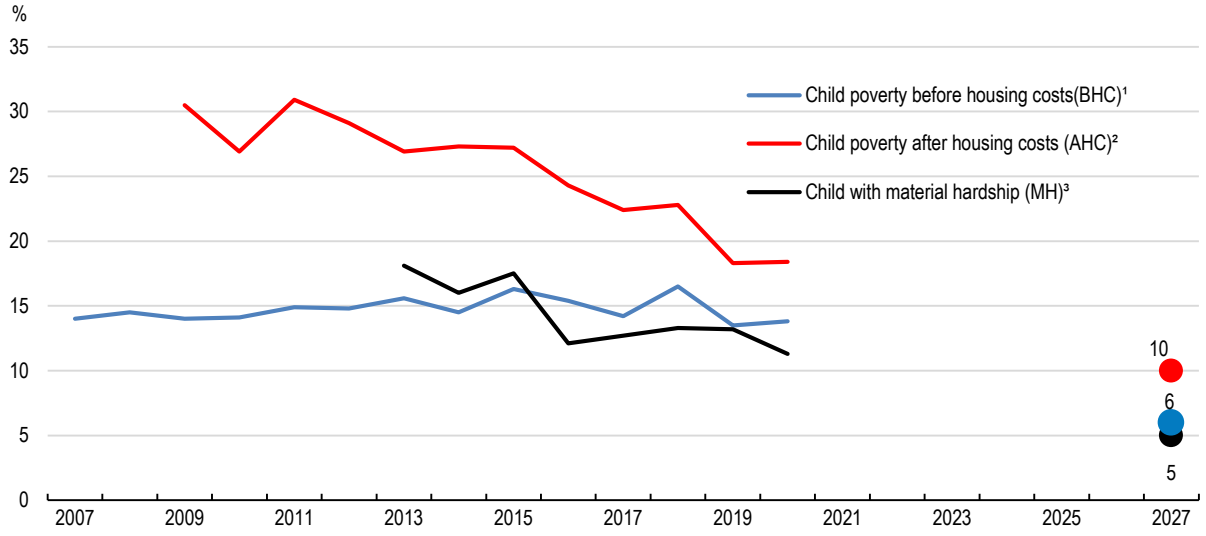
While the impacts of the COVID-19 shock on wellbeing are yet to be fully assessed due to unavailability of indicators that covered the pandemic period, some survey results summarised in the Wellbeing Outlook of Budget 2021 indicate that New Zealanders remained healthy, financially secure overall and well connected to others during the pandemic. The government's successful handling of COVID-19 (Box 1.2) and effective macroeconomic policy response (Box 1.4 and Box 1.5) contributed to these outcomes. Nevertheless, the COVID-19 shock exacerbated some wellbeing challenges present before the pandemic, such as relatively high income inequality and poor housing affordability. Also, the pandemic has affected all groups in the labour market but inequalities by sex, age and ethnicity slightly widened in 2020, before reverting to historic levels.

In order to attenuate a potential increase in income inequality and child poverty resulting from the COVID-19 shock, the government included in Budget 2021 an increase in all weekly main benefit rates by between NZD 32 and 55, in line with the recommendation of the Welfare Expert Advisory Group. The main benefits increased by NZD 20 on 1 July 2021 and the second increase will follow on 1 April 2022. They came on top of the 3.1% increase in 1 April 2021 from wage indexation. Families with children enjoyed a top-up of NZD 15. The government projects that these measures will lift between 19 and 33 thousand children out of poverty on the after-housing-costs measure. Reforms to help households exit benefits by reducing barriers to work would further reduce child poverty. Although the average labour tax wedge in New Zealand is low in comparison with many OECD countries (Figure 1.29, Panel A), sole parents with children and single-earner married couples with children face one of the highest marginal effective tax rates on labour income (Panel B). This is because means-tested benefits and tax credits are withdrawn quickly as earnings increase beyond 65% of the average wage (OECD, 2021[19]). The loss of a large part of extra earnings through taxation and abatement of benefits discourages such households from working more, locking them into in-work poverty (Nolan, 2018[20]).

Figure 1.28. Reduction in child poverty progressed toward the targets before the COVID-19 shock

Primary measures of child poverty by the government

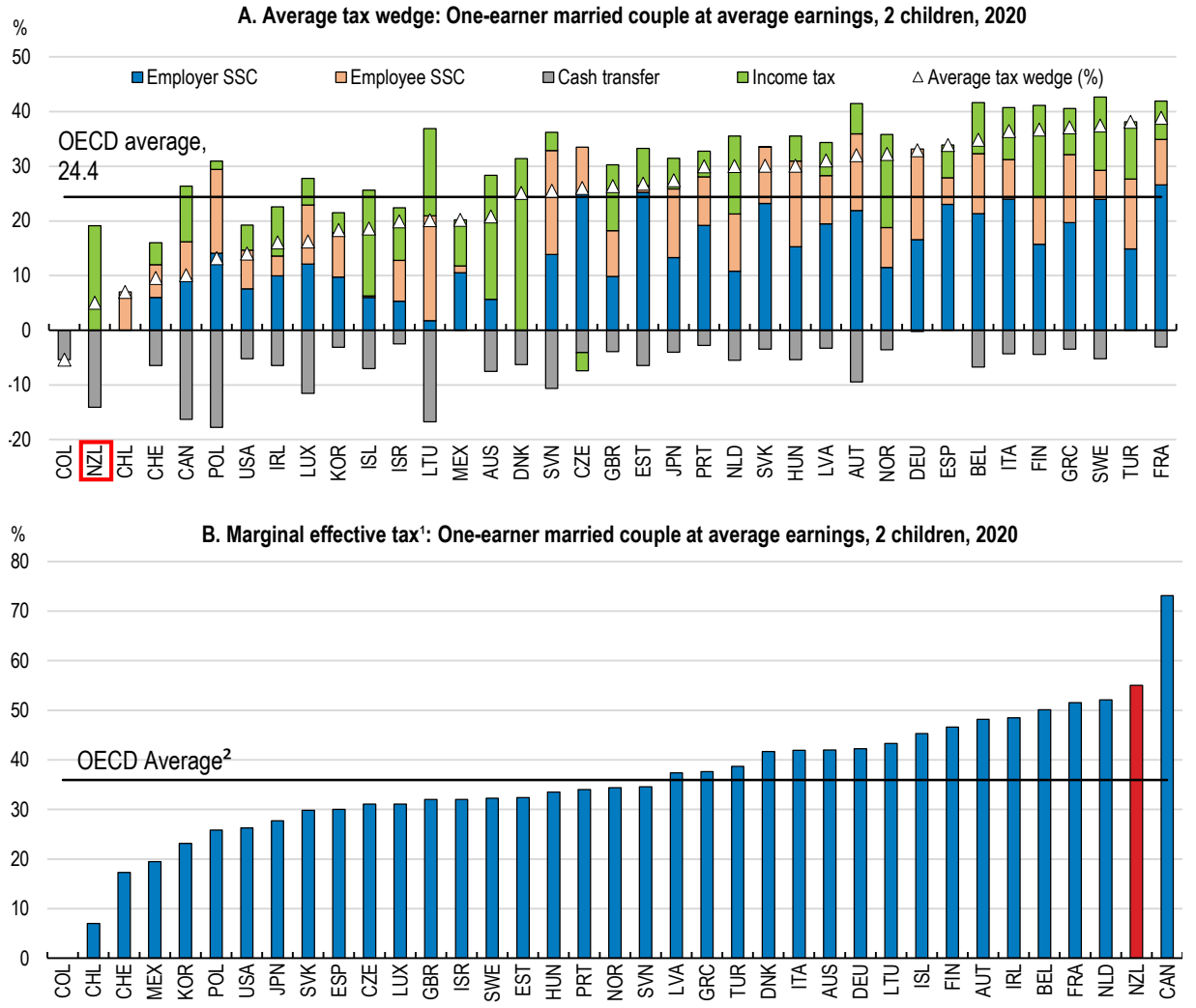


1. The share of children living in households with income less than 50% of median household income.
2. The share of children living in households with income less than 50% of median household income after housing costs are subtracted.
3. The share of children living in households lacking six or more out of the 17 items in the material deprivation index, which include things like having two pairs of shoes in goodcondition and not putting off visits to the doctor. The dots in 2027 are the target level for each measure.
Source: Stats NZ (2021), *Child Poverty Statistics*

StatLink https://stat.link/wdpvl3

By far the largest means-tested payment in New Zealand is *Working for Families*, which is a package of four tax credits amounting to NZD 3 billion (3.5% of total tax receipts) that is paid to families with children; these tax credits account for most of the cash transfers shown in Figure 1.29, Panel A. To reduce in-work poverty traps and high marginal effective tax rates, *Working for Families* abatement thresholds should be increased and abatement rates reduced, as recommended by the government's Welfare Expert Advisory Group (2018[21]). Abatement thresholds, which in practice have been adjusted on an *ad hoc* basis during the Budget process, should be more systematically adjusted to ensure that they reflect well recent inflation in living costs, notably by indexing thresholds to inflation (Welfare Expert Advisory Group, 2018[21]). The government should also review and adjust abatement thresholds more regularly and frequently to ensure that they reflect current economic conditions and support exit from benefits of low-income households.

Figure 1.29. The labour tax wedge is among the lowest in the OECD



1. The marginal effective tax rate is the marginal rate of income tax plus employee social security contributions less cash benefits. 2. Sample average.

Source: OECD (2021), *Taxing Wages 2021*

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Strengthening a wellbeing approach in policymaking

Budget 2020 rightly focused on countering the socioeconomic impacts of COVID-19 and supporting affected New Zealanders. The pandemic also disrupted the government's efforts to elaborate tools, frameworks and datasets needed to implement wellbeing objectives more rigorously into the Budget, as substantial reallocation of resources was needed to deploy urgent support measures.

Budget 2021 refocused on wellbeing, with priorities on keeping COVID-19 at bay and accelerating the recovery while addressing key challenges like climate change, housing affordability and child poverty. Budget 2022 was formulated with the following wellbeing objectives in mind:

- Just Transition - supporting the transition to a climate-resilient, sustainable and low-emissions economy.
- Physical and Mental Wellbeing - supporting improved health outcomes for all New Zealanders and minimising COVID-19 and protecting New Zealand's communities.

- Future of Work - enabling all New Zealanders and New Zealand businesses to benefit from new technologies and lift productivity and wages through innovation.
- Māori and Pacific Peoples - lifting Māori and Pacific Peoples' incomes, skills and opportunities, including through access to affordable, safe and stable housing.
- Child Wellbeing - reducing child poverty and improving child wellbeing, including through access to safe and stable housing.

Going forward, there is scope to further strengthen the capabilities of government agencies in integrating wellbeing analysis into policy planning, including with respect to the requisite cost-benefit and value-for-money analyses (Table 1.9). This requires wellbeing indicators that are quantifiable, sufficiently granular and statistically reliable. Government agencies should avoid basing their policies on indicators that are highly subjective, general or based on very small samples, and use subjective indicators in tandem with objective ones, as stressed in the 2019 OECD *Economic Survey*. The wellbeing priorities in the budgeting process can be complemented with practical guidelines to facilitate their implementation. In the first Wellbeing Budget in 2019, wellbeing priorities were too general to guide government agencies effectively and did little to narrow down the budget bids received by Treasury. Cross-ministerial groups were set up for Budget 2020 to select policies for each of the Budget priorities. As the wellbeing budgeting framework continues to develop, it is essential to ensure that it can be implemented by government agencies without incurring large additional burdens.

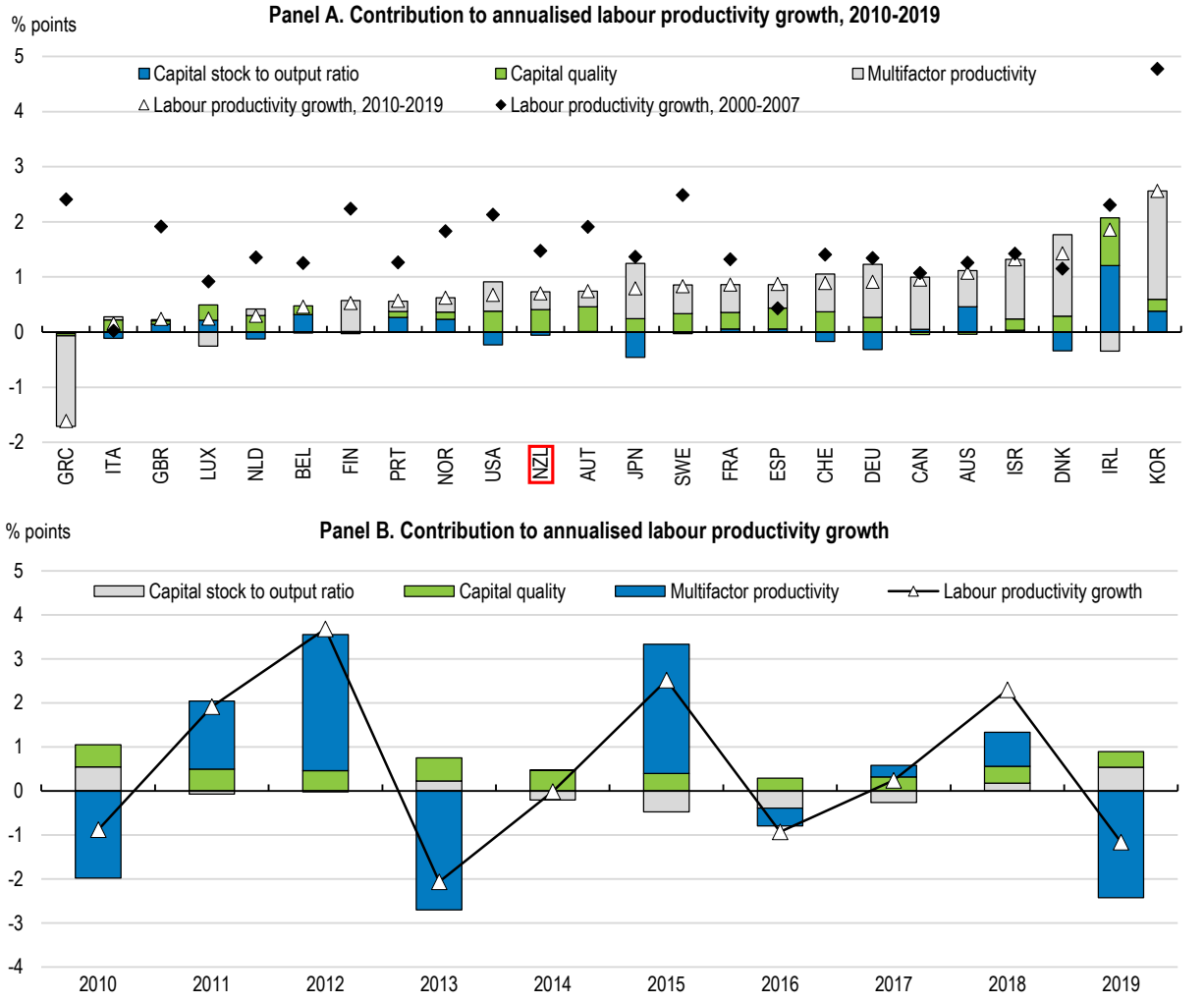
Table 1.9. Past OECD recommendations on wellbeing budgeting and actions taken

Recommendations in the 2019 Survey (Key ones in bold)	Actions taken since the previous *Survey*
Prioritise improving wellbeing for Māori, Pasifika, sole parents and children, through better targeted income, education, health and housing policies.	Budget 2020 had to be refocused on supporting people affected by Covid-19. Budget 2021 highlights the five wellbeing objectives that prioritise those target groups (sole parents are however not included in the target groups).
Strengthen measurement of natural capital, innovation, human capital, cultural identity and integration of indigenous perspectives, within the Dashboard or the Stats NZ Indicators Aotearoa New Zealand database.	The government's efforts to expand the breadth of indicators were held back by the COVID-19 pandemic. Some progress was made in the conceptualisation of Māori wellbeing and in considering how to integrate culture and children's wellbeing into the Living Standards Framework used in the budgeting process. The frequency of some indicators has been increased as well.
Ensure sufficient resources to collect key indicators on a regular basis and with appropriate granularity.	The COVID-19 pandemic required substantial resource reallocation away from these activities to responding to its socioeconomic effects.
Subjective wellbeing indicators should continue be used as a complement to, rather than a replacement for, objective data.	No action taken.
Review experiences from Budget 2019 and further develop the methodological guidance on the preparation and assessment of spending bids.	The development of methodological guidance for the preparation and assessment of spending bids is evolving.
Integrate wellbeing into other policy advice and tools, such as regulatory impact assessment, and evaluation.	Some of the government's cost-benefit analysis tools now incorporate the wellbeing approach.

Enhancing productivity growth

As in many other OECD economies, labour productivity growth declined after the global financial crisis, to about a half of the pre-crisis rate (Figure 1.30, Panel A). Slower productivity growth has been due to limited capital deepening and subdued multifactor productivity growth (Panel B). The former reflects weak capital investment and the latter the absence of strong competition pressures that enhance innovation and resource allocation, limited integration into the global economy, weak innovation and knowledge transfer, and high qualification- and skills mismatches, as extensively reviewed in the 2017 OECD *Economic Survey of New Zealand*. Capital investment has been held back by the high effective corporate taxes that reduce the attractiveness of New Zealand as a location to expand profitable operations.

Figure 1.30. Productivity growth slowed down



Note: Labour productivity is defined as value added per hour worked. Capital quality refers to changes in the composition of the capital stock among different types of assets.

Source: OECD (2021), *OECD Compendium of Productivity Indicators*, OECD Publishing, Paris.

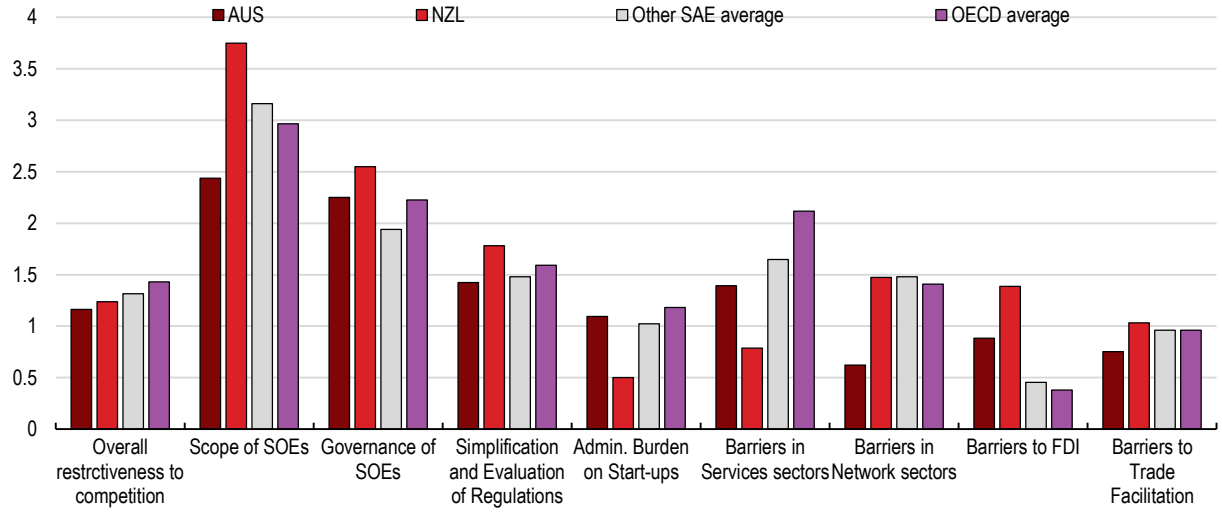
StatLink https://stat.link/5idgrl

New Zealand's small and regionally fragmented domestic market and geographical remoteness limit competition. According to the OECD Product Market Regulation Indicator, regulatory barriers to competition in New Zealand are fairly low, and the administrative burden to start new businesses is among the smallest in the OECD (Figure 1.31). There is, however, room to simplify regulations by publishing all subordinate regulations currently in force online, like in Australia or in other small advanced economies. The scope of state ownership is also more extensive than in many other OECD countries, and some state-owned enterprises enjoy preferential treatment. High state ownership also limits competition in the network sector. While regulatory barriers to competition in services are low, the retail grocery sector is dominated by a duopoly of two large retail supermarket chains (Commerce Commission, 2021[22]). The Commerce Commission initiated a market study on the retail grocery market in November 2020. In its draft report, circulated in July 2021 for consultation with stakeholders, the Commission reported that the two retailors earn persistently high profits, charge higher grocery prices than in other OECD countries, and tend to avoid competing on price with each other (Commerce Commission, 2021[22]). Other grocery retailers are unable to compete on price and product range, nor can they access competitively priced wholesale supply because the two large retailers are also the largest wholesalers and only supply themselves. The Commerce Commission has proposed options for interventions in the draft report, ranging from the two

major retailers undertaking to supply other retailers with groceries on fair and non-discriminatory terms, to fostering entry and growth of a third large retailer or, as a last resort, to vertically separating the retail and wholesale businesses of the two large retailers. The Commission will narrow down these options through the consultation to final recommendations, which will be submitted to the Minister of Commerce and Consumer Affairs in March 2022.

Figure 1.31. Regulatory barriers to competition are low overall but state ownership is high

OECD Product Market Regulation Indicator, indexed as least (0) to most (6) restrictive, 2018



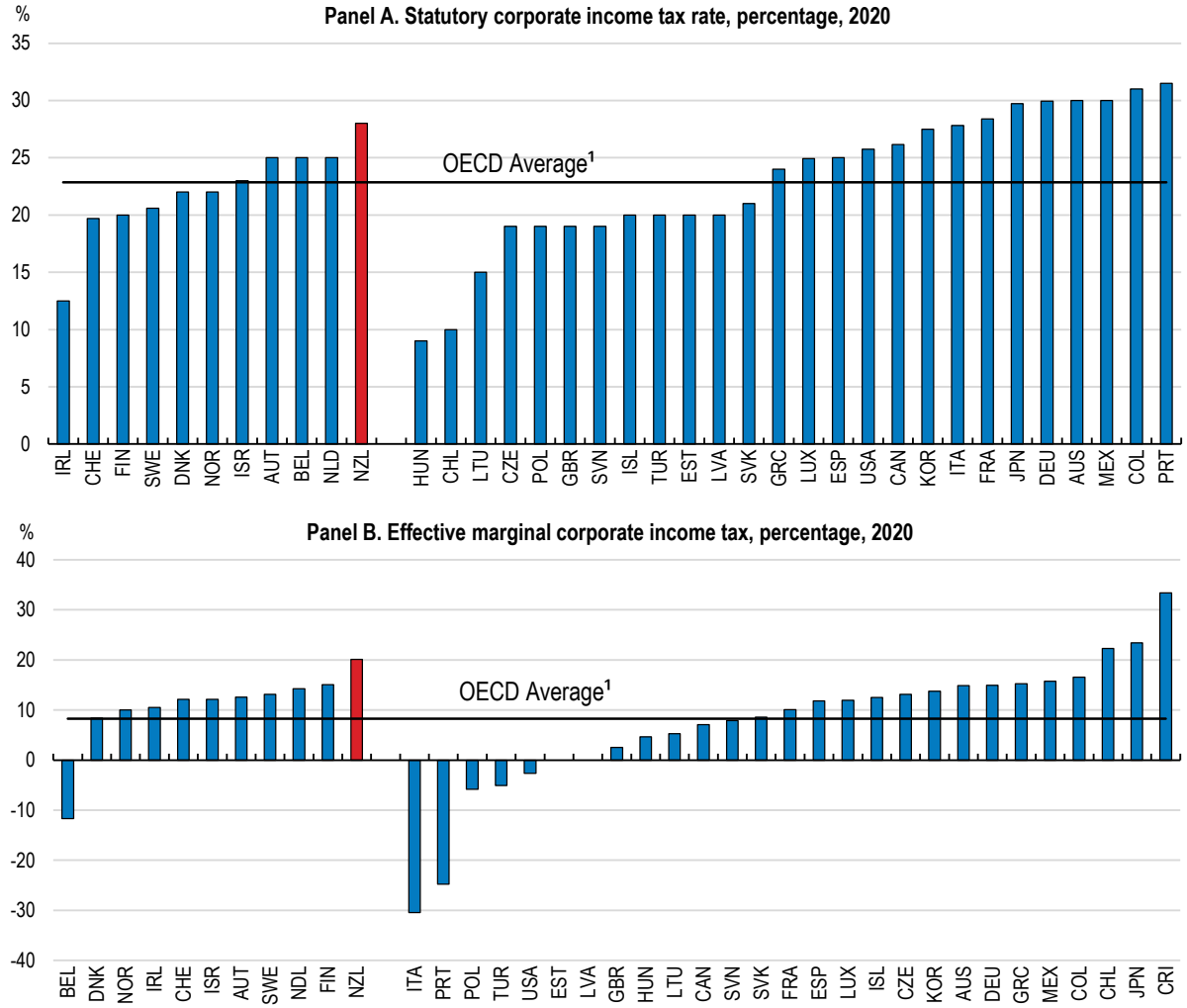
Note: This chart displays the overall Product Market Regulation (PMR) Indicator value as well as its selected sub-components. Other SAE (Small Advanced Economies) are Austria, Belgium, Denmark, Finland, Ireland, Israel, the Netherlands, Norway, Sweden and Switzerland.
Source: OECD (2018), *OECD Product Market Regulation Indicator*

StatLink https://stat.link/hduc4g

Adjusting the corporate tax rate to competitive levels

Corporate income tax rates are higher in New Zealand than in most other OECD countries, and are especially high compared with some small advanced economies (Figure 1.32). The high nominal rate (Panel A) encourages internationalised firms to shift profits abroad or locate their highly profitable activities outside New Zealand. The high marginal effective rate (Panel B) discourages firms, including multinationals, from investing more as it increases the user cost of capital, contributing to low rates of capital investment in New Zealand (OECD, 2017[23]; 2021[24]). The difference between nominal and effective tax rates is smaller in New Zealand than in most other OECD countries because the corporate income tax base is broader, despite the reinstatement of depreciation deductions on industrial and commercial buildings in 2020. Reducing the nominal corporate tax rate to align the effective rate with those in Australia and small advanced economies would encourage investment in tangible and intangible capital that contributes to productivity growth; previous OECD recommendations on taxation are listed in Table 1.10. It would also reduce incentives for internationalised firms to minimise the share of profits declared in New Zealand. However, these benefits need to be weighed against fiscal and other costs of reducing the corporate tax rate. For instance, lowering the corporate tax rate (28%) further below the top two marginal personal income tax rates (38% and 33%) could endanger tax integrity by encouraging wealthy individuals to shift income to corporate entities to reduce their tax liabilities. It would also reduce taxation of economic rents (Tax Working Group, 2018[25]). Inland Revenue will explore the role of the tax system in promoting investment and productivity in its 2022 Long-Term Insights Briefing, which will provide an opportunity to consider the appropriateness of the current corporate tax rate and possible reforms.

Figure 1.32. The corporate tax rate is high, especially compared with other small advanced economies



1. Sample average.

Note: Effective tax rates (ETRs) are forward-looking synthetic tax policy indicators calculated on the basis of a prospective, hypothetical investment project. See (Hanappi, 2018[27])for the OECD methodology. Small advanced economies are defined as the OECD countries with populations above 1 million and below 20 million people, and with a per capita income above USD 30 000.

Source: OECD, *Tax database*

StatLink https://stat.link/en6415

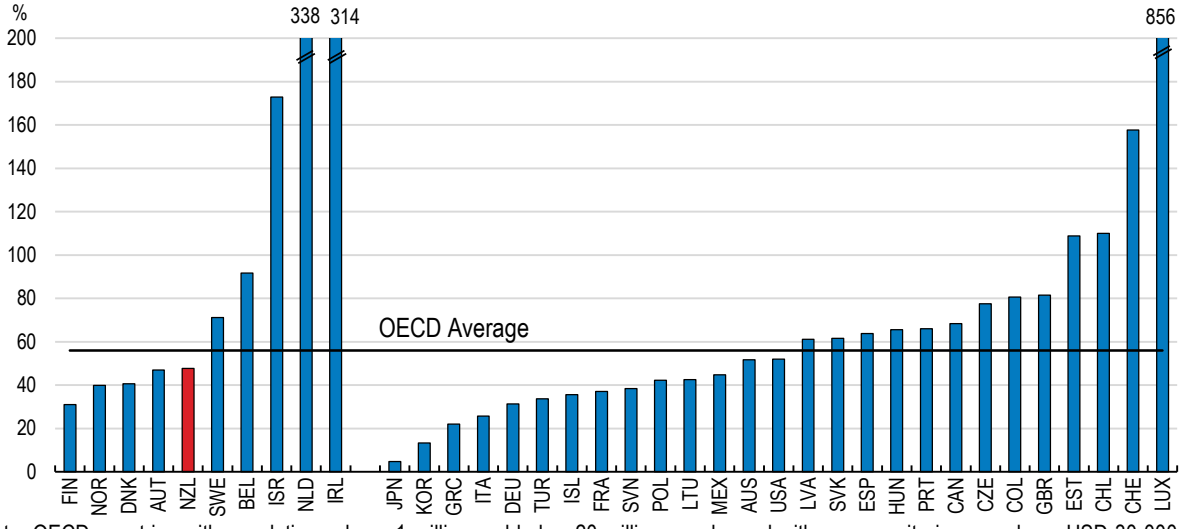
Table 1.10. Past OECD recommendations on taxation and actions taken

Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous Survey
Eliminate the double-taxation of trans-Tasman profits distributed to shareholders by continuing to work towards agreement with Australia on mutual recognition of imputation and franking credits for foreign investment.	No action taken.
Implement a capital gains tax and boost environmental and property or land taxes to facilitate a more efficient and equitable tax structure.	The capital gains tax on investment properties has been extended from those held for less than five years to those held for less than ten years.
Consider limiting KiwiSaver tax credits to low-income members. Extend automatic enrolment to all existing employees. Change the investment strategy for default funds to a life-cycle approach that is adapted to the member's age.	No action taken.
Limit the tax deductibility of losses from rental property investments by only allowing them to be offset against future rental income.	The government limited the tax deductibility of rental property losses to future rental income, with effect from the 2019-20 tax year.

New Zealand's inward Foreign Direct Investment (FDI) has been smaller than in many other OECD countries (Figure 1.33), holding back trade and integration in global value chains (Figure 1.5, Figure 1.6), which often act as channels of technology diffusion from the world's productivity frontier. Prior to the COVID-19 pandemic, New Zealand retained a comprehensive foreign investment screening process with a wide range of investment requiring notification to and approval by the Overseas Investment Office (OIO), imposing significant compliance costs and uncertainties on foreign investors and constraining service trade. In May 2020, the scope of FDI subject to screening was temporarily expanded to all foreign investment that entails taking a stake in any New Zealand business that results in more than a 25% ownership interest, or increases an existing interest to or beyond 50, 75 or 100%. The government revoked this temporary measure in July 2021, and streamlined the FDI screening regime, introducing measures to exempt some transactions from the regime and alleviate administrative burdens. For instance, the scope of the national interest test applied to foreign governments or government-affiliated investors has been narrowed, which should facilitate equity investment by foreign pension funds. Some low-risk transactions like transfer of debt obligations were exempted from screening, and so were increases in interests in sensitive land that do not cross ownership or control limits. Exemptions were also introduced from the definition of an overseas person for New Zealand managed investment schemes and incorporated entities, including companies listed on New Zealand's Stock Exchange that are majority owned and substantially controlled by New Zealanders (overseas persons holding 10% or more of total shares collectively hold 25% or less of total securities). Repeat investors will be subject to streamlined background checks. Furthermore, statutory timeframe limits will be specified for each consent application, providing more certainty to foreign investors.

Figure 1.33. The inward FDI stock is small for a small open economy

Inward FDI position, % of GDP, 2020[1]



Note: OECD countries with populations above 1 million and below 20 million people, and with a per capita income above USD 30 000, are defined as small advanced economies. 1. 2019 values for Belgium, Norway, Finland, Luxemburg, Portugal, Australia, Mexico and Korea.
Source: OECD (2021), Foreign Direct Investment Statistics

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While these recent reforms are in line with the past OECD recommendation (Table 1.11) and thus welcome, the government should monitor their effects on FDI and streamline the procedures further if the new regime fails to stimulate investment. It also has been noted that FDI in New Zealand has not contributed much to the creation of new, innovative exports (New Zealand Productivity Commission, 2021[26]). The government should complement general reforms with targeted measures to attract FDI in

important sectors or technology areas where multinational enterprises can play a large role in diffusing advanced technologies and providing training opportunities.

Table 1.11. Past OECD recommendations on increasing productivity and actions taken

Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous *Survey*
Progressively narrow screening of foreign investment. Continue to reduce compliance costs and boost predictability for investors.	Although FDI screening was temporarily broadened under the COVID-19 pandemic, the government revoked these temporary measures in July 2021 and introduced measures to streamline the FDI screening regime and alleviate administrative burdens.
Review the merits of refocusing competition law on the effects of potentially anti-competitive conduct as opposed to its intent. Provide the Commerce Commission with the power and resources to undertake market studies.	A Commerce Amendment Bill currently before Parliament will amend the prohibition in section 36 of the Act to allow consideration of the effects of potentially anticompetitive conduct by firms with substantial market power. The Commerce Commission has completed a market study on the retail market for the supply of petrol and diesel used for land transport in December 2019. A market study into the retail grocery market was initiated in November 2020 and a draft report was circulated for review in July 2021. A market study of the building supplies sector was announced in November 2021.
Expand the use of *ex post* evaluations of Commerce Commission decisions to assess performance.	The Commerce Commission periodically conducts internal evaluations of its merger decisions to improve decision-making processes. The latest review was conducted in 2019. Additional resources have been allocated to strengthen Commission use and governance of data and insights that can be applied to support effective evaluation.
Increase fiscal support for business research and development. Maintain or increase long-term support for successful collaboration between research institutions and industry.	A 15% research and development tax credit was introduced in 2019, replacing Growth Grants. Firms with a tax loss position or income tax payment that is inferior to R&D tax credits can receive R&D tax credit refunds in some cases. The cap on this refund has been raised as part of the fiscal response to COVID-19.
To address equity financing gaps, shift the allocation of the NZ Venture Investment Fund to provide greater support for early-expansion-stage firms.	The government launched the Elevate NZ Venture Fund (the Elevate Fund) in March 2020, a fund of funds programme that will allocate up to NZD 300 million to venture capital firms over the next five years, in order to increase investment in high-growth tech businesses.
Move towards privatisation of state-owned enterprises (SOEs), and consider reducing local government ownership of port assets to bring more market discipline to the sector.	No action taken. In August 2021, the government withheld its support to the planned capital raising by Air New Zealand, causing it to be postponed until early 2022.

Exporting is a fundamental avenue for firms to achieve sufficient production scale to bring down unit costs. As in other OECD countries, exporting firms in New Zealand are more productive and invest more in capital and innovation than non-exporting firms (Sin et al., 2014[27]). This occurs because exporting allows them to gain sufficient scale to justify costly investments aimed at boosting productivity (see Chapter 2). However, because of the small domestic market and absence of adjoining markets within free-trade blocs, New Zealand's firms have to penetrate distant markets before attaining some production scale (New Zealand Productivity Commission, 2021[26]). In order to foster these so-called *born-global* firms, New Zealand needs effective coordination between innovation support and export promotion that strengthens competitiveness of young innovative firms and catapults them into export markets (Chapter 2). It is also important that these support measures promote the exports by women-owned businesses, which are usually less internationalised. New Zealand signed the Global Trade and Gender Arrangement (GTAGA) in 2020, together with Canada, Chile and now Mexico. The initiative aims at promoting mutually supportive trade and gender policies in order to improve women's participation in trade and investment, and in the furtherance of women's economic empowerment. New Zealand also has room for enhancing efficiency in its border procedures through better access to information on border ruling, boosting the use of advance

ruling, and streamlining and automating border clearing processes (as shown by the OECD Trade Facilitation Indicator).

Research and development (R&D) spending is low, with differences in industry composition explaining only a small part of the shortfall from the OECD average (OECD, 2017[23]). Business-based R&D spending is the lowest among small advanced economies. Government support to business-based R&D is now putting less weight on direct grants and more on tax incentives. The generosity of R&D tax credits is close to the median of OECD countries (OECD, 2021[28]). In addition, the R&D loss tax credit scheme allows firms to cash out 28% of the deficit related to R&D expenses. The R&D tax credits also benefit firms with a tax loss position or income tax payment that is inferior to R&D tax credits, via tax credit refunds. The cap on the latter has been raised as a part of the fiscal response to COVID-19. The shift from direct grants to R&D tax credits is a common trend across the OECD and would benefit a wider scope of firms than research grants. Nevertheless, R&D tax credits are insufficient as a means to guide innovation to broader societal needs, and represent suboptimal instruments to encourage investment in knowledge at the interface between basic research and actual product or process development (OECD, 2021[29]). Thus, they should be complemented by targeted grants considering the need for focused innovation support for strategic sectors or technologies that would accelerate New Zealand's productivity catch-up. For instance, the government's Industry Transformation Plans envisage focusing innovation effort to raise productivity on high-potential export-oriented sectors of the economy. However, targeted grants should be evaluated based on their impacts using a rigorous, transparent and independent monitoring system and withdrawn if found unsuccessful (New Zealand Productivity Commission, 2021[26]).

Knowledge transfer from Crown Research Institutes and universities, for instance through research collaboration, has been weak (New Zealand Productivity Commission, 2021[26]). One reason is that funding mechanisms do not provide sufficient incentives for knowledge transfer activities. For instance, only two out of seven Crown Research Institutes have substantial industry funding shares, focused on land-based industries and geothermal technologies. Financial incentives for university researchers to engage in applied research are also weak (New Zealand Productivity Commission, 2021[26]). Aligning universities' specialised research areas with topics that are most relevant to issues faced by New Zealand firms is important for leveraging the role of universities as a platform for international research collaboration and knowledge diffusion for the development of strategic sectors and technologies.

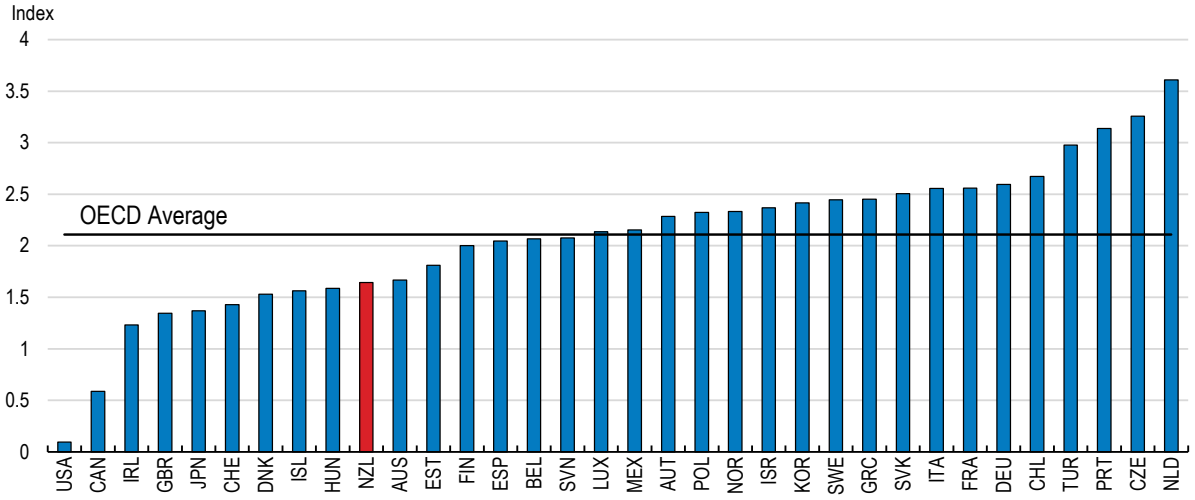
As explored extensively in the 2017 OECD *Economic Survey: New Zealand* and (Adalet McGowan and Andrews, 2015[30]), a sizable improvement in labour productivity is expected from reducing qualification and skills mismatches. The major impediment to improving the mismatches is the slow responsiveness of housing supply to demand, which hampers the movement of workers to areas with jobs that match better their qualifications and skills. If housing-related reforms (see below) progressed enough for the price elasticity of new housing supply to rise to US levels, labour productivity could rise by 2¼ per cent as a result of reduced mismatches.

Maintaining labour market flexibility while enhancing equity

The labour market is more flexible in New Zealand than in most other OECD countries. Employment protection legislation (EPL) is less strict (Figure 1.34), albeit more restrictive than in most other English-speaking countries, and wage bargaining fully decentralised − essentially confined to the enterprise level, as in Canada, the United Kingdom, the United States and 10 other OECD countries. This flexibility, together with strong incentives to work and macroeconomic stability contribute to high performance on quantitative labour-market indicators and to low employment-rate gaps for women, immigrants and people with disabilities (OECD, 2018[31]), but not for Māori and Pasifika. The government plans to consult on a possible reform to reduce the costs borne by displaced workers and has introduced legislation to reform the wage-bargaining system to increase workers' bargaining power.

Figure 1.34. Employment protection legislation is less strict in New Zealand than in many other OECD countries

Strictness of employment protection, individual and collective dismissals (regular contracts), 2019



Source: OECD (2021), *Indicators of Employment Protection*

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Introducing income insurance to improve support for displaced workers and those who lose their jobs because of non-injury-related health conditions or disabilities

Workers who experience involuntary job loss typically suffer a substantial reduction in wellbeing, especially during downturns. In the short term, displacement reduces economic security and harms mental health, while in the long term it adversely affects earnings, health and mortality risk (Hyslop et al., 2021[32]). Wage losses during the first five years after job displacement are estimated to amount to NZD 15.4 billion assuming that 100 000 workers per year are displaced (ibid). The impacts on workers losing work due to a health condition or disability are similar to those on displaced workers (Perry, Kenney and Tereshchenko, 2009[33]). In New Zealand, numbers leaving work owing to a health condition or a disability are more stable than those affected by displacement and less affected by economic cycles. Nevertheless, workers with health conditions and disabilities are vulnerable to job loss in recessions and to experiencing long-term unemployment.

Governments provide unemployment payments to support displaced workers and their families conditional on satisfying job search requirements and sickness-disability payments subject to satisfying medical criteria. All but two OECD countries – Australia and New Zealand – have unemployment insurance, which provides earnings-related payments for a limited period. Displaced workers who have not found a job at the end of this period may be eligible for lower, means-tested flat-rate benefits (i.e., unemployment or social assistance) if their household income is low enough. Australia and New Zealand only offer such unemployment assistance benefits. Similarly, while most OECD countries have income insurance for workers who lose their jobs because of a health condition or disability, New Zealand and Australia only provide means-tested flat-rate benefits where the health condition or disability is not accident-related (New Zealand) or work-related (Australia). In New Zealand, loss of income up to a limit (NZD 131 911 for the year to 31 March 2022) and medical costs caused by accidents are insured by the Accident Compensation Corporation (ACC).

In New Zealand, only one third of the unemployed receive unemployment benefits, often because the unemployed are ineligible. Displaced workers and their families who receive little or no unemployment payments experience a sharp loss in income, which can make meeting living expenses difficult, especially in a country where housing costs are so high. These difficulties oblige many displaced workers to find another job quickly, even if it does not represent a good match for their skills. As reported in the *2017*

OECD Economic Survey of New Zealand, skills mismatch is higher in New Zealand than in most other OECD countries. While redundancy pay, which is voluntary in New Zealand, reduces these difficulties, its coverage (one-half of displaced workers) and generosity (34 weeks of wages) are no higher than in countries that also have unemployment insurance (OECD, 2017[34]). Moreover, there are significant differences by age, gender, educational attainment and occupation, with actual protection depending on a worker's bargaining power and the good will of the employer. Workers made redundant because of a business failure are less likely to receive redundancy pay due than other laid-off workers.

While private unemployment- and disability insurance already exist in New Zealand, few workers avail themselves of it because it is expensive owing to adverse selection - insurers are obliged to charge high premiums to protect against the risk that buyers have private information that suggests that they are a greater risk than can be gleaned from information available to the insurer. This is why unemployment- and disability insurance are usually compulsory in other OECD countries (adverse selection also explains why health insurance is compulsory in most countries).

The government has signalled its intention to open a public consultation on a proposed social insurance scheme for displaced workers (i.e., unemployment insurance for workers made redundant) and for those who lose their jobs because of a non-injury-related health condition or disability (i.e., sickness and disability insurance) jointly developed by the government and employer- and employee representatives. Budget 2021 indicated that the proposed scheme could give workers replacement rates of around 80% for a limited period with minimum and maximum caps. Such a replacement rate for economic displacement coverage would be very high by international comparison - the OECD average is around 60% - but more in line with OECD average replacement rates for health or disability insurance. After expiry of social insurance entitlements, people still unemployed or with work capacity reduced by 50% or more could apply for the current means-tested unemployment- or sickness benefits. The introduction of unemployment insurance was recommended in the *2017 OECD Economic Survey of New Zealand* (Table 1.12) and the reduction in the gap in income protection between people who lose their jobs because of an accident-related- and non-accident-related health condition or disability was recommended in OECD (2018[35]).

Table 1.12. Past OECD recommendations on labour markets and actions taken

Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous *Survey*
Consider introducing unemployment insurance or, alternatively, longer notice periods and mandatory notification of layoffs. Also consider expanding training, guidance and counselling for displaced workers.	The government has indicated a desire to introduce social income insurance, which includes unemployment insurance, by 2023. Government officials and employee- and employer representatives are working together to establish key characteristics of the scheme.
Monitor the labour market and income distribution effects of minimum wage hikes, especially on women and youth, and slow the increases if the effects are negative.	The Ministry of Business, Innovation and Employment (MBIE) undertakes an assessment of the effects of minimum wage increases and makes a recommendation about the size of the increase to the government before it decides. MBIE recommended a smaller and delayed increase (1.3% to NZD 19.15 per hour in October 2021) than decided by the government (5.8% to NZD 20 per hour in April 2021).
Increase tertiary-sector responsiveness to labour market needs by formalising linkages between providers and employers, and directing funding to projected areas of skills shortfall, including better targeting of course offerings by providers and merit- and needs-based scholarships.	The Education (Vocational Education and Training Reform) Amendment Act came into effect on 1 April 2020. Compared to previous arrangements, the new system focuses more on delivering the skills that employers need, provides more support for learners while training and ensures greater consistency in vocational education across the country. Work-integrated learning will become an increasingly important part of the vocational education system.

A potential benefit of unemployment insurance is that it may allow displaced workers to search longer for jobs that may better match their skills. Whether or not increased search duration results in better job matches is an empirical question; theoretically, increased search duration could result in higher-quality job matches but it could also result in depreciation of skills or send negative signals to employers that worsen job match quality. Based on a review of meta-analyses Schmieder, von Wachter and Bende, (2016[36]),

Tatsiramos and Ours (2014[37]), and Hyslop et al. (2021[32]) conclude that increased search duration does not produce benefits overall in the form of higher-quality job matches. This is not to deny that some displaced workers, notably high-skilled workers, are likely to benefit from better job matches; for many low-skilled workers, any job match is likely to deliver similar productivity benefits. At the same time, there could be a tipping point where skills depreciation increases. In these circumstances, unemployment insurance design features such as short benefit duration, effective enforcement of activation requirements and diminishing replacement rates over time could increase the likelihood of better job matches. Should the scheme be implemented with a high replacement rate, it will be important to develop effective active labour market policies (ALMPs) to reduce the risk of increasing structural unemployment. Based on a pooled analysis of 31 advanced countries, Escudero (2018[38]) finds that sufficient resources and programme continuity are particularly important for ALMPs to improve aggregate labour market outcomes. Moreover, start-up incentives and measures aimed at vulnerable populations are more effective than other ALMPs in reducing unemployment and increasing employment, especially for the low-skilled.

A social insurance scheme would also be likely to improve the resilience of New Zealand's economy and job market to shocks by bolstering automatic stabilisers, especially given that such schemes typically have strong fiscal multiplier effects. Modelling by the OECD suggests that New Zealand has about average resilience to shocks. The impact of such a scheme on automatic stabilisers would depend on its size, generosity and the responsiveness of financing sources (levies, contributions or taxes) and redundancy payments to a downturn.

Fair Pay Agreements will strengthen worker bargaining power

Another plank in the government's Workplace Relations Package aimed at increasing low-paid workers' earnings, as discussed in the 2019 *OECD Economic Survey,* is to increase wages by strengthening worker bargaining power through the introduction of Fair Pay Agreements that stipulate minimum wages and conditions for workers in low-paid occupations or sectors. The legislation that the government hopes to introduce in Parliament by early-2022 has widened coverage to all occupations across the economy. Workers or their union representatives can initiate a Fair Pay Agreement bargaining process if 1000 or 10% of workers in an occupation support it. Employer representatives must negotiate and unions may not strike during the negotiation, which the government considers not to violate New Zealand's International Labour Organisation obligations concerning freedom of association and the right to strike in collective bargaining because these rights are preserved for other forms of bargaining. The obligation for both bargaining sides to use best endeavours to establish and maintain a productive relationship with all the workers or employers in coverage is a significant burden, far more demanding than the obligation to negotiate in good faith that exists in the current Employment Relations Act (Ministry of Business, 2021[39]). This problem is all the more acute given that New Zealand has few employer organisations and union coverage is low, at 19%. In the event that agreement is not reached, the Employment Relations Authority will make a binding determination. In many cases the system is likely to result in bargaining stalemates and determinations fixing terms by the Employment Relations Authority, limiting the added benefit of bargaining (MBIE, 2021[40]).

As discussed in the 2019 *OECD Economic Survey*, cross-country evidence suggests that Fair Pay Agreements could increase employment and reduce wage inequality for full-time employees (OECD, 2018[41]) but reduce both labour- and multifactor productivity growth in the covered sectors (OECD, 2017[42]). This suggests that lower flexibility at firm level, which characterises centralised bargaining systems, may result in lower productivity growth. OECD (2018[41]) suggests that organised decentralisation within the framework of sector-level agreements (Traxler, 1995[43]), which allows for elements of working conditions and organisation to be determined at company or individual level under certain conditions, may deliver better employment and wage inequality outcomes without lower productivity. As sector-level agreements that also cover small and medium-sized businesses, Fair Pay Agreements could help spread best practices in terms of personnel management, training, health and safety, technology usage,

insurance, or retirement packages (OECD, 2019[44]). In this regard, Fair Pay Agreements could play a significant role in enhancing labour market security and strengthening workers' labour market adaptability (OECD, 2018[41]). As evolving demands for products and services as well as technological change are quickly affecting skills needs, the social partners could provide active support to workers displaced from their existing jobs to help them back into good jobs (OECD, 2019[44]).

Fair Pay Agreements may help to unwind some of the wage compression that has occurred owing to large minimum wage increases by strengthening bargaining power for workers earning more than the minimum wage. As a result of substantial minimum wage increases, low-paid workers have experienced higher wage growth than middle- and high-paid workers; wage-rate growth for the least educated workers has also far outstripped that for the most educated workers (Table 1.13).

Poor targeting of the proposed system may create significant labour market inflexibility and costs when it is used in sectors without a demonstrable labour market issue, such as a 'race to the bottom' in sectors with heavy use of tendering (MBIE, 2021[40]). The low threshold for initiation means that the system could be used in situations where the marginal improvement in terms and conditions for existing workers is achieved at a significant cost to employer flexibility, raising the risk that the system reduces productivity and that benefits to workers are less than costs to employers and of providing the system. Such problems could be attenuated by raising the threshold for initiation or limiting coverage to sectors with clearly identified labour market problems.

Table 1.13. Hourly earnings have grown fastest for those in the lowest-paid jobs or with the lowest levels of education attainment[1]

	2013	2021	% change
	NZD		
Occupation[2]			
Low paid[3]	16.0	22.0	37.5
Middle paid[4]	20.4	26.0	27.8
High paid[5]	28.6	35.4	23.5
Education attainment			
Below upper secondary education	18.4	24.2	31.6
Upper secondary	18.4	24.0	30.3
Post-secondary non-tertiary education	19.4	21.4	10.2
Bachelor's or equivalent	26.9	32.0	19.2
Postgraduate	32.6	38.4	17.7

1. Median earnings for main wage and salary job. Comparable data for earlier years are not available
2. Low-paid, medium-paid and high-paid occupations have average hourly earnings at least one standard deviation below the mean, within one standard deviation of the mean or at least one standard deviation above the mean, respectively.
3. Sales workers and labourers.
4. Technicians and trade workers, community and personal service workers, and clerical and administration workers.
5. Managers and professionals.

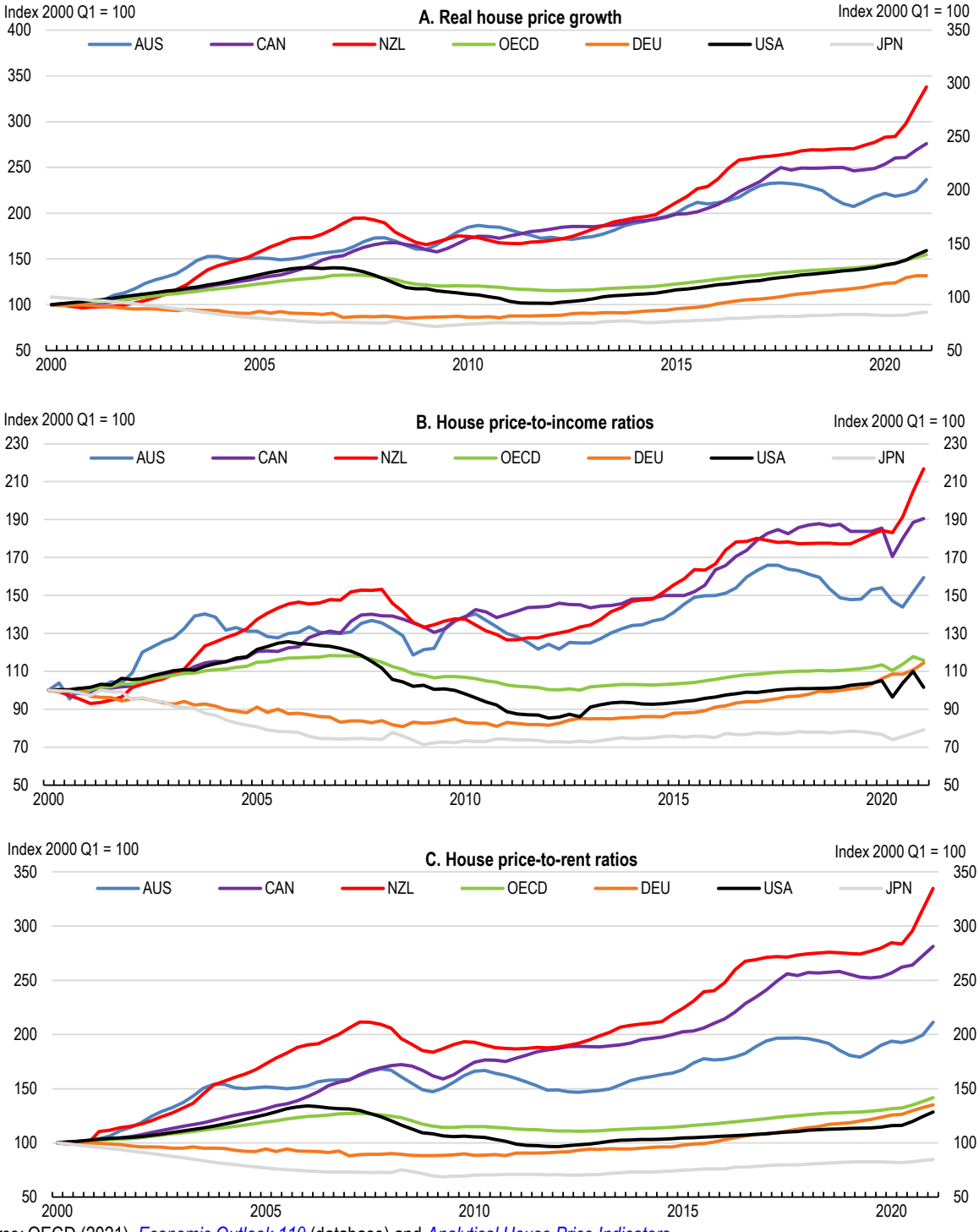
Source: Secretariat calculations using data adapted from Stats NZ income statistics

Making housing more affordable

Runaway house prices are a major drag on wellbeing in New Zealand, especially for first-home buyers, and are by far the greatest concern identified by households in the IPSOS NZ Issues Monitor (2021[45]). Real house prices had already increased much more than in most other OECD countries since the turn of the century before the COVID-19 pandemic hit (Figure 1.35, Panel A), but went on to rise by another 30% since then, largely owing to the monetary policy measures implemented to support the economy (Reserve Bank of New Zealand, 2021[46]). House prices have also increased more relative to fundamentals – household income and rents – than in most other OECD countries (Panels B and C). The large rise in house prices has increased wealth inequality between house-owners and non-owners. Had the price of

non-housing assets remained constant, it would have reduced overall wealth inequality, which was close to the OECD average in 2018 (OECD Wealth Distribution Database), because the majority of households in New Zealand own housing and the wealthiest households hold a higher share of their wealth in non-housing assets than the rest of the population (Symes, 2021[47]). However, amidst rapidly rising prices for most assets, it is not clear *a priori* how the wealth distribution has changed.

Figure 1.35. Real house prices have increased more than in other OECD countries



Source: OECD (2021), *Economic Outlook 110* (database) and *Analytical House Price Indicators*

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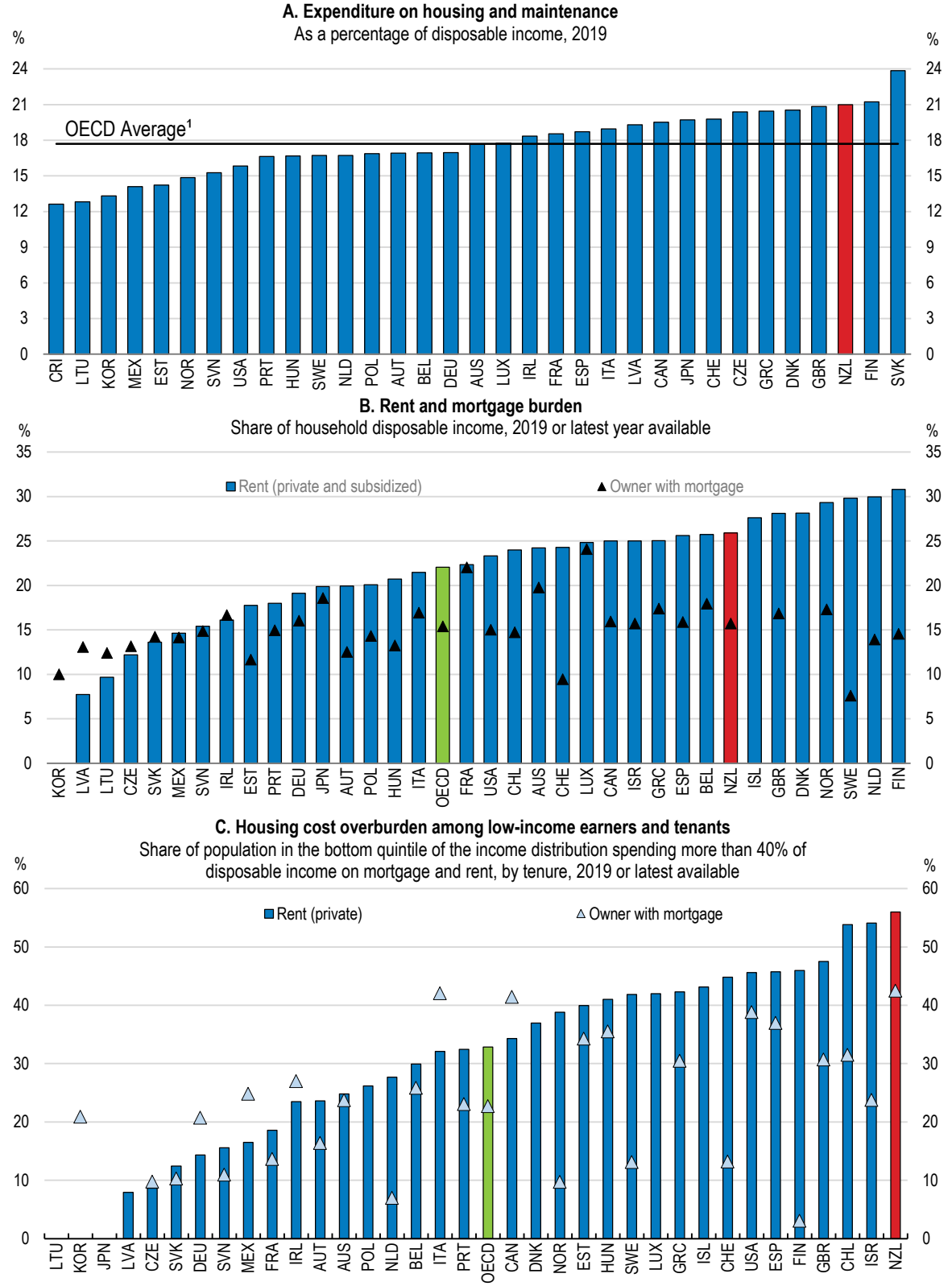
Housing affordability is also low by international comparison. National Accounts data show that the share of income spent on housing is higher in New Zealand than in most other OECD countries (Figure 1.36, Panel A). The New Zealand share is, however, somewhat overstated as proxy rental properties used to estimate imputed rentals are not stratified by location, resulting in the weight for Auckland, where rental properties are both more common and more expensive, being too high. Actual expenditure on rent (i.e., excluding imputed rentals) in the private- and subsidised (i.e., social) rental markets taken together is high as a share of income (Panel B), especially for low-income households renting in the private rental market (Panel C). The share of social rental housing in the total housing stock is low in New Zealand (Figure 1.37, Panel A) and, despite government funding for an additional 8 000 units between 2021 and 2024, will remain low. New Zealand spends a higher than OECD average share of GDP on housing allowances (Accommodation Supplement, which is not available to people in social housing, whose rents are already subsidised) (Panel B).

The long-term increase in real house prices and decline in affordability reflect strong demand growth combined with a weak supply response; as noted above, the recent spike in prices reflects the increase in demand resulting from substantial easing in monetary policy, an increase that has been accentuated by the expectation that housing supply will be slow to respond. While strong income growth has boosted demand, this factor only accounts for a small part of the price rise since 2000 given that the house price-to-income ratio has risen sharply (see Figure 1.35, Panel B). A major driver of demand has been the decline in interest rates since the 1990s, which has been greater than in most other countries. Another has been the large increase in net migration from the turn of the century until 2020, when COVID-related border restrictions slowed net migration to a trickle. Coleman and Landon-Lane (Coleman and Landon-Lane, 2007[48]) estimate that a 1% increase in population pushes house prices up by 10%, largely because housing construction fails to respond rapidly to new demand from immigration.

The housing supply response has been constrained by restrictive and complex land-use planning, infrastructure shortages and insufficient construction-sector capacity (2017 and 2019 *Economic Surveys of New Zealand*). While housing supply responsiveness is higher than in many European countries, it is lower than in North America and Nordic countries and has not been sufficient to contain house prices in a context of huge declines in interest rates and high population growth. New housing supply lagged substantially behind demographic demand over the past decade (Figure 1.38), especially in Auckland, where the shortage is estimated to have reached 40 000 to 55 000 dwellings (Coleman and Karagedikli, 2018[49]).

Figure 1.36. Housing affordability is low



1. Sample average excluding Chile, Mexico, Korea and the United States for which gross income instead of disposable income is used.
Source: Stats NZ; OECD (2021), *National Accounts at a Glance*; OECD (2021), *Affordable Housing database*

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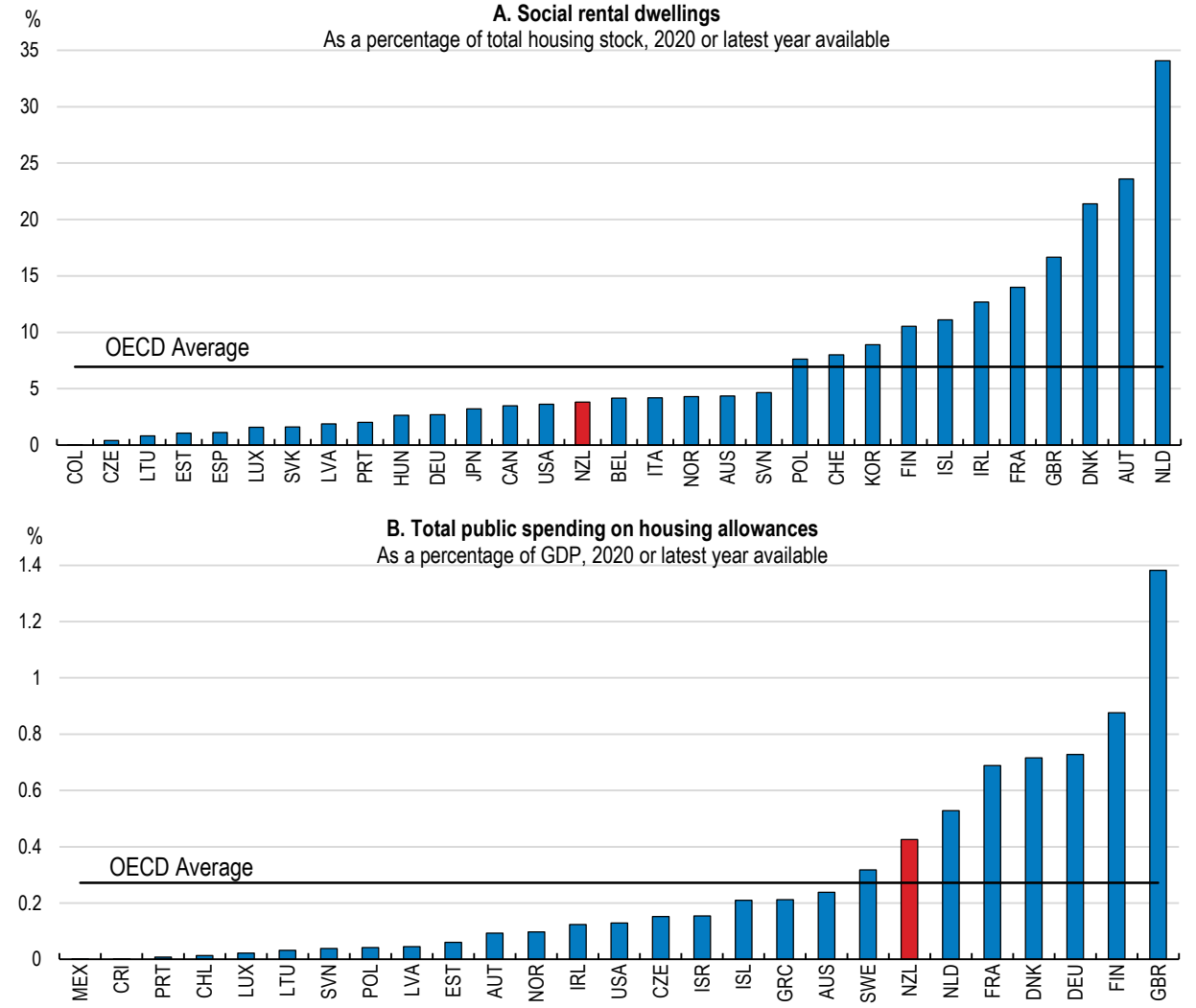
Figure 1.37. The share of social housing is low and public expenditure on housing allowances is high



Note: For New Zealand, data on social rental dwellings refer to the number of social housing places (public housing) that are funded through central government, and do not include social housing provided by local authorities (15% of the social housing stock). For more details about the data for the other countries, see the OECD Questionnaire on Social and Affordable Housing, 2021.

Source: *OECD Questionnaire on Affordable and Social Housing* (QuASH), 2021.

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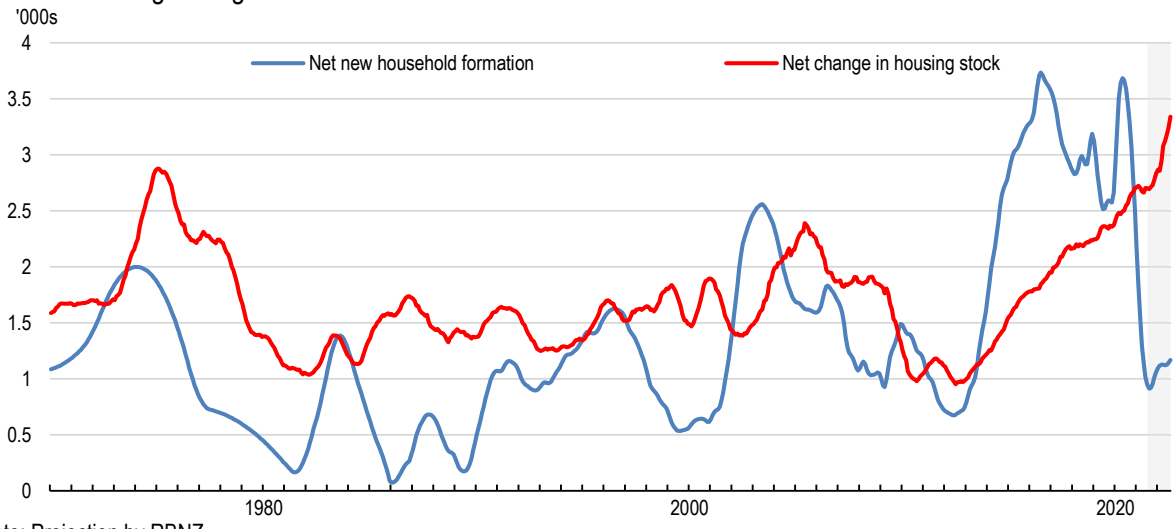
Figure 1.38. New housing supply ran behind demographic demand in the years preceding the pandemic

12-month moving average



Note: Projection by RBNZ.

Source: Reserve Bank of New Zealand (2021), *Monetary Policy Statement, August 2021*

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To increase the housing market's capacity to respond to demand, the government released the Urban Growth Agenda (UGA) in 2019. Its primary focus is on removing barriers to supply in the urban land- and infrastructure markets, as recommended in past *Surveys* (Table 1.14). Through accommodating and managing growth, the UGA also aims to improve choices around the location and type of housing, improve access to employment, education and services, assist emission reductions and build climate resilience, and enable quality-built environments, while avoiding unnecessary sprawl. The UGA consists of five interconnected focus areas that cover aspects of urban and infrastructure planning and provision:

- **Infrastructure funding and financing** enabling a more responsive supply of infrastructure and appropriate cost allocation;
- **Urban planning** to allow for cities to make room for growth, support quality-built environments and enable strategic integrated planning;
- **Spatial planning** (initially focused on Auckland and the Auckland-Hamilton corridor) to build a stronger partnership with local government as a means of developing integrated spatial planning;
- **Transport pricing** to ensure the price of transport infrastructure promotes efficient use of the network; and
- **Legislative reform** to ensure that regulatory, institutional and funding settings are collectively supporting UGA objectives.

The government is making progress in reducing urban planning barriers to housing supply. The National Policy Statement on Urban Development 2020 (NPSUD) puts in place the urban and spatial planning pillars of the UGA. The NPSUD, which sets out objectives and policies for urban development to which councils must give effect under the Resource Management Act 1991 (RMA), removes overly restrictive barriers to growth up and out in locations that have good access to existing services, public transport networks and infrastructure. It also directs local authorities to facilitate greater supply and make planning responsive to changes in demand, while seeking to ensure that new development capacity enabled by councils is of a form and in locations that meet the diverse needs of communities and encourages well-functioning, liveable urban environments. These reforms will be taken further with the Natural and Built Environment Act (NBA) that the government is currently consulting on to replace the RMA, which has imposed excessive planning restrictions on urban construction. The NBA will provide for land use- and environmental regulation, laying

out a mandatory set of national policies and standards to support natural environmental limits, outcomes and targets. These will be incorporated into combined regional plans prepared by local and central government and local Māori tribes (mana whenua). The main difference from the RMA is that people will have to work towards stated outcomes – this represents a shift to planning from consenting, which is effects based. An outcomes-based system, however, could be inefficient as the costs of achieving the stated outcomes could be excessive in some localities. There are related concerns about the high degree of central planning and a potential lack of protection of private property rights, for example from a loss of property value caused by a heritage protection classification included in the local council's district plan, without compensation for the owner.

Table 1.14. Past OECD recommendations on housing and actions taken

Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous Survey
Replace strict regulatory containment policies (such as restrictions on multi-dwelling units, minimum lot sizes, density controls and minimum parking requirements) with clear rules around overshadowing, building size according to location and green spaces.	The National Policy Statement on Urban Development 2020 removes overly restrictive barriers to growth up and out in locations that have good access to existing services, public transport networks and infrastructure. The Resource Management Act was amended in December 2021 to permit greater housing density in New Zealand's five largest cities. The reform allows up to three dwellings of up to three storeys that occupy no more than 50% of the site without the need for planning consent.
Through the Urban Growth Agenda, provide clear overarching principles for sustainable urban development. Support widespread adoption of initiatives that have been successful in the Auckland Unitary Plan, such as spatial planning and upfront consultation.	The Urban Growth Agenda (UGA) aims to make urban land, and hence urban housing, more affordable. This objective is supported by wider objectives to improve choices about the location and type of housing, improve access to employment, education and services, assist emission reductions and build climate resilience, and enable quality-built environments, while avoiding unnecessary sprawl. The UGA supports spatial planning. The government now has a number of Urban Growth Partnerships in place developing spatial plans. The Resource Management Act reforms will introduce Regional Spatial Strategies.
Increase user charging for water and roads, and remove barriers to greater use of targeted local taxes on property value increases resulting from changes in land use regulation or from infrastructure investment. **Give councils access to additional revenue linked to local development and shift the tax base for local government rates to unimproved land value.**	No progress has been made in increasing user charging for water, which is limited to Auckland, Nelson and Tauranga, or introducing congestion charging, although it is being considered in Auckland for 2024, when major improvements in public transport will be completed. Barriers to greater use of targeted local taxes on property value increases have not been reduced. No action taken
With support from the new infrastructure body, broaden the range of infrastructure financing options available to councils through greater access to public-private partnerships and project-specific bond issues.	The Infrastructure Funding and Financing Act 2020 gives councils greater access to finance through Special Purpose Vehicles (SPVs) to fund and construct infrastructure to support housing and urban development. A government agency is working with local councils to put deals together. None has come to fruition yet, but the Infrastructure Acceleration Fund makes this more likely as it requires co-funding, which could come from such SPVs.
Consider moving to a system of proportionate liability for the building sector, with consumer protected by mandatory backstop insurance overseen by a single central government agency. Introduce government-backed provision of building insurance on a competitively neutral basis if a viable market cannot be sustained with private-sector insurers alone.	No action taken.
Facilitate competition in construction through a Commerce Commission market study and extending suspension of anti-dumping actions on residential building materials.	A Commerce Commission market study into building supplies will begin in late 2021. The suspension of anti-dumping actions on residential building materials lapsed in 2019. Instead a new test was inserted in the Trade (Anti-dumping and Countervailing Duties) Act 1988 which requires consideration of the public interest (including cost to downstream industries and consumers) before a duty may be imposed. This test enables consideration of competition concerns.

Re-focus KiwiBuild on enabling the supply of land through aggregating land holdings and de-risking development sites.	No action taken. However, the National Housing and Urban Development Authority (Kāinga Ora – Homes and Communities) established in 2019 and using and/or devolving the powers under the Urban Development Act 2020 can assist with land amalgamation, including through compulsory acquisition as a last resort.
Give greater priority to new rental housing.	In the KiwiBuild reset announced in September 2019, the government announced that it would look for opportunities for build to rent with long-term institutional investors.
Cease underwriting or purchasing homes and end the government's role in allocating houses to buyers.	In the KiwiBuild reset, the government announced that it would reduce the amount available to underwrite future developments.
Reduce government subsidies for home ownership beyond those available through the tax system to reduce upward pressure on prices and adverse distributional effects.	No action taken.
Phase out KiwiSaver first-home withdrawal and First Home Loans.	In the March 2021 housing package, the government increased house price caps and income limits for First Home Grants and First Home Loans. No action has been taken on KiwiSaver first-home withdrawals.
Increase social housing provision in areas with shortages, including through expanding partnerships with non-governmental organisations and reallocating funding from KiwiBuild.	A further 8 000 public and transitional homes were funded through Budget 2020 and the public housing plan released in January 2021 signalled where those homes would be delivered. The Affordable Housing Fund is intended to support partnerships with non-governmental organisations to deliver affordable rentals. Kiwibuild funding – initially NZD 2 billion – is a recyclable fund that must be returned to the Crown at the end of the 10-year programme. This means it cannot be applied as grants to public housing without additional funding.
Remove water-rate subsidies to social housing tenants paying market rents.	No action taken.
Begin regular tenancy re-assessments for all occupants of social housing, accompanied by increased efforts to help tenants achieve financial independence and self-sufficiency.	Exemptions were broadened in 2018-19 to cover 81% of tenants, including those with children aged 18 or under and those aged 65 or over. For the remaining minority, social housing tenancy reviews have been put on hold since the beginning of the COVID-19 pandemic.
Tighten conditions for landlords to end a tenancy, as planned, and cap annual rent increases in line with local market rent growth.	The Residential Tenancies Amendment Act 2020 prohibits landlords from terminating periodic tenancies without grounds – landlords can only terminate tenancies for the reasons cited in the Act or subsequent regulations. The Act also limits rent increases to one per year and prohibits rental bidding by prospective tenants.
Limit the tax deductibility of losses from rental property investments by only allowing them to be offset against future rental income.	The government limited the tax deductibility of rental property losses to future rental income, with effect from the 2019-20 tax year.

In September 2021, the government released the Government Policy Statement on Housing and Urban Development (New Zealand Government and Ministry of Housing and Urban Development, 2021[50]), which sets out the government's vision for housing and urban development and the key actions underway to realise this vision. In addition to system reforms like the Urban Growth Agenda, Reform Management Act reforms and tax settings, the Statement also outlines how the government will work with others and look to catalyse and enable development through government-led development and partnering with others – with a strong focus on partnering with Māori. A key focus is to increase the supply of affordable homes for ownership and rent.

In December 2021, the Resource Management Act was amended with cross-party support to reform urban planning laws to permit greater housing density in New Zealand's five largest cities (Auckland, Wellington, Christchurch, Hamilton and Tauranga). The changes allow up to three dwellings of up to three stories that occupy no more than 50% of the site without the need for planning consent. Previously, district planning laws typically only allowed for one dwelling of up to two stories per site. It is estimated that these changes will increase housing supply by 48 000 – 105 000 over the next five-eight years. City councils in the five largest cities are required to apply these new Medium Density Residential Standards from August 2022.

Progress is proving to be more difficult in alleviating the infrastructure barrier to increasing housing supply – local councils have little capacity to borrow money to build new housing-related infrastructure and no incentive to increase rates on current property owners to pay for it. A step towards alleviating this barrier

was taken with the Infrastructure Funding and Financing Act 2020. It gives local councils greater access to finance through Special Purpose Vehicles (SPVs) to fund and construct infrastructure to support housing and urban development. SPVs will repay any finance raised by charging a levy to those who benefit from the infrastructure (for example, homeowners in the area serviced by the new infrastructure). A government agency is working with local councils to put deals together. However, none has come to fruition yet. Local councils still need greater incentives to accommodate growth, for example by sharing tax bases linked to local growth, as recommended in past *Surveys* (see Table 1.14).

The government announced a package of measures in March 2021 to increase housing supply, especially of affordable housing, and to discourage investment in rental properties other than new builds. A key measure was the creation of the Housing Acceleration Fund (NZD 3.8 billion), to increase the pace and scale of home building. It includes the Infrastructure Acceleration Fund (NZD 1 billion, NZD 350 million of which is ring-fenced for the Māori Infrastructure Fund), which is to help fund the critical infrastructure needed for housing development, especially in locations that have infrastructure constraints and that are facing the biggest housing supply and affordability challenges. The Housing Acceleration Fund also includes additional resources to accelerate the development of vacant or underutilised Crown-owned land, operate in more regions, and deliver a broader range of affordable housing options for rental and homeownership. Furthermore, the government will allow the Homes and Communities government agency (Kāinga Ora) to borrow an additional NZD 2 billion to purchase land and support its development. To discourage investment in rental properties other than new builds, the government extended the bright line for capital gains to be taxable from five- to ten years on all future purchases of investment properties except new builds and phased out mortgage interest deductibility over the next four years on all investment properties other than new builds, which will retain deductibility for 20 years, and properties on which capital gains are taxable.

The planning measures implemented, and those taken in recent years, such as the Auckland Unitary Plan and policy changes to facilitate reconstruction following the 2010 and 2011 Canterbury earthquakes, have contributed to increasing the responsiveness of housing supply to demand – new housing supply is growing at the fastest pace in half a century (see Figure 1.38). Moreover, they have supported a large switch from construction of single to multi-dwelling properties (apartments and townhouses), especially in Auckland. This switch has increased the supply of more affordable, conveniently located housing. Building consents data suggest that new housing supply will be growing even faster by mid-2022. Supply will get a further boost as the March 2021 measures gain traction. Combined with the decline in demographic demand associated with the sharp fall in net migration, the high level of house construction should continue to drive down the shortage that developed in recent years and, should net migration remain much lower than in the past, as expected, eliminate it within the next few years.

Several factors are likely to reduce demand for housing further. The most important are an increase in interest rates to more neutral levels, which would make residential property investment less attractive and result in a substantial increase in debt servicing costs (Figure 1.39), and intensified use of macro-prudential tools (see above). The government's recent tax measures to discourage investment in existing rental properties together with lower LVR limits on mortgages for such properties has already reduced the share of mortgage lending for them from 21% at the beginning of 2021 to 17% in November. With increased housing supply and reduced demand, the Reserve Bank expects house prices to begin to fall modestly from late 2022, eventually reaching more sustainable levels (Figure 1.40). If nominal house prices were to remain at their current level, it would take eight years for the median price-to-income ratio to return to the pre-COVID level.

Figure 1.39. Debt servicing costs for new buyers would be much higher at neutral interest rates[1]

Estimated debt servicing costs[2] for new buyers as a share of income

1. The neutral interest rate is the short-term interest rate at which monetary policy is neither expansionary nor contractionary. The neutral 5-year mortgage rate equals the neutral short-term rate plus a term premium plus lenders' interest-rate margin.
2. Debt servicing costs include both interest and principal repayments, based on a 30-year mortgage term. Estimates are for buyers purchasing at the median selling price with a 20% deposit.

Source: Reserve Bank of New Zealand (2021), *Monetary Policy Statement, August 2021*

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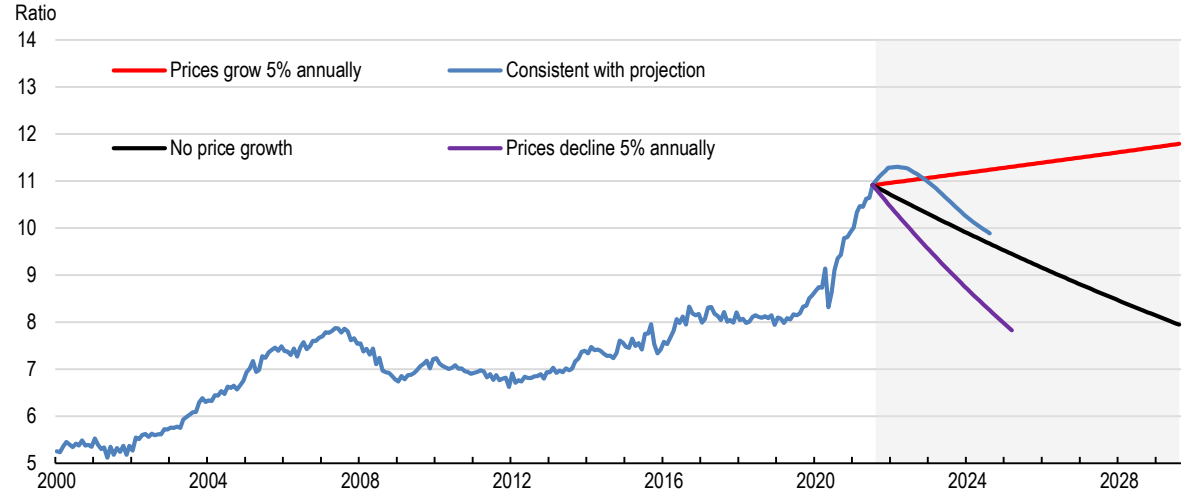
Figure 1.40. It will take many years for the median house price-to-income ratio to return to the pre-COVID level if house prices do not fall

House price-to-income ratio



Note: Projection by RBNZ.

Source: Reserve Bank of New Zealand (2021), *Monetary Policy Statement, August 2021*

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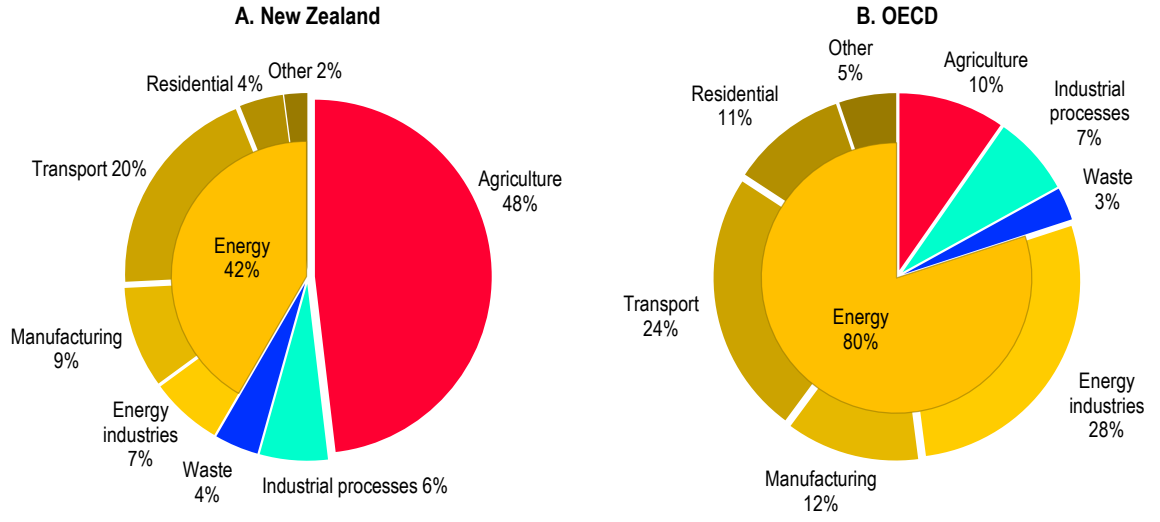
Making economic growth more environmentally sustainable

Reducing greenhouse gas emissions

New Zealand has amongst the highest GHG emissions (excluding land use, land-use change and forestry) per capita among OECD countries and they have only declined by 10% since 1990, less than the OECD average (see Figure 1.7). Energy-sector emissions comprise 42% of total emissions (Figure 1.41, Panel A) and are growing rapidly (44% since 1990), mainly driven by very high growth (96%) in road transport emissions; energy industries' emissions share is much lower than the OECD average (Panel B) because electricity generation is 81% renewable (mainly hydraulic). The other major contributor is biological emissions from agriculture – mainly methane – that make up almost half of total emissions, a much higher share than the OECD average. They have grown by 17% since 1990, driven by increased use of synthetic nitrogen fertiliser and higher dairy cattle numbers. Emissions will need to fall substantially in both of these sectors if New Zealand is to transition to a low-emissions economy.

Figure 1.41. The agricultural sector accounts for a large share of GHG emissions in New Zealand

GHG emissions share (excluding land use, land-use change and forestry), 2019



Source: OECD (2021), *Green Growth database*

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New Zealand is estimated to have met its unconditional commitment to reduce GHG emissions by 5% from the 1990 level by 2020 by relying on net emissions and removals from eligible forestry activities (109.2 Mt CO_2-e) and carrying over unused units (23.1 Mt CO_2-e) from the first Kyoto commitment period to fall within the carbon budget for 2013-2020 (509.8 Mt CO_2-e). It is unlikely that New Zealand will be able to respect future international commitments without substantially reducing gross emissions – it is not clear what future rules will be concerning forestry sinks and international carbon markets have lost credibility in recent years (Figure 1.42).

Reducing GHG emissions has become a more pressing policy priority in recent years. A major step forward was the passage of the 2019 'zero carbon' amendments to the Climate Change Response Act 2002. The amended Act aims to achieve net zero GHG emissions excluding methane from agriculture and waste (over 40% of current emissions and mostly from agriculture) by 2050 and at least a 24-47% reduction in these methane emissions from 2017 levels (with an interim target of 10% by 2030). It also created the Climate Change Commission to advise the government on feasible policies to meet abatement targets and adaptation strategies, recommend domestic emissions budgets and hold it accountable. The Commission (2021[51]) recommended gross domestic emissions budgets for the period 2021-2035 that entail progressively deeper reductions, thereby reducing the costs of stranded assets and avoidable business

failures from making steeper cuts upfront. If these budgets were achieved, long-lived GHG emissions would be cut by 63% by 2035 from the 2019 level, biogenic methane emissions by 17% and total emissions by 42%.

Another major improvement to framework conditions is the strengthening of the longstanding New Zealand Emissions Trading Scheme (NZ ETS), which is New Zealand's most important abatement instrument – it covers emissions from 96% of non-agricultural GDP (Box 1.7). The New Zealand Climate Change Response (Emissions Trading Reform) Amendment Act 2020 aligns the NZ ETS with the goals of the Paris Agreement and the 'zero carbon' amendments to the Climate Change Response Act 2002. The Emissions Trading Reform sets a cap on available emission permits that is derived from the carbon budgets and limits permits entering the system much more than in the past, bringing New Zealand's ETS into line with other cap-and-trade schemes and potentially opening the way for linkage to them. The Reform also phases down free permit allocations to emissions-intensive exporting activities (currently covering 60-90% of permit requirements, depending on the degree of emissions intensity) by a minimum annual rate of 1% over 2021-30, 2% over 2031-2040 and 3% over 2041-2050. It also created a cost containment reserve that can be used to limit prices and a price floor below which permits will not be sold into the scheme. The initial containment reserve trigger price (NZD 50) was breached in the third auction, which was held in September 2021; the clearing prices in the first two auctions, held in March and June 2021, were NZD 36 and NZD 46, respectively. The secondary market price of emissions permits was NZD 68 (EUR 41) per tonne in early December 2021, compared with an EU ETS price of EUR 77.

Box 1.7. Main features of the New Zealand Emissions Trading Scheme

The New Zealand Emissions Trading Scheme (NZ ETS) is a market where emissions permits are traded. The unit of account is the New Zealand unit (NZ unit, or unit for short), which equals one tonne of carbon dioxide. Buyers are businesses in the NZ ETS, all of which are required to give the government a unit for every tonne of greenhouse gas (GHG) emissions (CO_2 equivalent) they emit. Sellers are eligible foresters who receive units from the government for carbon dioxide absorbed by their trees and entities that hold more units than they need. Units also enter the market through free allocations from government to businesses that are emissions intensive and highly exposed to international competition. The government also sells units directly to the NZ ETS through auctioning, which began in March 2021. While provision has been made for approved overseas units to enter the system, no overseas units have yet been approved.

The government sets a cap on emissions covered by the NZ ETS based on the five-yearly emissions budgets mandated by the New Zealand Climate Change Response (Emissions Trading Reform) Amendment Act 2020 that are updated annually after deducting emissions not covered by the ETS (just over one half of the total). Net emissions budgets are currently 292, 307 and 212 million tonnes of CO_2 equivalent over 2022-2025, 2026-2030 and 2031-2035, respectively (73, 61.4 and 48.4 million tonnes of CO_2 equivalent in annual average terms, respectively). For the first five-year period, the average annual cap on gross emissions is 31.9 million tonnes of CO_2 equivalent and the share of free allocations progressively falls to 22% by 2026 (Table 1.15).

Table 1.15. NZ ETS unit limit settings

	Millions			
	NZ units available by auction	Approved overseas units used	Overall limits on units	Free allocations % of total
2022	26.3	0.0	34.5	23.8
2023	25.6	0.0	34.5	25.6
2024	25.0	0.0	32.9	24.0
2025	23.3	0.0	29.6	21.3
2026	21.7	0.0	27.9	22.2

The Act also created a cost containment reserve that can be used to limit unit prices and a price floor below which permits will not be sold at auction into the scheme. The trigger price for releasing units from the cost containment reserve into the NZ ETS was NZD 50 in 2021, rising to NZD 70 in 2022 and NZD 98.34 by 2025. The floor price was NZD 20.40 in 2021, rising to NZD 21.56 by 2025.

Source: New Zealand Ministry for the environment

The Act also subjects agricultural GHG emissions to a carbon price, as recommended in past Surveys (Table 1.16), from 2025. The favoured option is to cover them by a farm level levy/rebate system. A partnership between the government and the agricultural sector has been established to prepare for this pricing mechanism, including the development of on-farm accounting and reporting systems for GHG sources and sinks. However, if this partnership has not made enough progress by 2022 for implementation in 2025, agricultural emissions will be brought directly into the NZ ETS from 2022, with livestock emissions priced at the processor level (e.g., milk processors and abattoirs). GHG emissions from fertilizers would then probably be covered upstream under the NZ ETS at the importer/manufacturer level. If agriculture is brought within the ETS, free allocations of permits will initially cover 95% of the sector's requirements.

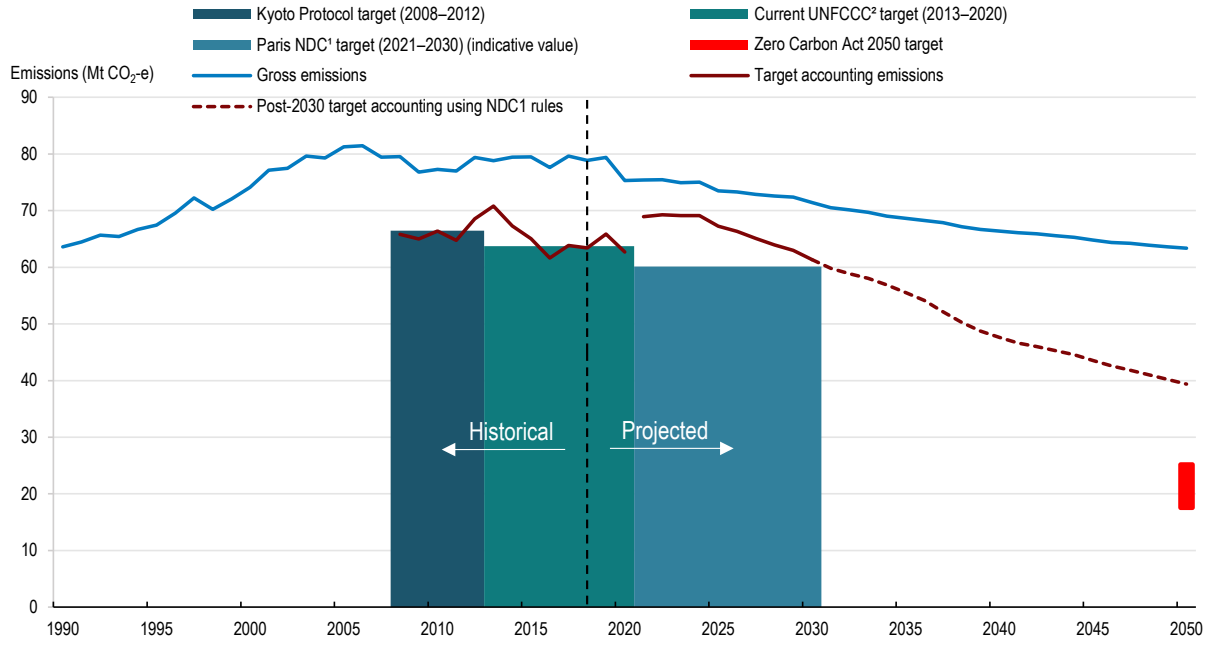
With current measures and assuming a carbon price of NZD 35 per tonne of CO_2 equivalent in the ETS, which was the cap before the first permit auction occurred, New Zealand is not on track to meet either its 2030 objective (30% below the 2005 level or 11% below the 1990 level) or its 2050 objective (Figure 1.42). The government is currently preparing an Emissions Reduction Plan for publication in 2022 which is to outline policies and actions to help bridge the gap between the current emissions trajectory and the trajectory required to meet the 2050 targets. The Climate Change Commission (2021[51]) estimates that New Zealand can meet its abatement objectives from domestic sources with increases in the carbon price to NZD 140 per tonne by 2030 and NZD 250 per tonne by 2050 and implementation of the package of measures it recommends, which include the following:

- Make sure that all government policy and investment decisions support the transition to low emissions;
- Support innovation, mobilising finance for low-emissions investments and supporting behavioural change;
- Reduce emissions from existing and new urban areas, including by phasing out gas connections to homes;
- Introduce measures to ensure that vehicles entering the fleet are efficient, accelerate the uptake of electric vehicles, and create options to decarbonise heavy transport and freight;
- Decarbonise the energy system;
- Accelerate the switch to low-emissions fuels for process heat and transform buildings to have low emissions;
- Introduce policies, tools and incentives to speed up emissions reductions from agriculture;
- Reduce reliance on forestry carbon removals, manage afforestation and incentivise the reversion and planting of new native forests to create a lasting carbon sink;
- Develop an equitable transition strategy.

Complementary measures to carbon pricing are essential to reduce abatement costs, not only where it is too costly or technically difficult to apply pricing mechanisms to individual emitters, but also where there are market failures not addressed by carbon pricing. For example, higher carbon prices increase demand for housing that is close to amenities and well served by public- and active transport options but complementary urban planning policies, such as the Urban Growth Agenda (see above), and transport policies are needed to make the supply of such housing more responsive to demand (i.e., to increase the price elasticity of supply of such housing). Similarly, while higher carbon prices increase demand for more

energy-efficient buildings, regulations that establish more demanding standards than would otherwise be met reduce information failures that arise from buyers not being well informed about the long-run costs and benefits of adopting lower emissions options or believing that these benefits would not be reflected in the price of their building when they sell or let it, resulting in a greater increase in the supply of such buildings than otherwise. Another example of complementary policies is the need for public support for Electric Vehicle (EV) charging infrastructure, which helps to overcome coordination problems in the diffusion of EVs (people will not buy EVs if the charging infrastructure is inadequate and investors will not supply such infrastructure if there are too few EVs to make it profitable). In other words, a suite of policies is needed to achieve abatement targets at least cost, with emissions pricing working in conjunction with companion policies that that help to provide a wider range of low emissions options. At the same time, it will be important to ensure that measures are indeed complementary to carbon pricing to avoid risk of high-cost abatement in situations where lower-cost abatement would be forthcoming through the ETS. An example where caution would be required is the proposed NZ Battery Project, which would provide the electricity system with a backup for intermittent supply from renewables and thereby enable the renewable share to be increased from around 93% under a business as usual scenario to 100%. On the one hand, there is risk of abatement costs far higher than the NZ ETS price, and a risk of lower demand for emissions permits from electricity generators that lowers the permit price, resulting in lower-cost abatement elsewhere not occurring. On the other hand, careful investigation of long-term emissions reductions can be justified if the time horizon prevents markets from pricing the benefits, and the supply of ETS units in New Zealand can be managed by the government including to account for the impact of complementary measures.

Figure 1.42. New Zealand is not on track to meet its GHG abatement objectives



1. Nationally Determined Contribution.
2. United Nations Framework Convention on Climate Change.
Source: Ministry for the Environment (2021), *New Zealand's Projected Greenhouse Gas Emissions to 2050*

StatLink https://stat.link/b9lczo

Table 1.16. Past OECD recommendations on green growth and actions taken

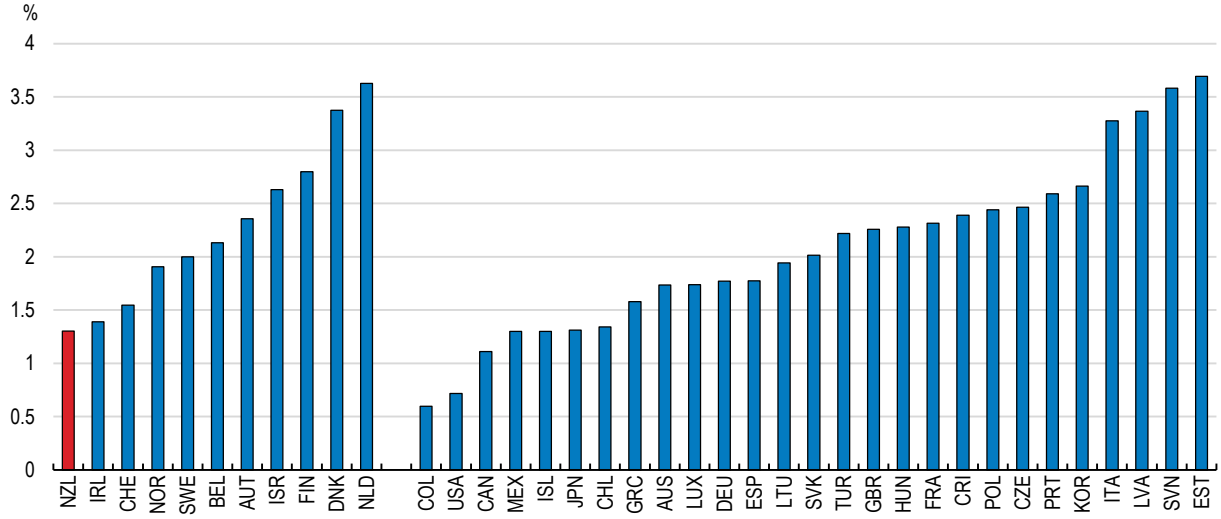
Recommendations in past Surveys (Key ones in bold)	Actions taken since the previous Survey
Increase the price of carbon to a level consistent with New Zealand's intended transition to a low-emissions economy.	The price of permits in the NZ ETS has increased to around NZD 50 per tonne, which is too low to be compatible with an efficient transition to a low-emissions economy.
Announce a date for inclusion of biological emissions in the NZ ETS or alternative pricing and regulatory measures to reduce them.	Biological emissions from agriculture will be priced from 2025, through either a sector-specific scheme or the NZ ETS.
Introduce an excise duty on diesel and ensure that petrol and diesel tax/charge rates consider the environmental costs of transport. Introduce fuel efficiency and air emission standards for new and imported used vehicles.	No action taken.
Extend the waste disposal levy and encourage local authorities to introduce quantity- or volume-based waste charges to help minimise waste, foster recycling and recover costs of waste service.	From 1 July 2021, the government is progressively increasing and expanding the national waste disposal levy. The revenue gathered from the levy will be used to reduce waste and encourage resource recovery (e.g., composting and recycling).
Introduce pollution charges or cap-and-trade measures for water quality. Expand water trading and pricing to ensure scarce water goes to its best use.	No significant action taken. The National Policy Statement for Freshwater Management, which entered into force in September 2020, requires regional councils to include in their regional plans criteria for deciding how to improve and maximise the efficient allocation of water.
Intensify protection of species by continuing to develop a National Policy Statement on biodiversity.	The National Policy Statement for Indigenous Biodiversity was circulated for public consultation in 2020 and is scheduled to come into effect end-2021.

Taxing environmental externalities more effectively

Revenue from environmentally related taxes is relatively low in New Zealand (Figure 1.43). Transport fuel taxes are lower than in most other OECD countries and most fossil fuel uses outside the road sector are not taxed (OECD, 2019[52]). While more effective pricing of carbon and other GHG emissions should be pursued primarily through the New Zealand Emission Trading Scheme, taxation can be used to internalise environmental externalities that the emissions trading scheme cannot address. For instance, taxes for fuels used in transport could be increased to internalise social costs linked to transport, such as local air pollution and congestion (OECD, 2017[23]). As technology improves, congestion charging is likely to be a more efficient way of internalising local social costs caused by transport. The United Kingdom, Singapore and Sweden already have such charges and Israel is planning to introduce one. A cross-party Parliamentary Committee recently recommended that the government should propose legislation to enable congestion pricing, and implement a congestion pricing scheme in Auckland. Since mid-2021, the government is progressively increasing and expanding the national waste disposal levy. The government is also considering a range of other options for increasing environmental taxes.

Figure 1.43. Environmental taxation is limited compared to other OECD economies

Environmentally related tax revenue as a percentage of GDP, 2019 or latest year available



Note: The data refer to 2018 for Colombia and Israel, 2016 for Australia and the United States, 2014 for Canada and Korea. OECD countries with populations above 1 million and below 20 million people, and with a per capita income above USD 30 000 are defined as small advanced economies.

Source: OECD (2021), *Policy Instruments for the Environment (PINE)* (database).

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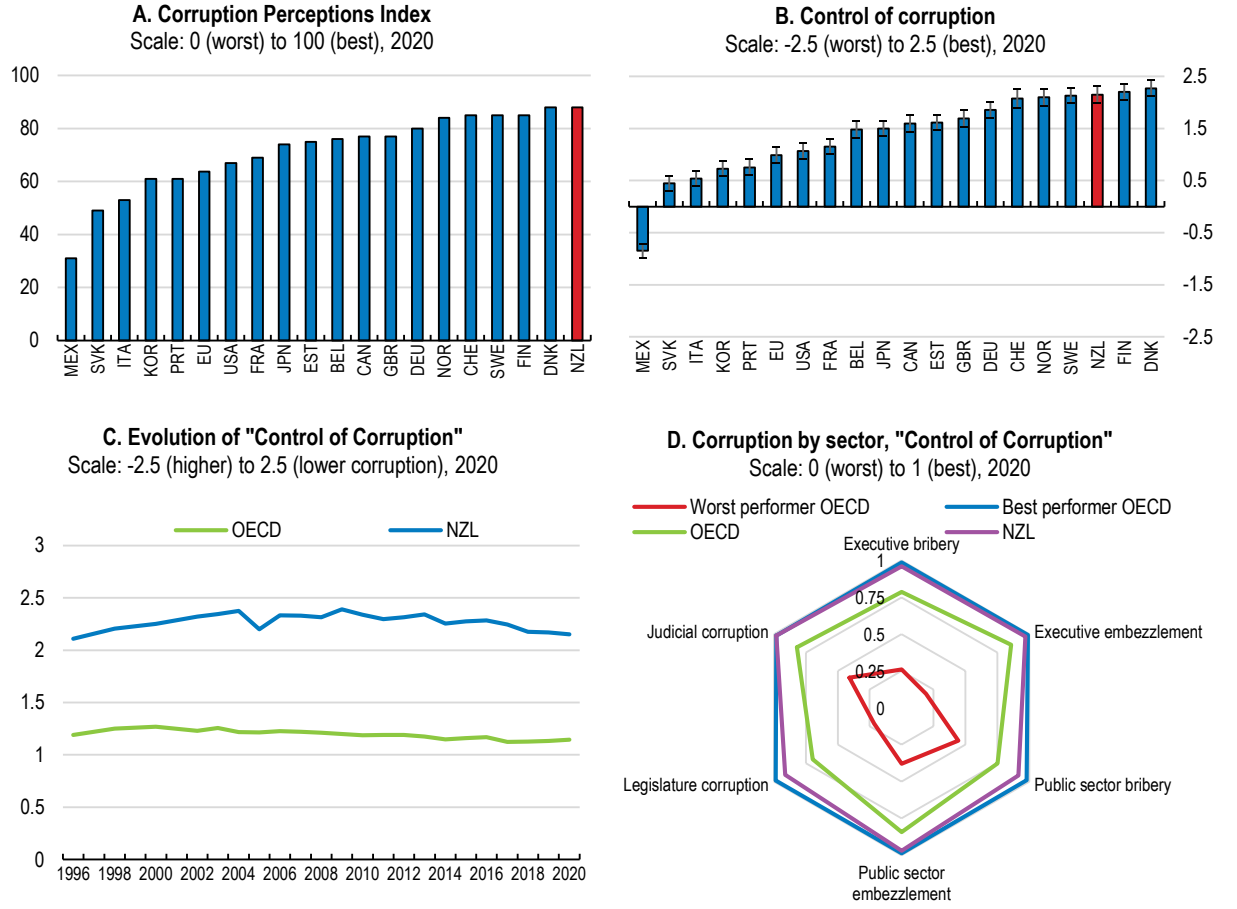
Keeping corruption low

Perceived corruption in New Zealand is equal lowest (with Denmark) in the OECD (Figure 1.44, Panel A), tax transparency is high and anti-money laundering is relatively effective (Figure 1.45). New Zealand's policy settings to control corruption are generally best practice (Figure 1.44, Panels A, B and C). Nevertheless, the OECD Working Group on Bribery's 2016 report (OECD, 2016[53]) stressed the need for New Zealand to strengthen enforcement of its foreign bribery offence. In response, New Zealand has made significant attempts to identify foreign bribery offences. It funds a position at the International Anti-Corruption Control Centre (IACCC), which was set up in 2017, and has responded to around 200 requests from this organisation. However, none of them has led to an investigation of a foreign bribery offence in New Zealand. The Serious Fraud Office (SFO), which investigates financial crimes including corruption, has increased international engagement, cooperating with and providing assistance to overseas agencies and joining the International Public Sector Fraud Forum. The SFO continues to open investigations where information is received that leads to suspicion that an investigation may disclose serious or complex fraud (including corruption) but none has resulted in a corruption charge. Reasons for the apparent lack of cases include that: New Zealand does not have the same risks as other jurisdictions owing to the size and make up of its economy; and a lack of New Zealand activity in issues identified overseas given that New Zealand receives few requests for assistance from foreign agencies other than the IACCC.

Figure 1.44. Corruption is very low



Note: Panel B shows the point estimate and the margin of error. Panel D shows sector-based subcomponents of the "Control of Corruption" indicator by the Varieties of Democracy Project.

Source: Panel A: Transparency International; Panels B & C: World Bank, *Worldwide Governance Indicators*; Panel D: Varieties of Democracy Project, V-Dem Dataset v11

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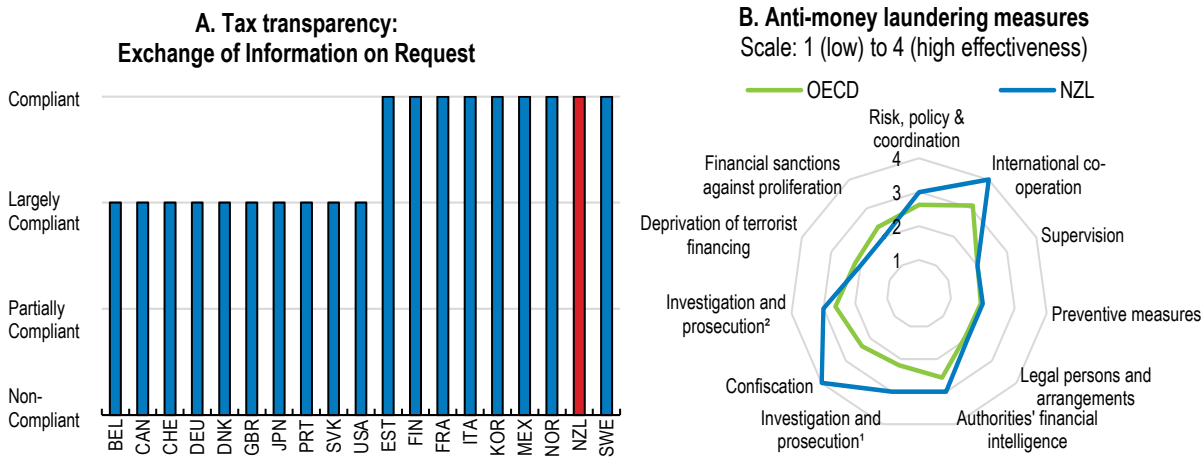
Figure 1.45. Tax transparency is high and anti-money laundering is relatively effective



Note: Panel A summarises the overall assessment on the exchange of information in practice from peer reviews by the Global Forum on Transparency and Exchange of Information for Tax Purposes. Peer reviews assess member jurisdictions' ability to ensure the transparency of their legal entities and arrangements and to co-operate with other tax administrations in accordance with the internationally agreed standard. The figure shows first round results; a second round is ongoing. Panel B shows ratings from the FATF peer reviews of each member to assess levels of implementation of the FATF Recommendations. The ratings reflect the extent to which a country's measures are effective against 11 immediate outcomes. "Investigation and prosecution¹" refers to money laundering. "Investigation and prosecution²" refers to terrorist financing.
Source: OECD Secretariat's own calculation based on the materials from the *Global Forum on Transparency and Exchange of Information for Tax Purposes*; and OECD, *Financial Action Task Force* (FATF).

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Findings and recommendations

FINDINGS	RECOMMENDATIONS [Key recommendations in bold]
Making growth more sustainable in the wake of the COVID-19 crisis	
Faced with the Delta coronavirus variant, the government has moved from an elimination- to a minimisation and protection strategy. Intensive Care Unit (ICU) capacity is low.	**Increase ICU capacity and vaccination rates among vulnerable groups. Once vaccination rates are high, progressively relax border restrictions, as planned.**
The recovery has been rapid and strong and the economy is showing signs of overheating. The government plans to increase the structural budget balance slowly and to reduce medium-term government debt only modestly. In the longer run, population ageing will substantially increase budget deficits and debt on unchanged policies.	**Withdraw fiscal stimulus rapidly to reduce the burden of macroeconomic stabilisation on monetary policy.** **Commit to explicit long-term debt-to-GDP targets.** **Increase the old-age pension eligibility age by linking it to life expectancy and take measures to limit the impact on disadvantaged groups.**
Inflation has increased to well above the Reserve Bank's 1-3% target band but business five-year ahead inflation expectations remain anchored.	**Tighten monetary policy to the extent necessary to bring inflation back within the target band and to ensure that inflation expectations remain anchored.**
Household mortgage debt is high. The Reserve Bank has reduced loan-to-value limits and is consulting on introducing debt-servicing restrictions.	**Complement loan-to-value restrictions by requiring banks to use minimum interest rates for assessing borrowers' debt servicing capacity or by introducing debt-to-income restrictions.**
The government has improved the legal framework for reducing greenhouse gas emissions but is not on track to reach net zero by 2050.	**Complement rising carbon prices from progressively tightening the supply of emissions permits with targeted measures that address market failures not corrected by carbon pricing alone.**
No progress has been made in increasing user charging for water, which is limited to Auckland, Nelson and Tauranga, or introducing congestion charging, although it is being considered in Auckland for 2024, when major improvements in public transport will be completed.	**Ensure that the new water service delivery entities, which are planned to be established by 2024, are enabled and encouraged to apply volumetric charging for water and wastewater.** **Introduce congestion charging in Auckland.**
Increasing productivity, housing affordability and tax efficiency	
Productivity is low by international comparison owing to muted product market competition, weak international linkages and innovation, and skills and qualifications mismatches. The comprehensive FDI screening regime was streamlined in 2021. Effective corporate tax rates are high by international comparison, holding back capital investment and FDI.	**Remove barriers to competition in the retail grocery sector.** **Monitor the effect of reforms in the FDI screening regime and streamline the procedure further if needed.** **Complement R&D tax credits with targeted grants subject to strict evaluation and enhance knowledge transfer from research institutions.** **Consider the appropriateness of the current corporate tax rate.**
The Infrastructure Funding and Financing Act 2020 gives municipalities greater access to infrastructure financing through special purpose vehicles (SPVs) but no deals have yet been made.	**Identify and remove unwarranted barriers to SPV deals.** **Give city councils greater incentives to accommodate growth, for example by sharing local GST receipts.**
Sole parents and single-earner married couples with children face high marginal effective tax rates on earnings above 65% of the average wage owing to high taper rates on means-tested benefits and tax credits.	Increase *Working for Families* abatement thresholds and reduce abatement rates. Review and adjust abatement thresholds more systematically and frequently to ensure that they reflect current living costs and support exiting benefit dependency.
Maintaining labour market flexibility while enhancing equity	
Most displaced workers do not qualify for the means-tested unemployment benefit. The government is now consulting on introducing unemployment insurance to reduce the burden on displaced workers.	**Introduce the Social Insurance Scheme being developed and incorporate design features that encourage a rapid return to employment.**
The government has submitted legislation to introduce Fair Pay Agreements, which specify sectoral or occupational minimum wages and conditions that may come at significant cost to employer flexibility.	Increase the threshold for initiation of FPA bargaining or limit FPAs to low-paid sectors or occupations where there are clearly identified labour market problems and more efficient solutions are not available.

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2 Boosting productivity by unleashing digitalisation

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Effective use of digital technologies enables New Zealanders to participate in society in a more inclusive way, firms to boost productivity and better integrate into the global economy, and the government to offer better services. New Zealand's digital sector and digital innovation have much room for growth. Diffusion of digital technologies and investment in intangible capital that maximises the potential of these technologies could be enhanced by addressing structural bottlenecks. There are severe shortages of specialised ICT skills owing to COVID-19-related border restrictions and a weak domestic pipeline of these skills that partly results from school students' poor mathematics achievement. Some regulations have not kept pace with technological change and risk constraining digital innovation while failing to prevent harmful activities. More intensive use of digital tools is also held back by low availability of high-speed Internet connections in rural areas and a lack of financial support for small businesses. Weak coordination between export promotion and innovation support prevents young firms investing in digital innovation from reaping high returns through exporting. New Zealand should rigorously implement its new national digitalisation strategy so that government agencies and social partners can advance digital transformation.

Better use of digital technologies can deliver productivity gains

Digital technologies have transformed the economy and social interactions in recent decades, with the COVID-19 pandemic accelerating this trend. Digital technologies have considerable potential to boost productivity growth and improve wellbeing. For instance, a wider use of online platforms lowers transaction costs by matching sellers and buyers more efficiently and reducing information asymmetries. Big Data analysis and Artificial Intelligence enhance innovation by helping firms to exploit large and timely data in their R&D activities or introduce novel digital solutions to reduce costs and improve efficiency (OECD, 2020[1]). Digitally-enabled innovations often exert strong economies of scale as they can be replicated with little additional cost (Brynjolfsson et al., 2008[2]). Despite the ongoing digital transformation, many OECD countries, including New Zealand, are struggling with low productivity growth. This is partly because economic statistics do not capture fully the benefits of digital technologies, not least when digital services are provided for free. But a more import reason is that diffusion of digital technologies is still underway and is not fast and broad enough to significantly raise productivity growth (Brynjolfsson, Rock and Syverson, 2021[3]).

Historically, general-purpose technologies have generated significant productivity gains only after a long time lag, and might even have contributed to a productivity slowdown in the short run as resources have had to be diverted for adoption and learning (Hornstein and Krusell, 1996[4]). Countries need to accumulate intangible capital that complements digital technologies, such as new work organisation, digital and managerial skills and valuable (big) data (Brynjolfsson, Rock and Syverson, 2021[3]; Corrado et al., 2021[5]).Investment in such intangible capital is costly and time consuming, as well as risky, involving substantial trial-and-error. It requires good access to a skilled workforce and risk capital, as well as flexible and competitive regulatory settings that encourage digital innovation. Availability of high-quality digital infrastructure, like ultra-fast broadband, also underpins faster diffusion of advanced, data-intensive digital technologies (Sorbe et al., 2019[6]; OECD, 2021[7]).

The effective use of digital technologies and data would enable New Zealanders to participate in society in a more inclusive way, firms to boost productivity and exports and the government to offer better services. However, reaping these benefits requires seizing the opportunities digital technologies bring, judicious investment in digital technologies and infrastructure, as well as better risk management against heightened digital security threats, and strong trust in digital environments (OECD, 2019[8]). Social institutions including laws, regulations, education and innovation policies will need to adjust while ensuring that all citizens enjoy access to good, affordable communication infrastructure, opportunities to acquire skills to thrive alongside the digital transformation of the workplace, and means to protect themselves against data theft and other harmful online activities.

In many OECD countries that underwent prolonged periods of lockdown, the COVID-19 pandemic accelerated the use of digital technologies among businesses, notably through changes in work arrangements and moving activities online (OECD, 2021[9]). The stringent lockdown in April 2020 raised awareness among New Zealand businesses of how effective use of digital tools can improve their performance. However, they may not have seized the opportunity to press ahead with the digital transformation as much as their peers in other OECD countries as economic activities reopened rapidly (Chapter 1). The next section assesses the diffusion of digital technologies in New Zealand from several angles including ICT industries, digital innovation and the use of digital tools by firms, households and the government. The following one discusses various policies to enhance the diffusion of digital technologies.

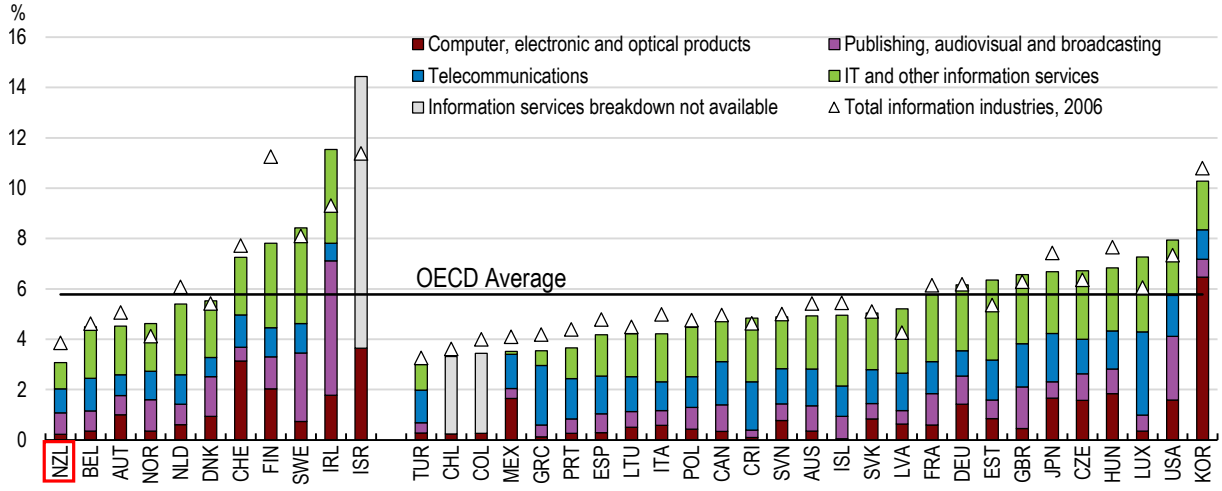
There is scope to enhance the diffusion of digital technologies in New Zealand

The digital sector is small

The digital sector, defined here as the ICT sector and digital services, is small in New Zealand by international comparison. For instance, value added shares of information industries (defined as the ICT sector plus the content and media sector) have decreased since 2006 and are among the smallest in the OECD (Figure 2.1). New Zealand especially stands out in comparison with other Small Advanced Economies (SAEs), which are defined in this chapter as the 11 OECD countries with populations between 1 million and 20 million and with per capita incomes above USD 30 000 (PPP exchange rates). This definition is in line with the one employed by the Productivity Commission (2021[10]) and Skilling (2020[11]), except that they also included two non-OECD economies (Singapore and Hong-Kong). This chapter compares New Zealand with other SAEs not only to control for their smaller domestic product and factor markets, but also to identify areas of digitalisation where New Zealand has substantial room to catch up to its peers through policy reforms.

Figure 2.1. ICT industries account for a low share of value added

Value added by information industries as a percentage of total value added, 2016[1, 2] or latest



1. Values for Colombia, New Zealand, Poland, Portugal, Spain, Sweden and Turkey are for 2015 and values for Canada are for 2014.
2. Small advanced countries are defined as the OECD countries with populations of 1-20 million and with per capita incomes above USD 30 000.

Source: OECD (2021), STAN database, Inter-Country Input-Output database and national sources.

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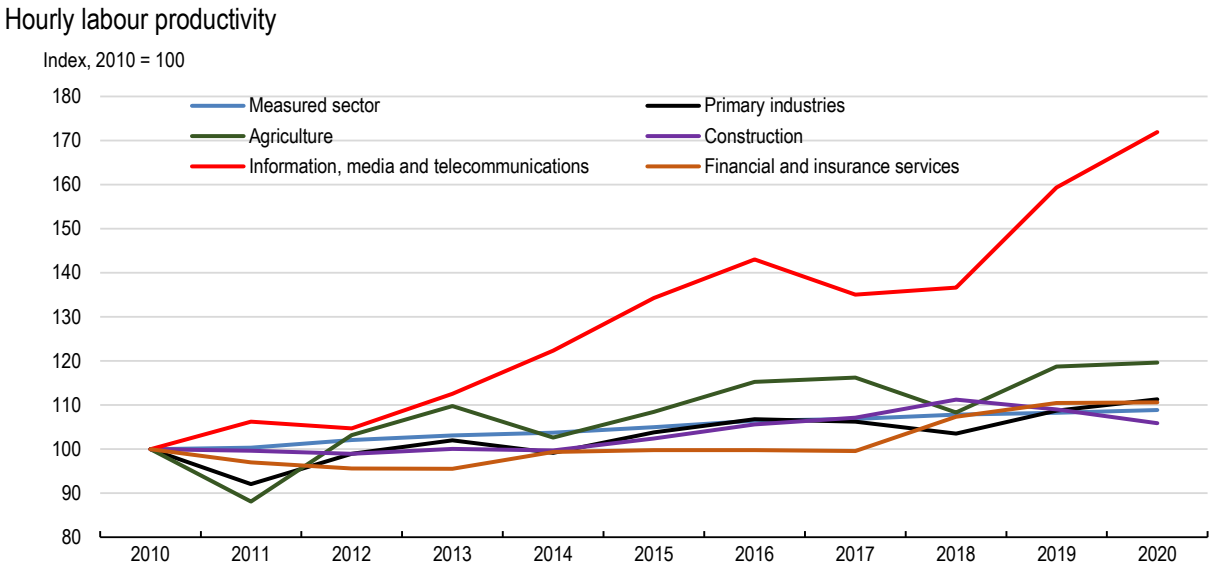
Productivity growth in the ICT sector outpaces that in other sectors (Figure 2.2), but its contribution to New Zealand's aggregate productivity growth is muted by its small weight. Chronic shortages of ICT skills (Figure 2.3) have contributed to high wage levels in the digital sector (Figure 2.4). Firms in the ICT sector are by far the most advanced users of digital technologies, such as big data and cyber security technologies (OECD, 2020[1]). Innovation in the ICT sector exerts positive spillover effects on productivity in other industries, through backward and forward linkages (Han et al., 2011[12]). Industries that are more ICT intensive benefit most from such spillover effects, which materialise over time. While the weight of ICT intensive sectors in New Zealand is small compared with many other OECD countries (Figure 2.5, Box 2.1), it is growing, with their contribution to employment growth around the OECD average during 2006-16 (Figure 2.6).

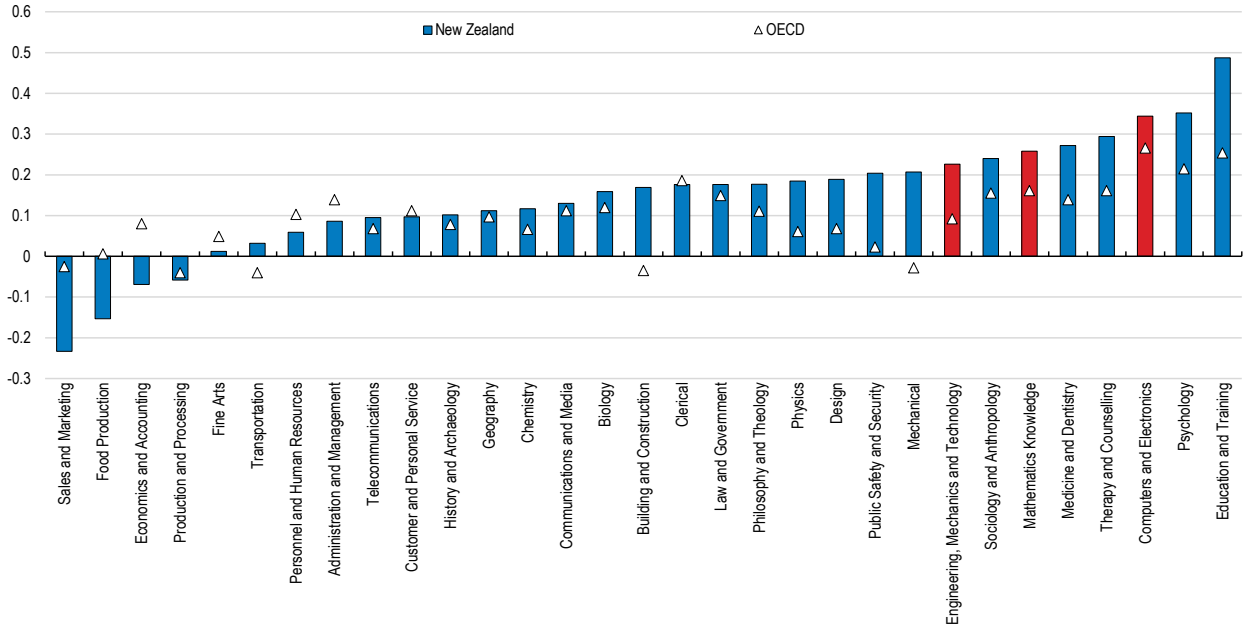
Figure 2.2. Labour productivity has grown fast in the ICT sector



Source: Stats NZ.

StatLink https://stat.link/rjfhs3

Figure 2.3. Shortages of ICT skills are among the most pronounced in New Zealand, 2015



Note: The OECD Skills for Jobs indicator captures skills shortages and surpluses. Positive values indicate skills shortages while negative values point to skills surpluses. The larger the absolute value, the larger the imbalance. Results are presented on a scale that ranges between -1 and +1. The maximum value reflects the strongest shortage observed across OECD countries and skills dimensions.
Source: OECD, *Skills for Jobs* (database).

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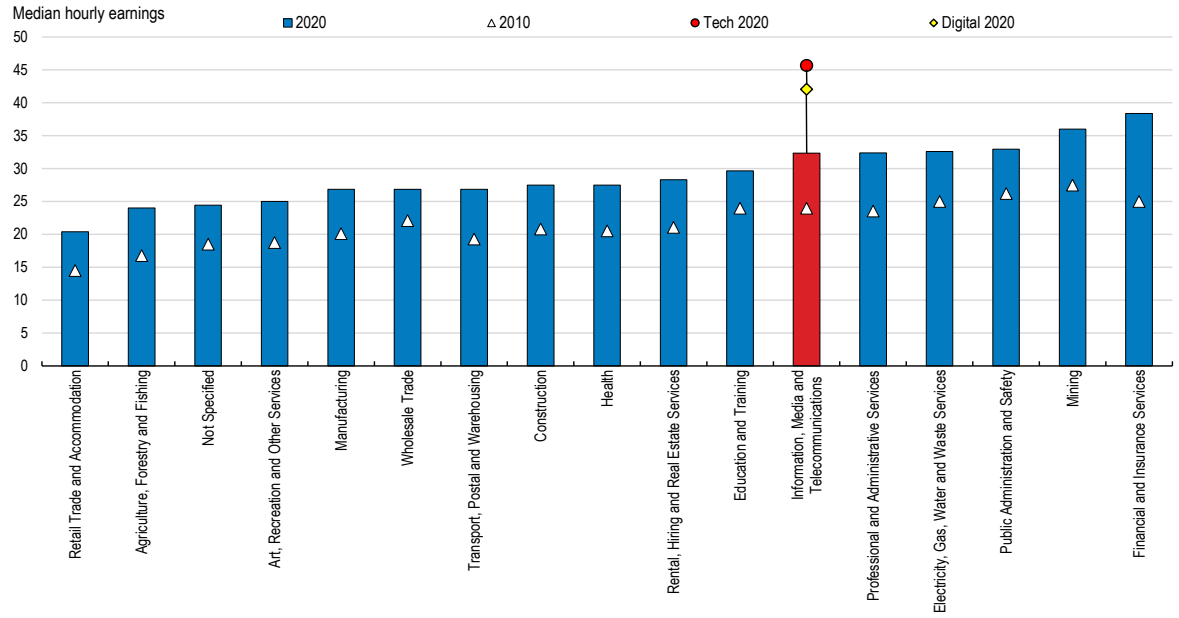
Figure 2.4. Wages in the digital sector are relatively high



Note: Data on wages for tech and digital jobs come from absolute IT. Tech jobs include roles such as software engineer, scrum master and data analyst. Digital jobs include roles such as web developer, SEO manager and digital marketing specialist.
Source: Stats NZ; Absolute IT (2021), *Tech & Digital Remuneration Report, July 2021*

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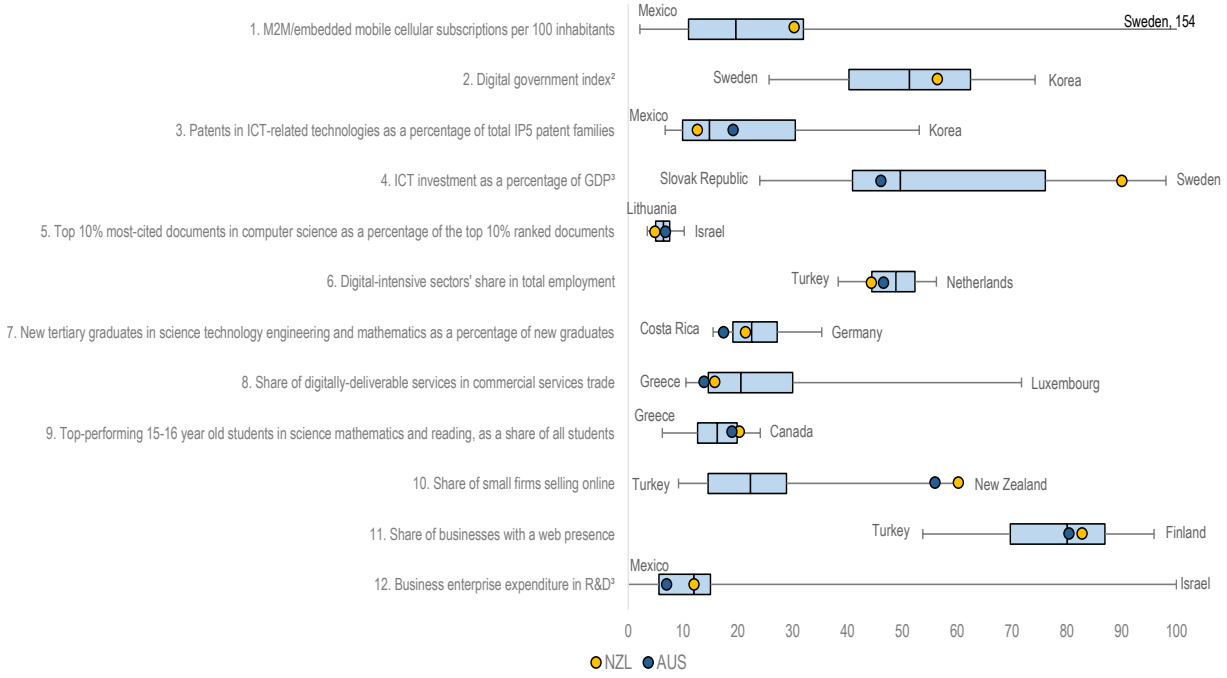
Figure 2.5. Overall, New Zealand scores around the OECD average on the available digital indicators[1]



1. The box shows the second to fourth quintile, the vertical line indicates the median and the whiskers show minimum and maximum values.
2. The OECD Digital government index assesses the adoption of digital technologies by public sector organisations. The index takes values from 0 (lowest digital maturity) to 1 (highest digital maturity). In this chart, index values have been multiplied by 100.
3. Not actual values, but relative ranking by OECD Going Digital.
Source: OECD (2021), *Going Digital Toolkit*

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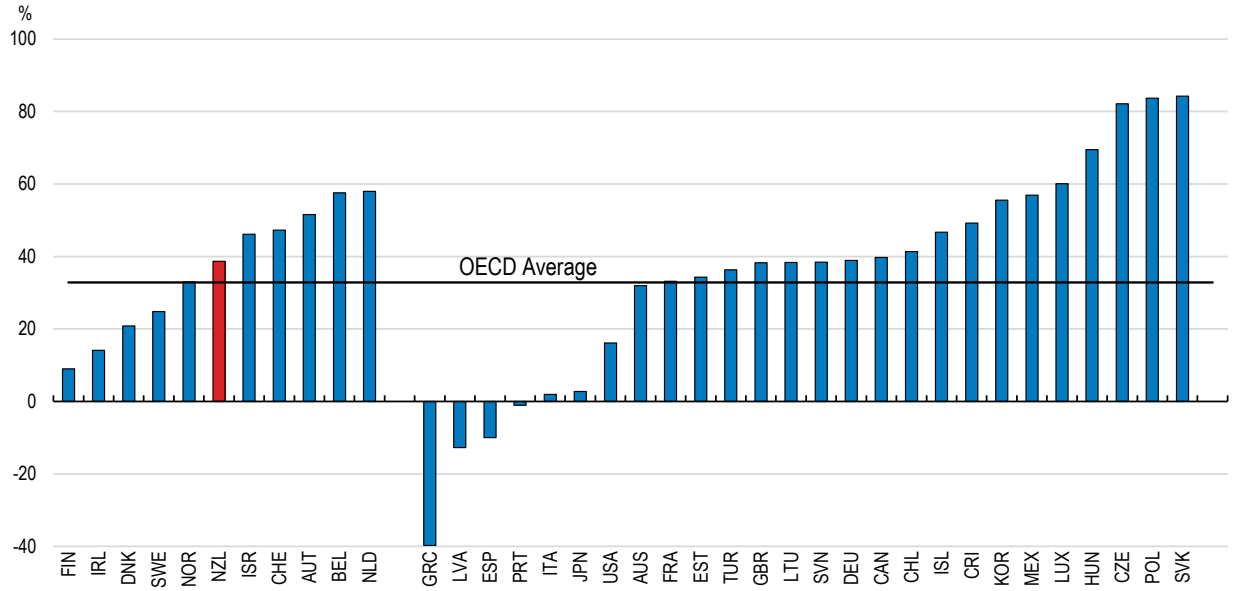
Figure 2.6. The contribution of digital-intensive sectors to employment growth is around the OECD average

As a percentage of total absolute changes in employment in 2006-16



Note: Digital intensity is defined according to the taxonomy described in Calvino et al (2018). See the source for more details.
See Figure 2.1, note 2 for the definition of small advanced economies.
Source: Calvino et al. (2018), *A taxonomy of digital intensive sectors*, OECD Science, Technology and Industry Working Papers, No. 2018/14.

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Box 2.1. The OECD Going Digital Toolkit indicators

The OECD Going Digital Toolkit includes 42 key indicators for benchmarking OECD countries' digital transformation. The indicators, capturing a wide range of aspects of a digital economy, are categorized into seven policy dimensions: Access, Use, Innovation, Jobs, Social, Trust and Market openness.

The *Access* dimension measures components that lay the foundation for the digital transformation, such as access to communication infrastructure, data and services. The *Use* dimension captures the extent to which digital technologies are actually used, for instance for selling and buying products online or interacting with authorities. The *Innovation* dimension gauges both how much resources are put into innovation and the actual output, in terms of academic research and start-up firms. The *Jobs* dimension captures the weight of the digital sector and the readiness of workers to thrive in a digital workplace. The *Society* dimension captures inclusiveness in the digital economy and society. The *Trust* dimension captures individuals' and firms' confidence in the digital environment. For instance, this dimension includes an indicator on the extent to which national health data may be shared with domestic and international stakeholders. The *Market Openness* dimension captures the weight of the digital sector in trade and the openness to trade and investment in digital services.

Many indicators in the Toolkit are missing for New Zealand, making it difficult to identify the aspects of its digital transformation that require the greatest attention (Table 2.1). Improving data should be a priority in the national digital strategy currently being developed (see below).

Table 2.1. Many of the Going Digital Toolkit indicators are missing for New Zealand

Dimension	Indicator	New Zealand data not available	Underperforming the OECD average	Outperforming the OECD average
Access	Fixed broadband subscriptions per 100 inhabitants			Med. [1] quintile
	M2M (machine-to-machine) SIM cards per 100 inhabitants			X
	Mobile broadband subscriptions per 100 inhabitants		Med. [1] quintile	
	Share of households with broadband connections	X[2]		
	Share of the population covered by at least a 4G mobile network		X	
	Broadband speed			X
	Disparity in broadband uptake between urban and rural households	X		
Use	Internet users as a share of individuals	X		
	Share of individuals using the Internet to interact with public authorities	X		
	Share of Internet users who have purchased online in the last 12 months	X		
	Share of small businesses making e-commerce sales in the last 12 months			X
	Share of businesses with a web presence			X
	Share of adults proficient at problem-solving in technology-rich environments			X
	Share of businesses purchasing cloud services	X		
Innovation	ICT investment as a percentage of GDP			X
	Share of start-up firms (up to 2 years old) in the business population			X
	Top 10% most-cited documents in computer science, as a percentage of the top 10% ranked documents		X	
	Patents in ICT-related technologies, as a percentage of total IP5 patent families		X	
	Business R&D expenditure in information industries as a percentage of GDP		X	
	Venture capital investment in the ICT sector as a percentage of GDP	X		
Jobs	Digital-intensive sectors' share in total employment		X	
	Workers receiving employment-based training, as a percentage of total employment			X
	New tertiary graduates in science, technology, engineering and mathematics, as a percentage of new graduates		X	
	Public spending on active labour market policies, as a percentage of GDP		X	
	ICT task-intensive jobs as a percentage of total employment	X		
Society	Percentage of individuals who live in households with income in the lowest quartile who use the Internet	X		
	Disparity in Internet use between men and women	X		
	Top-performing 15-16 year old students in science, mathematics and reading			X
	OECD Digital Government Index			X

	Percentage of individuals aged 55-74 using the Internet	X		
	Women as a share of all 16-24 year-olds who can program	X		
	Percentage of individuals who use digital equipment at work that telework from home once a week or more	X		
Market openness	Digitally-deliverable services as a share of commercial services trade		X	
	OECD Digital Services Trade Restrictiveness Index		X	
	OECD Foreign Direct Investment Regulatory Restrictiveness Index		X	
	ICT goods and services as a share of international trade	X		
	Share of businesses making e-commerce sales that sell across borders	X		
Trust	Health data sharing intensity	X		
	Percentage of businesses in which ICT security and data protection tasks are mainly performed by own employees	X		
	Percentage of individuals not buying online due to concerns about returning products	X		
	Percentage of individuals not buying online due to payment security concerns	X		
	Percentage of Internet users experiencing abuse of personal information or privacy violations	X		

1. Median.
2. After 2018.
Source: OECD (2021) *Going Digital Toolkit*.

The use of advanced digital technologies is limited among NZ firms

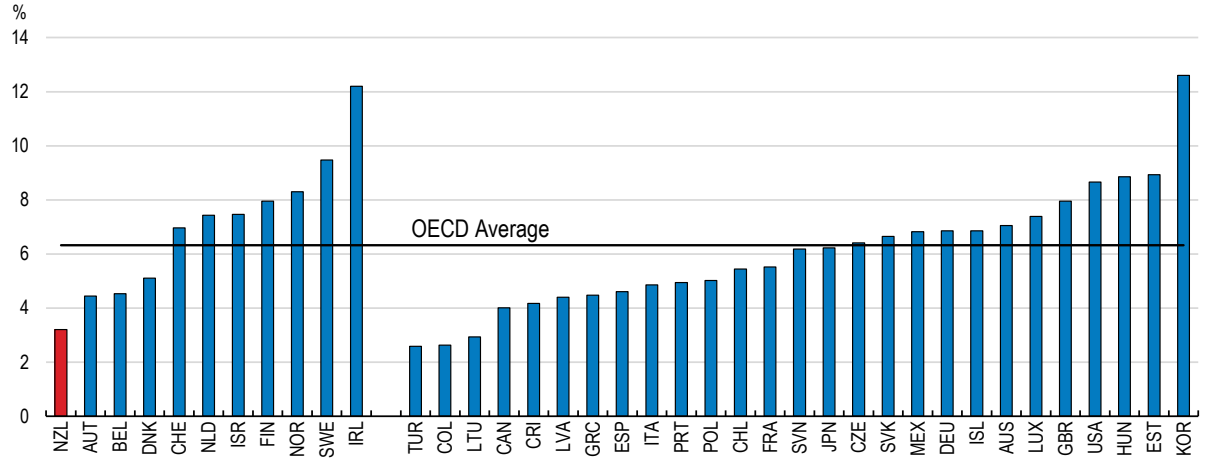
The use of advanced digital technologies by NZ firms appears to be low compared with other OECD countries. For instance, the information industry supplies only 3.2% of intermediate inputs used in New Zealand's production, the lowest share among SAEs and one of the lowest in the OECD (Figure 2.7). The small size of information industries (Figure 2.1) also indicates that the use of digital services by New Zealand firms is lower than in many other OECD countries, either due to smaller demand or limited supply. In particular, IT and other information services, the main providers of digital services including cloud computing that provide firms on-demand access to ICT services, comprise only 1% of value added in New Zealand, half the OECD average. Although ICT investment as a share of GDP is relatively high (Figure 2.5), this may reflect the weak use of ICT services, notably cloud computing, which requires New Zealand firms to build up their own digital capabilities.

Surveys conducted of New Zealand firms also suggest that their use of advanced digital technologies is limited. For instance, only 16% of 852 small businesses surveyed by the Small Business Council (2019[13]) used cloud computing in 2019. Intezari et al. (2019[14]) found that two thirds of managers in predominantly large and medium-sized companies expressed only limited confidence in big data analysis, with one quarter having only rudimentary knowledge of big data. Few New Zealand firms integrate a digital strategy into their corporate strategy (PwC, 2017[15]). While the shutdown of non-essential businesses during the COVID-19 pandemic highlighted the difference in performance between firms that exploited digital tools and those that did not, it did not result in a significant increase in the use of sophisticated digital tools. Among 2 280 NZ firms interviewed by the Ministry of Business, Innovation and Employment (MBIE), the share of firms that took up communication tools like Skype or Zoom increased from 29% to 50% during

the pandemic, but the use of cloud-based collaboration tools increased by a mere 5% (Better for Business, 2020[16]).

Figure 2.7. New Zealand makes little use of digital inputs in its production

The share of information industry products in intermediate consumption, 2015



Note: See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD (2021), *Going Digital Toolkit*

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New Zealand is advanced in using some digital technologies. For instance, New Zealand firms make good use of some ubiquitous digital technologies, like online sales. Some 60% of SMEs sell online, the highest share in the OECD (Figure 2.5). Nevertheless, the weight of online sales in total sales is relatively low - some 62% of the companies reported that their internet sales account for 10% or less of total dollar sales in 2020 (Stats NZ, 2021[17]) – although smaller firms and firms in more ICT-intensive sectors sold relatively more online. The share of firms owning a website is above the OECD average (Figure 2.5), although it is lower than many other SAEs. The COVID-19 pandemic resulted in a dramatic rise in online shopping. While the number of people shopping online continues to increase, the average number of transactions, as well as the average size of each transaction, has decreased since the second quarter of 2020 (NZ Post, 2021[18]). New Zealand also has a high number of M2M (machine-to-machine) SIM cards issued per 100 inhabitants (Figure 2.5), which suggests an advanced use of the Internet of Things (IoT). In the aforementioned survey of 2 280 firms, 62% responded that they have or use IoT technologies (Better for Business, 2020[19]).

Diffusion of digital technologies generates positive productivity spillovers. For instance, Gal et al. (2019[20]) found that higher industry-level adoption of digital technologies increases the productivity of European and Turkish firms, particularly firms with initially high productivity levels. A wider use of cloud computing by small and credit-constrained firms would allow them to experiment with digital technologies without investing in their own digital facilities or hiring technicians, thereby boosting innovation and productivity.

Digital innovation could be stronger

New Zealand's digital innovation is moderate overall. For instance, R&D spending by information industries was about 0.3% of GDP in 2018, which is slightly lower than the OECD average (about 0.4%) but slightly higher than Australia (about 0.2%) (OECD Going Digital Toolkit). Furthermore, only 13% of IP5 patents (patents filed in at least two patent offices worldwide, including one of the five largest IP offices) filed by

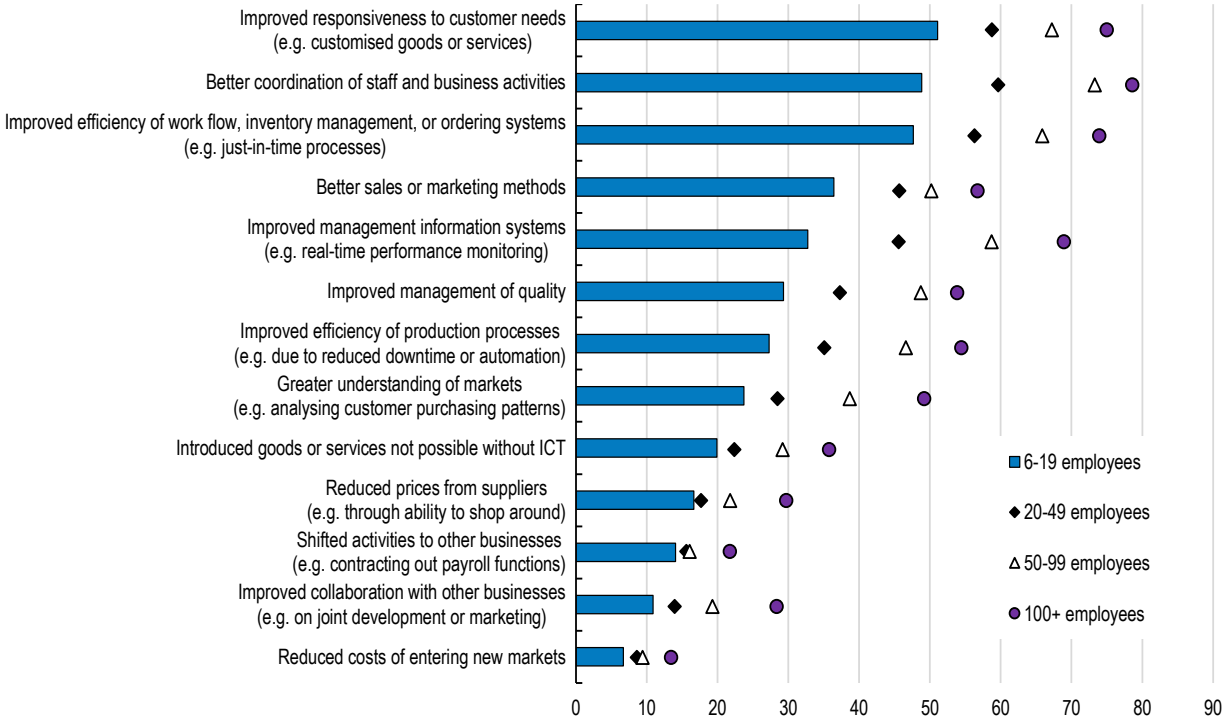
New Zealand entities were on ICT-related technologies, a share that is again lower than the OECD average (20%) or in Australia (19%) (Figure 2.5).

Large firms are not obtaining transformative outcomes using digital technologies

Digital innovation does not only concern R&D or patent application by information industries. It encompasses the introduction of novel products, production or delivery processes, as well as organisational and marketing changes enabled by digital technologies. However, New Zealand firms' relatively low overall investment in R&D (0.8% of GDP as opposed to the OECD average of 1.8% in 2019) and in other intangible capital (OECD, 2017[21]), together with relatively poor management quality (see below) risk holding back New Zealand firms in achieving strong productivity gains. Indeed, while a high share of New Zealand firms self-reported that they improved customer relations and work efficiency by using digital technologies, only a small share managed to reduce the cost of entering new markets, introduce new products or collaborate with other businesses on innovation (Figure 2.8). Small firms are less likely to improve information management, coordination of staff and business activities or marketing than mid-sized firms, possibly because they invest much less in intangible capital (Figure 2.9).

Figure 2.8. Few New Zealand firms are successful in achieving transformative outcomes using ICT

Outcomes achieved using ICT, percentage of firms by size, 2020



Source: Stats NZ (2020), *Business Operations Survey*

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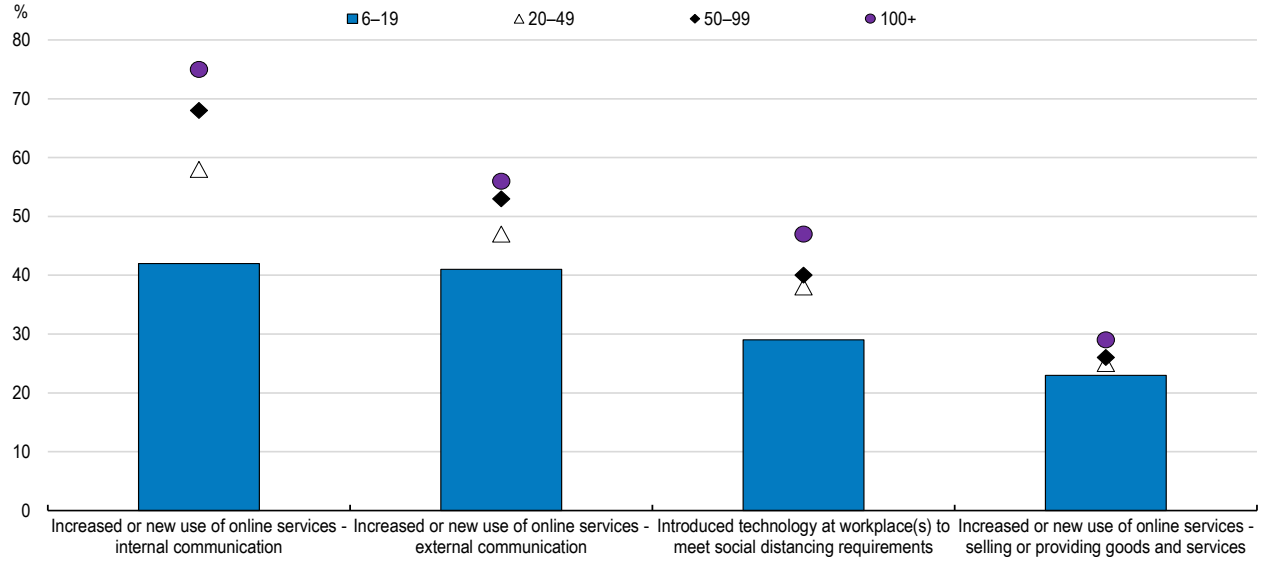
Figure 2.9. Large firms were not much better than smaller firms in expanding online sales during the pandemic

Firms using digital technologies in response to COVID-19, share of total respondents in each size class



Note: Businesses were surveyed from August to December 2020 about how they responded to the COVID-19 pandemic in 2020.
Source: Stats NZ (2020), *Business Operations Survey*

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Weak digital innovation is holding back productivity growth in the agricultural sector

Agriculture accounts for a large share of New Zealand's economy and exports (Chapter 1). It exports over 90% of its products and is highly exposed to global competition; with virtually no producer support, prices are in line with the world market (OECD, 2021[22]). It has also been historically agile in adopting new technologies (Ministry of Business Innovation and Employment, 2020[23]).

Despite its strong export performance, New Zealand's agricultural sector faces several structural challenges. Its annual average total factor productivity (TFP) growth during 2007-16 was only 0.7%, lower than in Australia, the United States or the European Union (Figure 2.10). This points to slow adoption of new technologies and innovation, partly resulting from a heavy reliance on low-skilled migrant labour. With the inflow of migrant workers curtailed by border restrictions and unlikely to return to pre-COVID levels owing to immigration policy becoming more restrictive, faster technology adoption will be needed to cope with labour shortages.

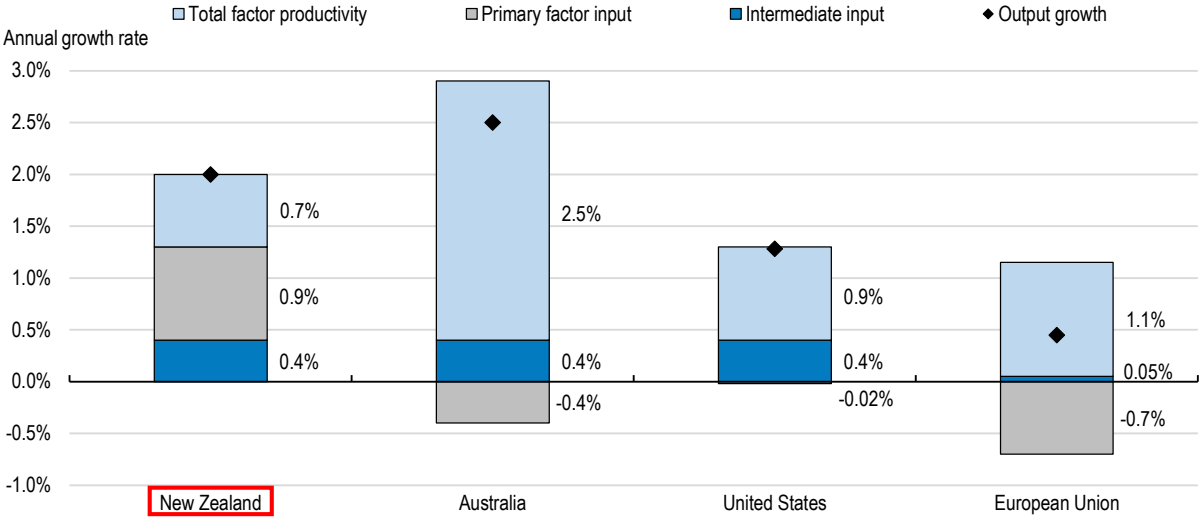
The agricultural sector also faces other issues, such as a significant shift in global consumer preferences towards sustainable farming and healthy food. The emergence of new production technologies like plant-based or laboratory-produced meat and dairy products may eventually reduce demand for products from pastoral farming (Ministry of Business Innovation and Employment, 2020[23]). New Zealand's farmers and food production firms need new technologies and business models that enable them to provide quality assurance to final consumers and communicate their environmental commitment more effectively (Baragwanath, 2021[24]). The agricultural sector also faces stricter regulations on fresh water pollution and will need to reduce its greenhouse gas emissions (see Chapter 1). The natural hazard risks farmers have to cope with are also likely to be heightened by climate change (Casalini, Bagherzadeh and Gray, 2021[25]).

Better use of digital technologies would help the agricultural sector to respond to these challenges. Digital innovation can unlock strong productivity growth. Intelligent and digitally connected machinery (the Internet of Things) would facilitate precision farming, helping farmers improve the accuracy of operations and

optimise the use of inputs including fertilisers and pesticides (Paunov and Planes-Satorra, 2019[26]). It would also help farmers determine nutrient loss based on their application of fertiliser onto pasture, which is critical for implementing environmental regulations at the farm level. Increased use of robots would help to address labour shortages and boost productivity in horticulture, which often involves labour-intensive harvesting and packing processes; New Zealand has already developed some successful robotics for horticulture and pastoral farming (GOFAR, 2021[27]). Agritech New Zealand (2020[28]) estimates that effective use of these technologies could boost the agricultural sector's output by 21% in the long run. Digital tools can also help the government to better manage natural hazard and biosecurity risks and provide quick responses in the case of an animal disease outbreak or flooding emergency.

Figure 2.10. Growth in agricultural output is driven less by innovation and more by growth in primary factor input

Composition of agricultural output growth, 2007-16



Note: Primary factors comprise labour, land, livestock and machinery.
Source: OECD (2021), *Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems*, OECD Publishing, Paris.

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Nevertheless, the take-up of digital technologies has been slow. For instance, only 16% of businesses in the agricultural sector were using fibre broadband in 2020, compared with an average of 64% across all sectors (Stats NZ, 2021[17]). Furthermore, less than 10% of over 4 000 farmers responding to the 2017 Survey of Rural Decision Makers (Manaaki Whenua, 2017[29]) made use of precision agriculture, while only 3% indicated uptake of automation or robotics.

Digital technologies can help reduce the "tyranny of distance"

New Zealand's exports are constrained by its geographical remoteness from large markets and suppliers of intermediate inputs (Fabling and Sanderson, 2010[30]; de Serres, Yashiro and Boulhol, 2014[31]). This remoteness increases shipment costs, which holds back the competitiveness of New Zealand exports, and information frictions, which make it harder for New Zealand exporters to penetrate foreign markets and establish export relationships. This "tyranny of distance" not only holds back New Zealand's exports, but also the adoption of digital technologies. Without export sales, New Zealand firms may not be able to capture sufficiently large returns to justify risky investments in new technologies and intangible capital. An effective use of digital tools like websites or online platforms can help to reduce the tyranny of distance by

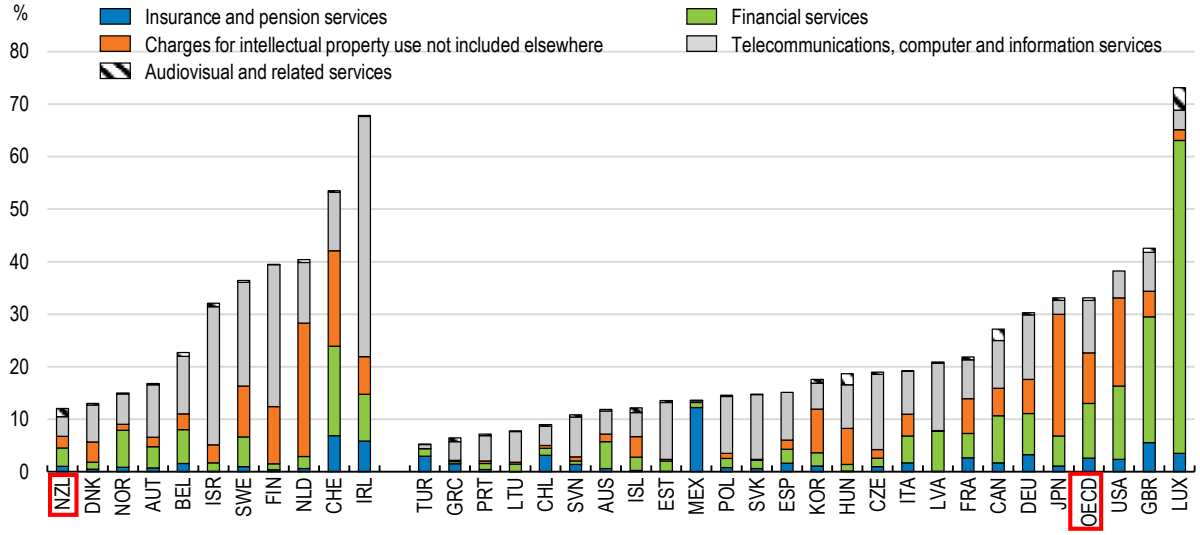
facilitating export entry via reduced search costs and information asymmetries in international transactions (see Box 2.2).

If digital take-up enables more New Zealand firms to start exporting or expand their export markets, this would, in turn, accelerate the adoption of digital technologies and intangible investments (Box 2.2). This interaction between digital take-up and exporting is an important driver of diffusion of digital technologies. Firms that export and adopt digital technologies become more productive and competitive, thereby expanding their domestic market shares and attracting resources like labour. This reallocation of resources toward digitalised exporting firms boosts aggregate productivity (Melitz, 2003[32]). Exporting also provides firms with opportunities to learn advanced technologies and management practices from foreign buyers (De Loecker, 2007[33]), which would help New Zealand firms to catch up to the global productivity frontier (New Zealand Productivity Commission, 2021[10]).

Another way of reducing the tyranny of distance is to increase exports by the weightless sector, such as digital services that can be delivered predominantly online. The share of predominantly digitally deliverable services in New Zealand's service exports is relatively low compared with the median of OECD countries (Figure 2.5) or other small advanced economies (Figure 2.11). There are opportunities to increase exports of digital services, particularly for the digital gaming industry, which has already established a strong track record in New Zealand. However, the competitiveness of digital services is constrained by a severe skills shortage, which has been greatly aggravated by COVID-related border restrictions (Chapter 1) and a weak domestic pipeline of skilled digital workers (see below). Furthermore, distance can hold back competitiveness in other ways besides increasing shipping costs. For example, some digital services delivering highly tailored products require intensive face-to-face interactions (Australian Productivity Commission and New Zealand Productivity Commission, 2019[34]). The lack of agglomeration of innovation activities in New Zealand also limits competitiveness in knowledge-intensive services. New Zealand's export-oriented digital start-ups often seek to establish their presence in large foreign markets to better serve foreign customers and tap into local knowledge sources (Sim, Bull and Mok, 2021[35]).

Figure 2.11. Exports of predominantly digitally deliverable services are relatively low in New Zealand

As a percentage of total services exports, 2017



Note: For Chile, Mexico, New Zealand and Switzerland, Audiovisual and related services include Other personal, cultural and recreational services. See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD, *International Trade in Services Statistics*; WTO (2018), *Trade in Commercial Services*

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Online platforms can help small firms in particular to export as they often struggle to cover the sizable entry costs of exporting related to finding foreign buyers and establishing distribution channels (Melitz, 2003[32]). In 2020, 31% of New Zealand firms with 20 to 49 employees that sold online also exported online, well above the overall share of exporters in this size cohort (23.5%), implying that firms using traditional trade channels were much less likely to export (Figure 2.12). In contrast, for firms with over 50 employees, the two shares are about the same, implying that larger firms were equally likely to export online or through traditional channels, possibly because they can bear traditional export entry costs.

Even though small firms selling online enjoy reduced export entry costs, the low share exporting online suggests that barriers to exporting remain high even with the use of digital tools. One such barrier is the lack of intangible capital that underpins export competitiveness. For example, established brands and reputation among foreign consumers are important for expanding sales, particularly from online platforms (Box 2.2). A lack of brand recognition in foreign markets has been the most common challenge acknowledged by New Zealand's exporters (Sim, Bull and Mok, 2021[35]). Another potential barrier is limited capabilities by small firms to make an effective use of digital tools. Joint research by the OECD and MBIE finds that the adoption of ultra-fast broadband, which supports an extensive use of digital technologies, increases the chance that New Zealand firms start exporting, particularly for those that are making effective use of digital tools. Indeed, New Zealand firms that export use Internet more for enhancing communication and business collaboration than non-exporting firms do, and also deploy websites equipped with more functions (Box 2.3). This underscores the importance of support measures that help firms develop capabilities to leverage digital tools for capturing new business opportunities and boosting profits.

Figure 2.12. Smaller firms are more likely to export online than via traditional channels

Share of exporting firms in each size cohort, online versus general exports, 2020

Note: The share of firms exporting online is computed as the share of firms with non-zero sales via Internet that sell abroad over all firms with non-zero sales via Internet. The general share of exporting firms is the share of firms reporting non-zero exports.
Source: Computed by the Secretariat based on Stats NZ (2020), *Business Operations Survey*

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Box 2.2. Can digital technologies overcome the tyranny of distance?

Digital technologies facilitate trade but do not make distance less important

Digital technologies facilitate trade between countries by reducing transaction and information costs through faster and cheaper communication. One might expect that they partially offset the well-documented negative impact of distance on trade flows. However, empirical evidence is mixed.

On the one hand, Freund and Weinhold (2004[36]) reported that a 10 percentage point increase in the growth of the number of web hosts in a country led to a 0.2-percentage point increase in service export growth during 1995-1999. Osnago and Tan (2016[37]) reported that higher Internet adoption (defined as the number of individuals using the Internet per 100 persons) by both the exporting and the importing countries boosts bilateral exports: a 10% increase in Internet adoption in the exporting (importing) country increases bilateral exports by 1.9% (0.6%). On the other hand, these trade-promoting effects coming from increased Internet use do not necessarily mean trade has become less sensitive to distance. On the contrary, Disdier and Head (2008[38]) reported that the impact of distance on bilateral trade has increased since the 1970s, despite the development and diffusion of ICT. Akerman, Leuven and Mogstad (2018[39]) found that roll-out of broadband Internet made international trade by Norwegian municipalities more sensitive to distance and the economic size of partner countries. Furthermore, digital services trade, which does not involve shipment costs, still seems to be negatively affected by distance. For instance, Blum and Goldfarb (2006[40]) showed that US imports of digital services consumed over the Internet fell with the distance between the US and the exporting countries.

Digital technologies help more firms to start exporting

Although digital technologies cannot nullify the impact of distance on trade, effective use of digital technologies can help firms to start exporting or enter new foreign markets by reducing the costs associated with searching foreign buyers or gathering information on foreign markets (Freund and Weinhold, 2004[36]). Osnago and Tan (2016[37]) found that higher Internet usage by the exporting country increases bilateral exports mainly through a larger number of exported products. However, the low entry cost to online platforms like AliExpress results in a large number of firms competing for consumers' attention, congesting consumers' search process and thus causing serious information frictions (Bai et al., 2020[41]). As a result, firms with sizable past sales, established reputation or recognisable brands are more likely to capture larger sales, thanks to their higher visibility on online platforms.

Exporting encourages adoption of digital technologies

Exporting encourages firms to adopt digital and other technologies that improve productivity because it increases the return to investment by allowing firms to capture larger sales from both foreign and domestic markets (Bustos, 2011[42]). Across OECD countries, including New Zealand, exporting firms are found to innovate more than non-exporting firms (Baldwin and Gu (2004[43]) for Canada; Damijan, Kostevc and Polanec (2008[44]) for Slovenia; Sin et al. (2014[45]) for New Zealand; and Peters, Roberts and Vuong (2020[46]) for Germany). In some cases, the decisions to adopt digital technologies and export can be made in tandem. For instance, some firms are not sufficiently productive and thus cannot capture sufficient export revenue to cover trade costs. They have an incentive to adopt new technologies to boost productivity so that they can start exporting (Lileeva and Trefler, 2010[47]).

Box 2.3. Does fast Internet increase exports by New Zealand firms?

Joint research by the OECD and the Ministry of Business Innovation and Employment (Sanderson, Wright-McNaughton and Yashiro, 2022[48]) explores the role of ultra-fast broadband (UFB), such as fibre, in promoting exports by New Zealand firms. It investigates whether adopting UFB increases the probability that a firm will start exporting.

UFB supports a more intensive use of digital tools like websites or online platforms, as well as adoption of advanced digital technologies that require transmitting large data instantaneously, such as Cloud Computing or the Internet of Things. As discussed in Box 2.2, digital tools can help firms find foreign buyers and establish export relationships by reducing search and information costs, which are often

considered as key barriers to export entry (Melitz, 2003[32]). Furthermore, UFB can also improve the productivity of New Zealand firms that use it to support their production and management processes (Fabling and Grimes, 2021[49]). This enables them to compete in overseas markets despite the increased costs and competition associated with exporting (Melitz, 2003[32]; Fabling and Sanderson, 2013[50]).

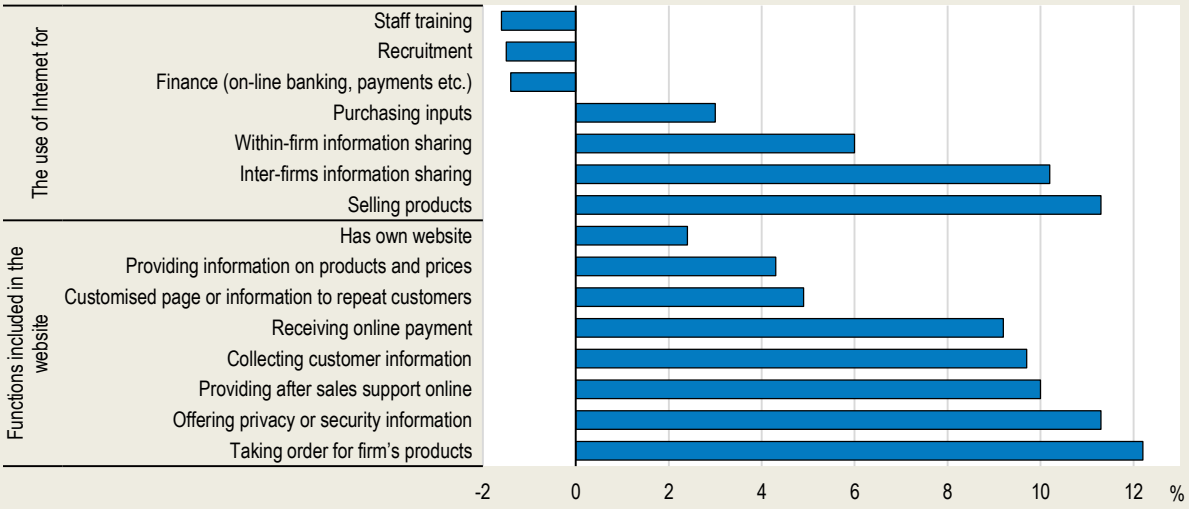
However, UFB may not boost firms' export capabilities to the same extent: it can be more effective when firms are making strategic use of the Internet or more sophisticated digital tools. This is in line with the view that good management practices and organisational changes condition the productivity gains from the adoption of digital technologies (Box 2.7).

Exporting firms are making greater use of the Internet

It is found that New Zealand firms that export not only use the Internet more extensively, but also use the Internet more for communication and collaboration purposes. For example, the probabilities that exporting firms use the Internet to share information with business partners or sell products online are more than 10 percentage points higher than for non-exporters (Figure 2.13). Exporters also own websites with more functions. They are significantly more likely to own websites equipped with functions like placing an online order or after-sales support.

Figure 2.13. Exporters use digital tools more intensively

Exporters' advantage over non-exporters in specific Internet uses or website features



Note: The chart displays how much exporters are more likely than non-exporters to use Internet for a given purpose or to have the specific function in their websites, after controlling for differences in firms' size and industry.
Source: Sanderson, Wright-McNaughton and Yashiro (2022[48]).

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UFB adoption increases the probability of export entry

To identify the impact of UFB on exports, the probability of export entry by a New Zealand firm is estimated as a function of UFB adoption. The exercise exploits the rich information on ICT take-up and export activity by New Zealand firms included in several waves of the Business Operations Survey (BOS), which are linked to broader firm-level information contained in the Longitudinal Business Database and Integrated Data Infrastructure. The BOS includes an ICT module that surveys ICT take-up every two years.

The empirical analysis focuses on two cohorts of firms that were not exporting nor using UFB in 2010 and 2012 and tracks whether these firms started exporting over the following four years. In particular, it estimates the extent to which non-exporting firms that adopted UFB in the two years between ICT

modules were more likely than other non-exporters to start exporting either during this period (time t) or two years later (t+2). In order to assess whether the impact of UFB is more important for firms that have been making more intensive use of digital tools, an indicator that summarises the information on a firm's use of Internet and its website functions overviewed in Figure 2.14 (*ICT intensity*) is included in the model. The indicator is lagged two years, so that it captures how intensively firms were using digital tools when they adopted UFB. Another indicator of ICT use, which captures the extent to which firms are using the Internet for enhancing efficiency of internal operations, such as their internal communication and human resource management (*ICT-process focus*), is also included.

After controlling for a wide range of firm characteristics that are likely to affect export entry and intensity of ICT use, the results suggest that firms that adopted UFB enjoy a higher probability of export entry both this period and two years later (Table 2.2, columns 1 and 2). While both the contemporaneous and future effects are statistically significant, the future effect is larger and more statistically significant. For instance, firms that adopted UFB were 6.3 percentage points more likely to export two years later. While past indicators of ICT use do not predict export entry by themselves, the coefficients on their interactions with UFB take-up are positive and significant (columns 3 and 4), implying that the impact of UFB in promoting export entry is stronger for firms that were using digital tools more intensively or for improving internal efficiency.

Table 2.2. Estimated coefficients on the probability of export entry by initial non-exporters

Firms in export-intensive industries

	(1)	(2)	(3)	(4)
	Export at t	**Export at t+2**	**Export at t**	**Export at t+2**
Adopts UFB	0.036*	0.063**	0.039*	0.063**
	(0.022)	(0.028)	(0.022)	(0.028)
ICT intensity	-0.000	0.003	-0.004	-0.003
	(0.005)	(0.008)	(0.005)	(0.007)
ICT - process focus	0.002	-0.000	-0.000	-0.009
	(0.006)	(0.009)	(0.007)	(0.010)
Adopts UFB#ICT intensity			0.019*	0.027
			(0.010)	(0.017)
Adopts UFB#ICT process focus			0.009	0.035*
			(0.015)	(0.020)
R-squared	0.045	0.045	0.048	0.054
Number of observations	1080	810	1080	810

Note: The table reports the estimated coefficients of a linear probability model of export entry by initial non-exporters. The numbers in parentheses are standard errors. ** and * represent statistical significance at 5% and 10% respectively. The model includes control variables such as firm size, capital intensity, human capital, inward and outward foreign direct investment, and R&D, as well as ANZSIC 1 digit industry and year dummies (all at t-2). The indicators *ICT intensity* and *ICT process focus* are principal components capturing the intensity of Internet use described in figure 2.13 and the extent to which the Internet is used to enhance internal efficiency. They are lagged so as to capture these features prior to fibre adoption (at t-2). The estimation sample is firms in five export-intensive industries, which are: Agriculture, forestry and fishing; Manufacturing; Wholesale trade; Information media and telecommunications; and Professional and technical services.
Source: Sanderson, Wright-McNaughton and Yashiro (2022[48]).
Disclaimer by Stats NZ: These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD) which are carefully managed by Stats NZ. For more information about the IDI and LBD please visit https://www.stats.govt.nz/integrated-data/ The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

Entry costs of exporting are more burdensome for small firms, which lack scale to disperse the sizable fixed costs. By reducing entry costs (Box 2.2), fast Internet may thus benefit small firms disproportionally. At the same time, small firms may lack the capabilities to exploit fast Internet effectively to advance their internationalisation strategies. Sanderson, Wright-McNaughton and Yashiro (2022[48]) find that while UFB adoption increases the probability of export entry by smaller firms, the magnitude of this effect depends importantly on the intensity of ICT use prior to the adoption. Especially, the UFB adoption increases the probability that smaller firms start exporting two years later only if they were making more intensive use of digital tools.

Policy implications

The importance of strategic use of digital tools in export entry indicates the need to combine financial or technical assistance with effective business strategy advice on how to exploit digital technologies to expand market reach. Policies to promote exports and digital take-up by New Zealand firms should include measures to build up their managerial capabilities in exploiting digital technologies, as is done in Germany (see below).

Internet use by individuals is high, but some groups have been left behind

In 2020, 96% of individuals comfortable with using the Internet used it daily at home (InternetNZ, 2020[51]), one of the highest shares OECD-wide. On average 65% of Internet connections at home are fibre, but this share varies across regions, ranging from 74% in Auckland to 48% in the West Coast region (Ministry of Business, Innovation and Employment, 2021[52]). Despite very high Internet access, some population groups have been left out. For instance, 31% of individuals living in social housing and 27% of disabled individuals have no access to Internet and students from certain minority groups, particularly Pasifika, have lower access to Internet at home (Grimes and White, 2019[53]). Shares of individuals without Internet access are also higher among those living in towns with a population less than 25 000, older persons, particularly those aged over 75 years, the unemployed and inactive. Lack of Internet access limits people's social relations, interactions with public authorities and ability to receive public services, lowering subjective wellbeing (Grimes and White, 2019[53]). InternetNZ (2018[54]) has estimated that the gains from closing the digital divide, and allowing more people to save time, communicate online and increase their employability, could amount to NZD 280 million per year. Before the pandemic, only about one-third of individuals used the Internet to interact with the government, far below the 60% OECD average. This partly reflects the limited digitalisation of government services, which is mostly at the stage of digitising existing processes (see below). COVID-19 has exacerbated the costs of the digital divide as those with poor access to Internet could not access government services, such as education services that were provided online during the lockdown.

As became clear at the onset of the pandemic, access to the Internet is, by itself, not enough for full digital inclusion. Other aspects, such as skills, trust and motivation matter as well. In fact, it is estimated that one in five New Zealanders falls short on at least one of these dimensions (New Zealand Digital Government, 2020[55]). For older people, who are more likely to be digitally excluded, the main barrier is not access to the Internet but other factors like skills, trust, cost and disabilities. In particular, lack of trust is an important factor preventing the elderly from using the Internet at all (Lips et al., 2020[56]). Only one third of New Zealanders aged 65 or above can easily access information on how to keep personal information secure online, and close to 50% of those over 70 would not know who to contact in the case of online security incidents, such as password theft (InternetNZ, 2020[51]; Bank of New Zealand, 2021[57]). As digital technologies evolve, older people who did not acquire digital skills at school or at work are exposed to higher risks of digital exclusion (Lips et al., 2020[56]). Among Māori and Pasifika, the cost of the Internet and devices is one of the primary barriers to digital inclusion. Other barriers are lack of skills and English-only digital platforms.

In response to the digital difficulties faced by older New Zealanders, the government earmarked NZD 600 000 in its 2019 Wellbeing Budget for digital literacy programmes for seniors to be spent over three years. It was found that elderly who had attended programmes such as "Pacific Senior CONNECT" and "Better Digital Futures" significantly improved their digital communication skills, learnt how to communicate through video and use email more often (The Government of New Zealand, 2020[58]). Some programmes also helped seniors to get affordable Internet access at home. To facilitate the use of digital services by disabled persons, the government has introduced a "web accessibility standard", which lays out guidelines on how to ensure that webpages are accessible to people with, for instance, low vision or hearing loss. However, many agencies fail to meet this standard.

The Covid-19 pandemic has accelerated the trend toward increased teleworking. In 2020, 73% of New Zealanders who could work from home did so for some or all of the time (InternetNZ, 2020[51]). In addition, half of the respondents who worked partly from home under the pandemic expressed a desire to work from home even more frequently in the future. However, slow Internet speed has been recognised as a major barrier to teleworking (InternetNZ, 2020[51]). In remote areas, some 44% of New Zealanders are concerned or very concerned about poor Internet connections.

The government could become more agile through better use of digital technologies

Digital technologies can transform the internal processes and operations of government and, consequently, how public services are designed and delivered. Extensive use of digital technologies and data enables governments to be more efficient, agile and responsive, and even anticipate people's needs. The early adoption of digital technologies referred to as e-government focused on increasing efficiency and transparency in the public sector through the digitisation of existing processes. Indeed, New Zealand's government has achieved some back-office efficiencies and some more user-friendly interfaces through its e-government efforts. For instance, the myIR system for reporting income tax in New Zealand provides online tax forms with much of the relevant data pre-filled, reducing the scope for erroneous or missing information and the compliance burden on taxpayers. Also, companies can be registered online, and thanks to a data-sharing arrangement between the Australian Securities and Investments Commission (ASIC) and the New Zealand Companies Office (NZCO), firms expanding across the Tasman can register easily in the other country. More recently, the government has been seeking to systematically improve user experience or approach system design from the perspective of customers. For instance, it launched the Business Connect platform in 2019, an online one-stop shop for firms to apply for and renew licences and permits. This platform has been evolving incrementally and will soon allow firms to manage their data held by the government and re-use the information they previously submitted to the authorities.

Governments across OECD countries are now aiming to upgrade their e-government efforts into the so-called digital government, which entails digitalisation of policy making and implementation processes as well as collaboration across public sector organisations, with the aim of delivering more integrated and seamless, as well as user-driven and proactive, services (OECD, 2020[59]). New Zealand ranks relatively high in the OECD Digital Government Index 2019, which captures progress toward digital government (Figure 2.5). In 2020, the government introduced a strategy for a Digital Public Service, which set broad objectives for the digital transformation of public services, with a programme of work.

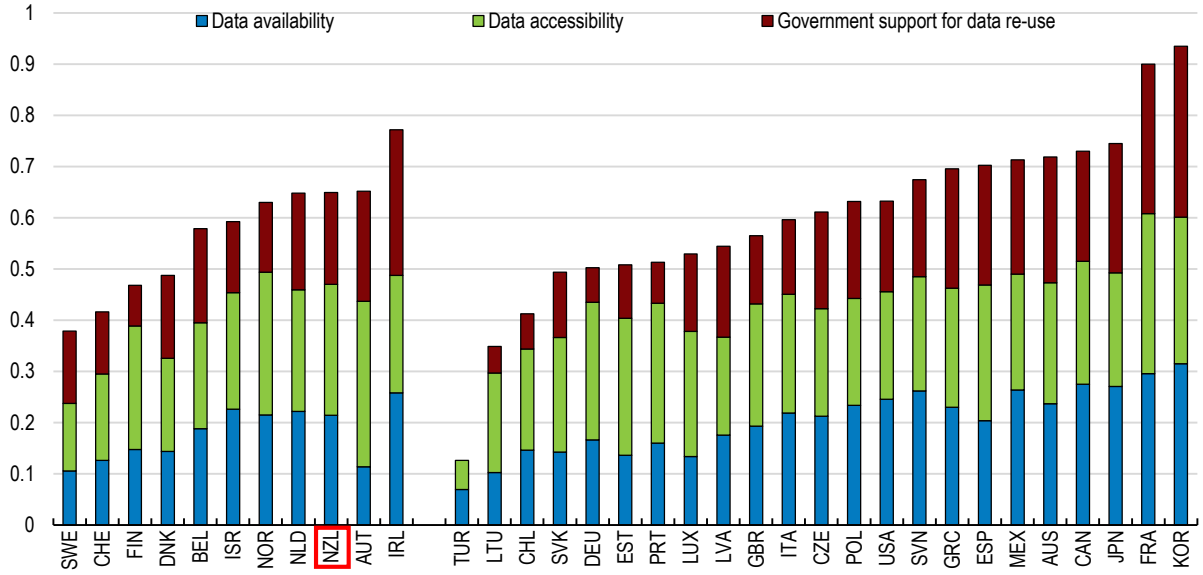
New Zealand is relatively advanced in terms of opening government data and systematically releasing government policies and decisions online. It ranks relatively high among SAEs when it comes to availability, accessibility and re-usability of government data (Figure 2.14). The statistical office has been leading and coordinating New Zealand's data strategy across agencies since 2017. The strategy aims to increase availability and accessibility of government data by, for instance, enhancing government data visibility, identifying data gaps and implementing an "open by design" culture, whereby data are released in a format that facilitates wider use by the public (Government Chief Data Steward, 2018[60]). One area with some room for improvement is promoting the re-use of the government data outside the public sector, for

instance through long-term partnerships with open data communities (OECD, 2020[61]). Efforts are underway, such as GovHack, a large annual Australasian event that involves dialogues between stakeholders and a two-day hackathon in which participants use open government data to propose innovative solutions to the challenges facing government and communities.

New Zealand has a good base for ensuring coherence in the use of digital technologies across policy areas, thanks to initiatives like the Digital Government Partnership, which brings together agencies from across the public service to support the goal of an all-of-government digital system. The function of this partnership is mostly advisory and does not involve decision-making on ICT investment across government agencies or evaluation of their ICT projects. The Partnership, however, annually disburses NZD 5 million to foster digital and data innovation by public sector organisations. There is room to strengthen the authority of the coordination body over government agencies in moving digitalisation forward (see the next section).

Figure 2.14. New Zealand is advanced in making government data open, useful and re-usable

OURdata Index scores, 2019



Note: OURdata Index is a composite index with a maximum value equal to "1" corresponding to the best practices. See Lafortune and Ubaldi (2018) for more information. See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD (2021), *OURdata Index on Open Government Data*

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New Zealand's government trails behind other OECD countries in terms of pro-activeness, defined as grasping citizens' changing needs and improving digital services accordingly in an anticipatory way (OECD, 2020[61]; New Zealand Productivity Commission, 2021[10]). One way of improving this is to enhance the participation by experts and stakeholders in the early stages of designing digital services (OECD, 2020[59]). The strategy for Digital Public Service aims for a more agile and adaptive digital public service. Frontrunners in digital government, such as Estonia and Korea, demonstrate what could be done to enhance and expand the scope of digital services in New Zealand. For instance, Estonia has leveraged digital IDs and a state-of-the-art data sharing technology (the X-Road) to deliver all but three public administrative services (marriage, divorce and real estate transactions) online and provide secure, transparent and traceable encrypted communication between public and private service providers and citizens (OECD, 2019[62]). Its digital ID framework is built on trust between the government and citizens, underpinned by legislation such as the amended 2018 Personal Data Protection Act, which for instance stipulates that citizens be informed when and for what purpose their data are being used by the government

as well as contact information of the officials in charge of this use. Korea introduced mobile ID cards that allow people to use government services from their smartphones and enabled citizens to download personal information held by public institutions and submit them directly to public authorities and banks through MyData portal (OECD, 2020[63]). The government also plans to increase the provision of personally customised digital services related to health check-ups, national scholarship applications, civil defence education or tax payments. Although Korea is already the frontrunner in the openness of public data (Figure 2.14), it will facilitate the use of public data even further to strengthen cooperation between the public- and private sectors and to promote new industries, such as autonomous driving and health care. The government is also investing in digital infrastructure and innovation in the public sector, for instance expanding 5G wireless networks and building a security control system using artificial intelligence.

A significant impediment to an extensive use of digital technologies by the government has been the absence of data companies based in New Zealand. This has been a barrier because any data stored, processed or transmitted by cloud services could be subject to legislation and regulation in the countries where data are stored. The decision by Microsoft and Amazon Web Services to establish datacentres in New Zealand is likely to address this data sovereignty issue, enabling the government to use cloud computing more intensively and adopt other data-intensive digital technologies.

Policies for faster diffusion of digital technologies

Advancing the new national Digital Strategy and enhancing coordination across all policy areas

New Zealand has recently embarked on the preparation of a comprehensive national digitalisation strategy, following up on the 2017 Building a Digital Nation report. Policy initiatives on digital transformation have been fragmented and subject to unstable budgeting. In 2020, the Digital Government Partnership (see above) put forth a strategy on delivering high-quality digital public services. Also, Industry Transformation Plans for digital technologies and agritech industries have been produced. However, a national digital strategy encompassing a wide range of policy areas such as education, labour market and social affairs was missing, making it difficult for government agencies to work in a coherent way toward New Zealand's digital transformation. The new national strategy is to strengthen coordination of digitalisation policies under three pillars: (1) trust in the digital environment, which includes sound data privacy; (2) digital inclusion, such as endowing New Zealanders with the right skills to thrive in digital workplaces; and (3) growth, which involves promoting the adoption of digital technologies among small businesses (New Zealand Government, 2021[64]). It is important that this strategy cover all relevant policy areas and set a clear roadmap and action plans. Furthermore, these action plans have to be implemented rigorously, on the back of strong political support.

The new national strategy is the responsibility of the Minister for the Digital Economy and Communications, appointed in 2020 to enhance the coordination of digitalisation policies. At the moment, various digitalisation strategies co-exist, including the one for Digital Public Service mentioned above and initiatives developed by the so-called government functional leads. For example, the Digital Government Partnership is led by the Government Chief Digital Officer, who is also the Chief Executive of the Department of Internal Affairs. The digital technologies Industries Transformation Plan is produced jointly by the Ministry of Business, Innovation and Employment and NZTech, a prominent social partner. Examples of the governance of national digital strategies in other OECD countries indicate that high-level leadership and a centralised mandate for strategic coordination, often above ministerial level, are important in advancing a holistic digital strategy (Box 2.4). While this does not necessarily imply that New Zealand needs a single government body overseeing all digitalisation policies, it highlights the importance of a clear hierarchy and a strong political mandate for the coordination body.

Monitoring and evaluation are essential to ensure effective implementation of a national digital strategy. However, New Zealand has not set transparent targets against which progress is assessed or the

effectiveness of existing strategies evaluated. A lot of data and indicators used by OECD countries to capture the progress in digitalisation are missing for New Zealand, making it difficult to benchmark New Zealand against best performers to identify room for catch up. For instance, many of the indicators in the OECD's Going Digital Integrated Policy Framework (OECD, 2020[65]), which help identify complementary policies to boost wellbeing through digitalisation, are not available for New Zealand (see Box 2.1). These data need to be collected to provide the basis for a national digital strategy and to monitor progress against this strategy.

Box 2.4. High-level strategic coordination is needed for a national digital strategy

The effectiveness of a national digitalisation strategy hinges on good coordination among government agencies and social partners. In order to ensure this, some OECD countries assign high-level leadership and centralised responsibility for strategic co-ordination above ministerial level. In these countries, a coordination office under the president, prime minister or chancellor usually drafts the national strategy backed by a strong political mandate. The office involves key ministries and stakeholders in the process, and also often leads strategic co-ordination. For instance, in Mexico and the Slovak Republic, the Prime Minister holds a strong mandate for digital issues, including for the drafting of the strategy, executed through a dedicated co-ordination office. In other countries like Chile, Estonia, Korea and Luxembourg, certain functions are ensured by the Prime Minister, notably for strategic co-ordination, but ministers still play an important role both in providing input to strategy development and in implementing the strategy.

The central co-ordination office may also be a centre within the government. The centre usually supports the highest level of the executive branch of government. Examples include the German Chancellery, the UK Cabinet Office and the White House Executive Office. Each government agency implementing the strategy often has a focal point, such as a chief digital officer, who ensures operational co-ordination. These agencies also monitor implementation and report to the co-ordinating office.

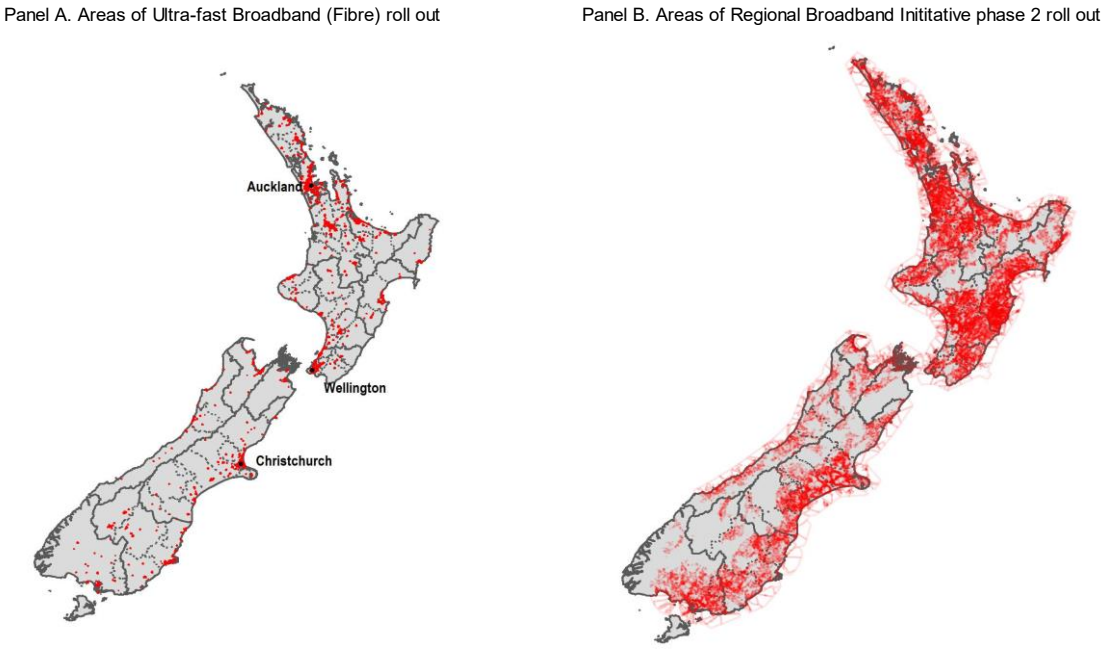
In other countries where political support is not as strong, the responsibility of strategic coordination of the National Digitalisation Strategy is allocated to a lead ministry often dedicated to digital affairs (as in Belgium, Japan, Poland, Portugal and New Zealand). In some countries, this ministry has responsibility for several policy areas including a digital portfolio and, in a few countries, there is not one but several ministries in charge.

Source: OECD (2019), *Going Digital: Shaping Policies, Improving Lives*, OECD Publishing, Paris.

Enhancing access to high-quality communication infrastructure

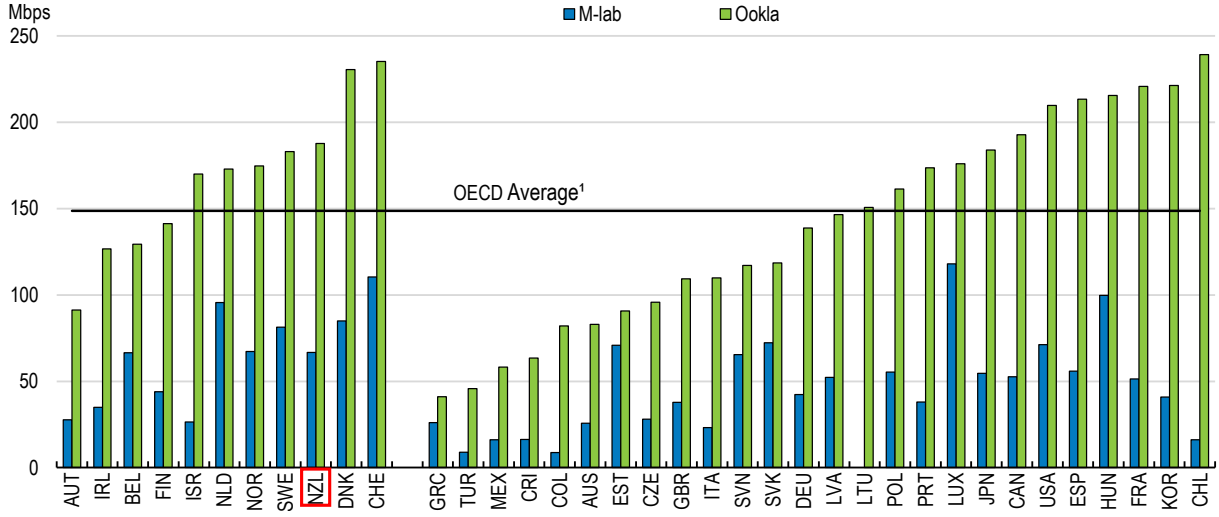
Access to fast and reliable connectivity is a prerequisite for the diffusion of digital technologies. New Zealand has been rolling out high speed broadband, with a target to provide 99.8% of its population with access to improved broadband by end-2023. In particular, the Ultra-Fast Broadband (UFB) programme has been rolling out fibre connections mainly in the urban areas, namely large cities (Figure 2.15, Panel A). It aims to provide access to fibre to 87% of the population in over 390 towns and cities by end-2022. As of July 2021, 85% of New Zealanders could already access fibre, and 65% had taken it up (Crown Infrastructure Partners, 2021[66]). In rural areas, where UFB roll-out is too costly, the second phase of the Rural Broadband Initiative (RBI) aims to provide high-speed broadband, primarily through wireless technologies such as 4G (Panel B). The government has also allocated NZD 10 million over two years to free up radio spectrum suitable for providing 5G technology in rural communities. Furthermore, more than NZD 46 million has been allocated to reducing network congestion on mobile networks in rural areas where data use has reached capacity constraints. These initiatives are expected to put New Zealand's broadband speed, which is already higher than the OECD average (Figure 2.16), on a par with the top performers.

Figure 2.15. New Zealand is rolling out high speed broadband



Note: Red dots in Panel A are areas covered by funding from the Crown Infrastructure Partners to build ultrafast fibre broadband (UFB) service to premises within those areas. Red dots in Panel B are areas covered by Fixed Wireless Access or wireless broadband service under the Rural Broadband Initiative Phase 2.
Source: New Zealand Crown Infrastructure Partners.

Figure 2.16. New Zealand's broadband speed is higher than the OECD average



1. Sample average. See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD, based on Ookla, November 2021 and M-Lab (Worldwide broadband speed league) as measured between July 2019 and June 2020.

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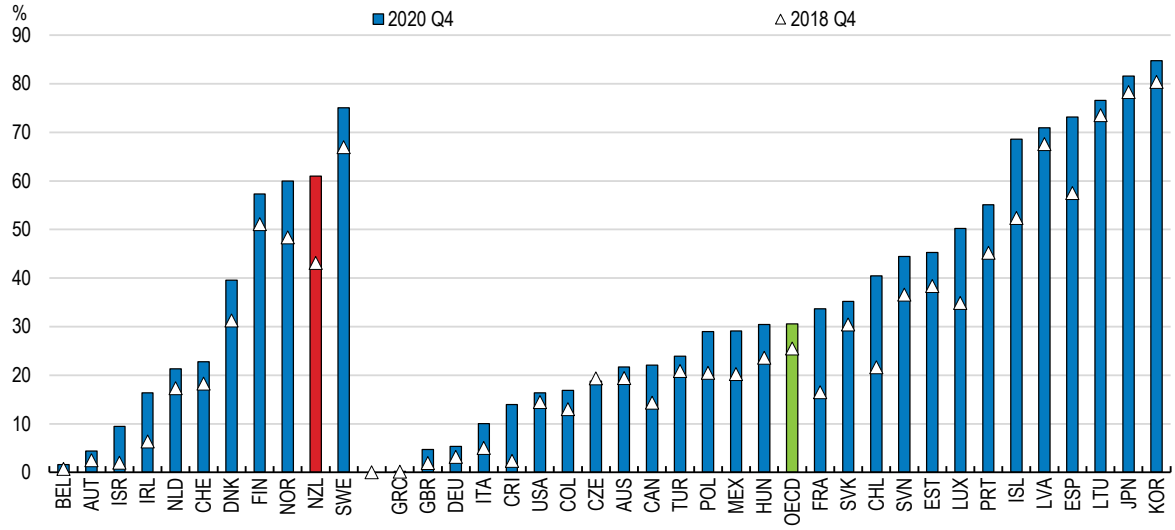
The high share of fibre in broadband implies that New Zealand's communication infrastructure will be able to support the use of new digital technologies that require transmitting large quantities of data rapidly (Figure 2.17). The number of companies using fibre-to-the-premise has risen rapidly in recent years,

especially among smaller firms. The overwhelming reason why some companies are still not using fibre-to-the-premise is unavailability in their location (Stats NZ, 2021[17]). One notable feature of the fibre roll-out in New Zealand is that it has prioritised schools. Because almost all state schools had fibre connections by 2016, New Zealand's schools are equipped with some of the best digital tools in the OECD (Figure 2.18). Grimes and Townsend (2017[67]) report that access to fibre broadband increased the proportion of students who achieved or outperformed the National Standard in mathematics, writing and reading by a small, but statistically significant margin. However, communication infrastructure and digital tools tend to be used in less educationally relevant manners by students from poorer and less privileged communities.

Figure 2.17. The share of fibre connections in total fixed broadband is relatively high



Note: See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD (2021), *Broadband Portal*

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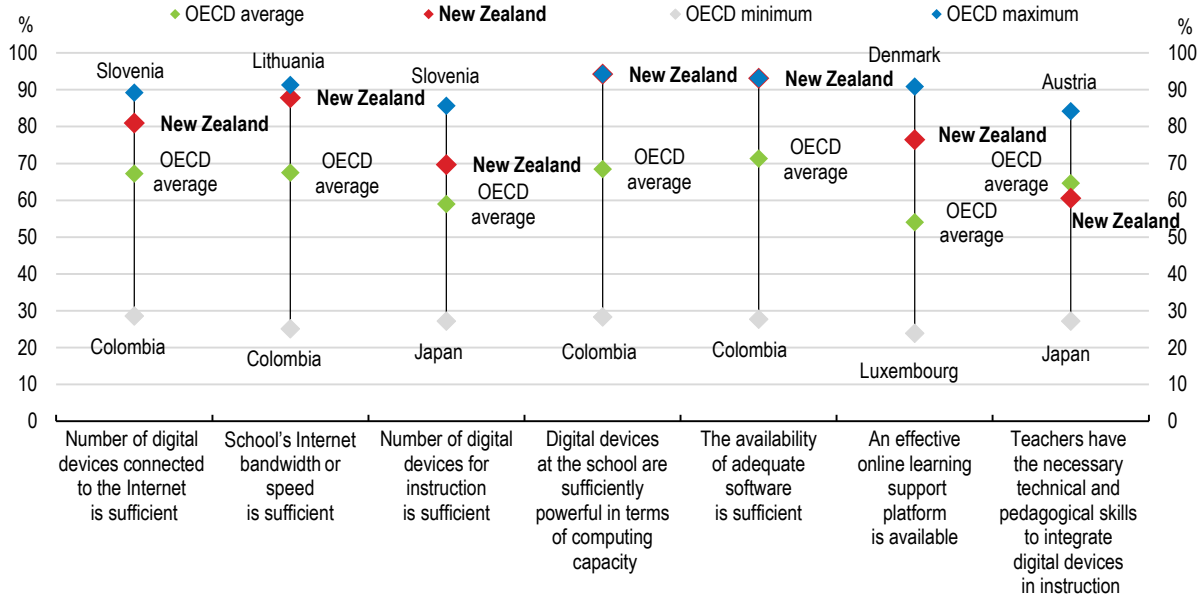
New Zealand's mobile network infrastructure serves over 95% of the population, but covers only half of the territory. Moreover, download speeds are between 32 to 44% slower in rural areas than in urban areas, constraining the use of data-intensive digital tools in rural areas. The Mobile Black Spot Fund (MBSF) aims to provide greater mobile coverage on approximately 1 400 kilometres of state highway and in 168 tourism locations where no coverage currently exists. To expand mobile coverage in remote regions in accordance with the MBSF and the RBI Phase 2 Initiative, New Zealand's three major mobile network operators, Spark, Vodafone and 2degrees, have formed a joint venture, the Rural Connectivity Group (RCG). Funded by both the RBI, the MBSF and the three mobile companies, the RCG builds communications infrastructure that can be used by all three operators. The MBSF has, however, so far progressed slower than the UFB and RBI programmes, holding back the use of digital technologies in remote areas.

Low-income households may be deterred from using advanced digital tools to improve their wellbeing if broadband service costs are too high. This also risks excluding them from accessing various online tools that connect them to government services, jobs and training opportunities as well as housing, limiting their social mobility. The monthly price of the unlimited broadband package, which 85% of Internet users subscribe to, averages NZD 73 (Commerce Commission, 2021[68]), corresponding to 4.5% of the median household income of the lowest income quantile. The share of New Zealanders concerned about the cost of Internet has declined over the past five years, and is considerably smaller than shares of those concerned with other issues like inappropriate online content (InternetNZ, 2020[51]). Instead, a more relevant issue that can lead to digital exclusion of disadvantaged individuals is the cost of digital devices, which has surged due to COVID-related increases in transportation costs and disruptions in global supply

chains. During the COVID-19-induced lockdowns, the government distributed free devices to students from disadvantaged households in addition to providing Internet connections and paying usage fees to prevent them from being excluded from online school courses. The government could consider providing subsidies for the comprehensive costs of accessing fast Internet, which include broadband subscription and digital devices. For instance, the United States subsidised broadband access by low-income households during the pandemic through the Emergency Broadband Benefit Program. Households qualifying for the programme received up to USD 50 per month to pay for Internet service and a USD 100 discount if they bought a computer, laptop or tablet. This temporary measure was extended into the permanent Affordable Connectivity Program in December 2021. Subsidised broadband access by disadvantaged households improves their employment prospects and earnings (Zuo, 2021[69]), contributing to inclusiveness. It would also allow the government to advance its e-government initiatives by moving a wider range of public services online without endangering access to these services by disadvantaged households.

Figure 2.18. Many of New Zealand's schools are equipped with good digital tools

Percentage of students in schools where the principal agreed or strongly agreed with the statement



Source: OECD calculations based on *PISA 2018 Results (Volume V)*

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Alleviating shortages of digital and management skills

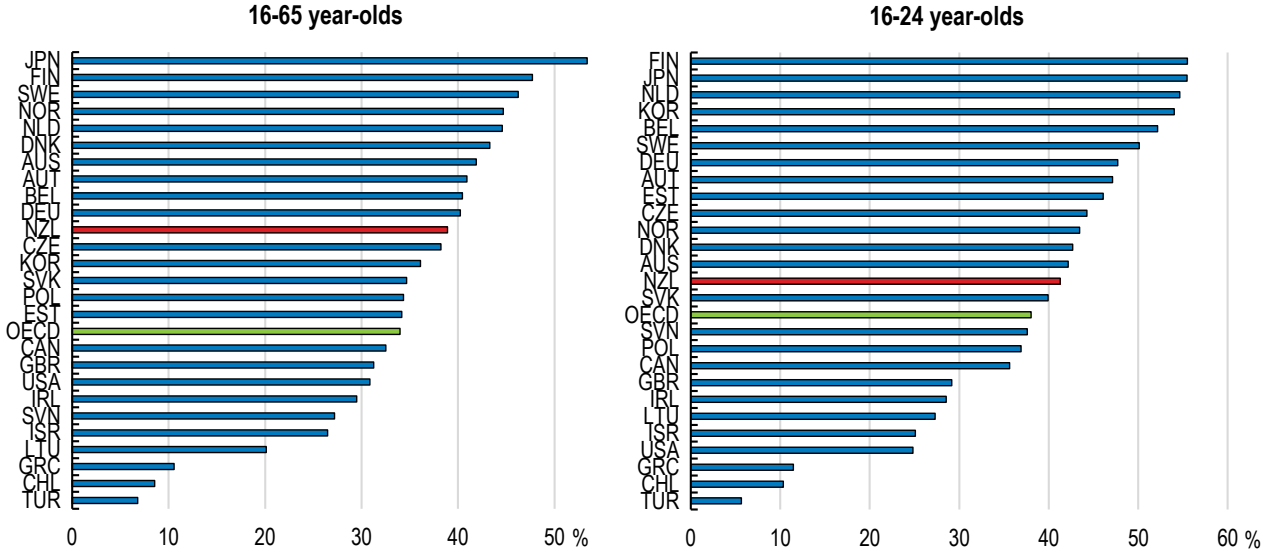
Strengthening foundational skills

To thrive in the digital workplace, workers need strong cognitive skills - literacy, numeracy and problem solving in a technology-rich environment – and socio-emotional skills (OECD, 2019[70]). A well-rounded skills set is the key that allows people to unlock all the benefits of Internet use and use the Internet in diversified and complex ways rather than just for information and communication (ibid). People with strong cognitive skills are better able to adapt to labour market changes, such as workplace reorganisation to use digital technologies more productively.

The share of the working-age population (aged 16-65 years) with a well-rounded skills set is above the OECD average (Figure 2.19) and the share lacking basic skills is one of the lowest (Figure 2.20), albeit with performance in numeracy lagging that in literacy and problem-solving in a technology-rich environment. However, the younger age group's (16-24 years) skills compare less favourably with those

of their peers in other countries than do the skills of older age groups. A factor that contributes to mediocre skills of the younger age group is that achievement increases less beyond lower secondary education than in most other countries. When comparing the literacy achievement of the cohort of individuals who were 15-year-old students in 2000 (2003 for New Zealand and three other countries to which the OECD PIAAC study was extended in 2015) and 26-28-year-old adults in 2012 (2015 for New Zealand and the other three countries), literacy achievement in New Zealand grew by 5 points on the PIAAC scale, which was less than the OECD average growth of 13 points (OECD, 2021[71]). Achievement growth for high performers in PISA was one of the lowest among participating countries (ibid, Figure 3.9). On the other hand, engagement in adult learning, which can reduce the loss of foundation skills owing to ageing, is high in New Zealand, which may help to explain the relatively strong performance of older age groups. The proportion of adults who do not participate in adult learning and report being unwilling to participate in the learning opportunities that are currently available to them (i.e. they are disengaged from adult learning) is 28%, far below the OECD average of 50% (OECD, 2021[71]). Workers who obtained a tertiary qualification are 14 percentage points less likely to be disengaged than workers without a tertiary qualification, a difference that is less pronounced than it is on average among OECD countries (ibid).

Figure 2.19. New Zealand has a high share of adults with a well-rounded skills set despite relatively weaker outcomes for the younger age group



Note: Individuals with a well-rounded skill set score at least Level 3 (inclusive), out of 5, in literacy and numeracy and at least Level 2 (inclusive) in problem solving.
Source: Calculations based on OECD (2012) and OECD (2015), *Survey of Adult Skills* (PIAAC).

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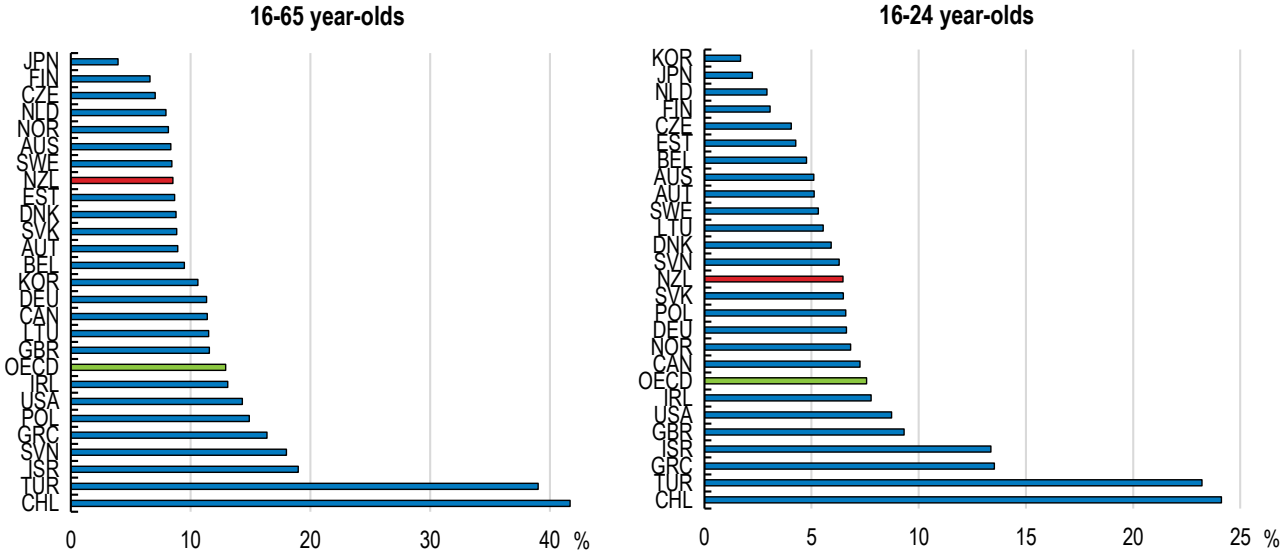
The corner stone for building information-processing skills and the foundations for lifelong learning is initial education. One indicator of the progress made by students at 15-16 years of age is achievement scores in the OECD PISA study, which are correlated with PIAAC scores and are a strong predictor of success at the tertiary level of education (OECD, 2016[72]). Achievement has been declining since PISA tests began (the average three-yearly trend is negative and statistically significant), although New Zealand scores remain above the OECD average and still rank relatively highly (6th – 12th rank range) amongst OECD countries in reading and science (Figure 2.21). The decline since 2009 reflects an increased share of low performers (below Level 2) and a reduced share of high performers, albeit to levels that are similar to those in countries with average scores that are not significantly different from New Zealand's (Figure 2.22). The increased share of low performers, which is over 20% in mathematics, is serious as they do not demonstrate the competencies that are needed to participate effectively in life as continuing students,

workers and citizens. Similarly, the decline in the share of top performers is a problem as this group has acquired the foundation skills at an early stage of their education that are needed to be well equipped in the digital era (OECD, 2020[1]). Māori and Pasifika achievement has also declined since PISA tests began and continues to lag well behind that of the rest of the population. The influence of socio-economic background on scores is similar to the OECD average but is higher than in the other English-speaking countries except the United States, for which the difference is not statistically significant (Figure 2.23).

Figure 2.20. New Zealand has a low share of adults lacking basic skills despite relatively weaker outcomes for the younger age group



Note: Individuals lacking basic skills score at most Level 1 (inclusive) in literacy and numeracy and at most Below Level 1 (inclusive) in problem solving (including failing ICT core and having no computer experience).
Source: OECD calculations based on OECD (2012) and OECD (2015), Survey of Adult Skills (PIAAC).

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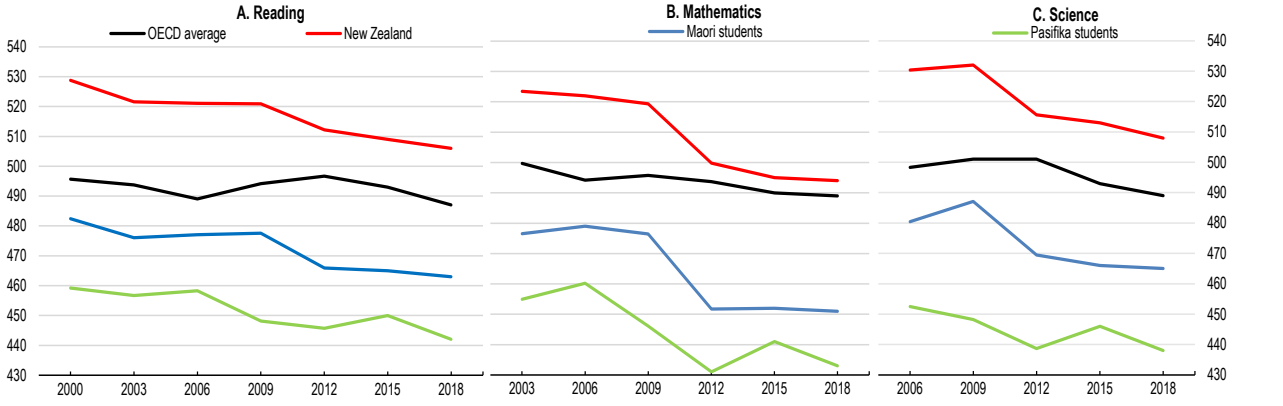
Figure 2.21. New Zealand's average PISA scores have declined



Source: OECD, PISA database ; (May, Jang-Jones and McGregor, 2019[73]), PISA2018, New Zealand Survey Report

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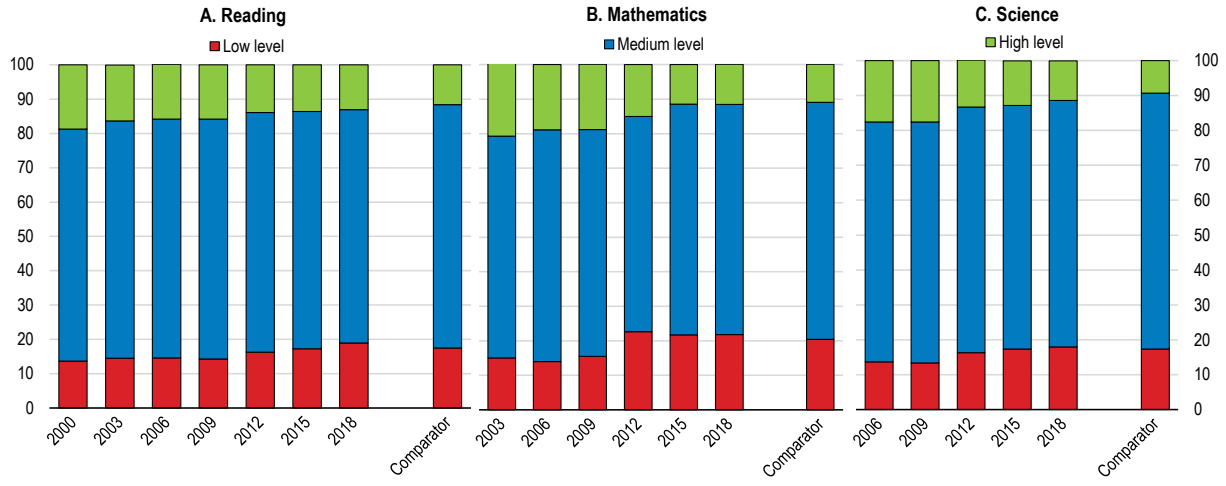
Achievement issues are most pronounced in mathematics, where the average PISA score is only just above the OECD average and there is a larger tail of low performers than in the other subjects. Weakness in mathematics is corroborated in the TIMSS study by Mullis et al. (2020[74]), which tests mathematics

knowledge and assesses students' ability to use it and apply mathematical reasoning in a range of problem-solving situations. New Zealand scores at Grades (referred to as years in New Zealand) 4 (year 5 in New Zealand with students aged around 10 years) and 8 (year 9 in New Zealand with students aged around 14 years) are lower than in other English-speaking countries and indeed lower than in all other participating OECD countries except Chile and, at Grade 4, France (Figure 2.24), and have fallen significantly at Grade 8 since New Zealand first participated in the TIMSS study in 1994. New Zealand's National Monitoring Study of Student Achievement (Darr et al., 2018[75]) showed that in mathematics most children were achieving at the curriculum level expected of them in year 4, but by year 8 only 45% were doing so. Concomitantly, less than half of students at year 8 are on a trajectory to reach the required level at year 12 to continue their education at the tertiary level in any field requiring mathematics competence.

Figure 2.22. The share of high performers in PISA has declined and the share of low performers has increased



Source: OECD, *PISA database*

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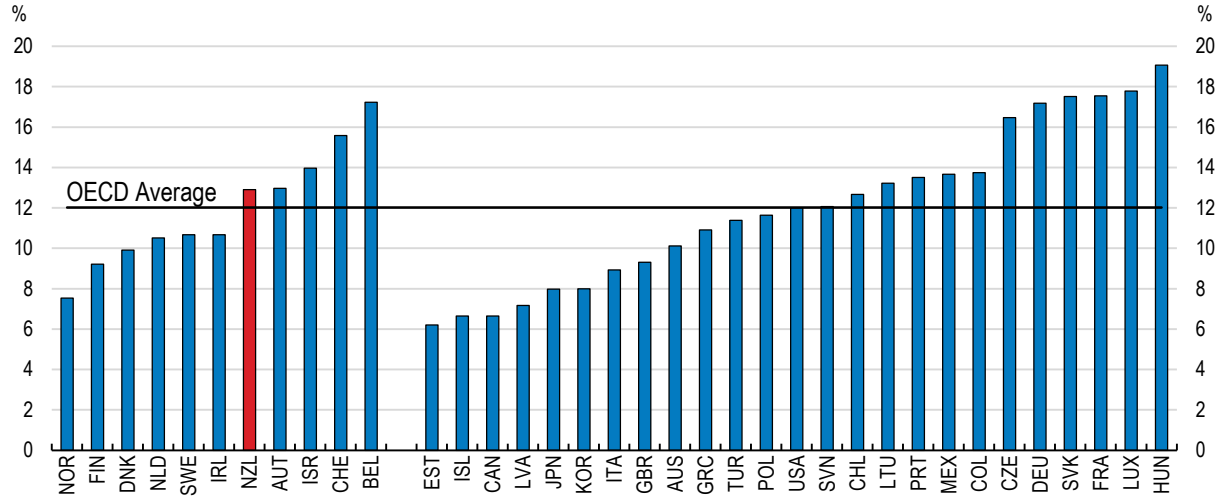
A key reason for New Zealand's poor equity and achievement outcomes is that, since the *Tomorrow's Schools* reforms in 1989, schools have predominantly operated as autonomous, self-managing entities, loosely connected to each other, and with a distant relationship with the centre (Ministry of Education, 2019[76]). This has left schools to operate largely on their own and without sufficient support. Moreover, School Boards of Trustees, which are largely composed of unpaid elected parents, have often struggled to perform the wide range of complex roles required of them, including appointment and performance reviews of principals. This has been a greater problem in more disadvantaged communities than others. In light of these problems, the government decided in 2019 to strengthen support networks in the school system and to make them more responsive to the needs of students and their families. The first plank of the government's reform to the *Tomorrow's Schools* framework is to rebalance the Ministry of Education towards more regional and local support, through the establishment of a separately branded business unit within the Ministry of Education, the Education Service Agency (ESA), which will lead a programme of substantial service level transformation. The second plank is to strengthen the arrangements that underpin principal leadership of schools. This includes inviting the Teaching Council to establish a Leadership Centre, a new role of Leadership Advisor, and the establishment of eligibility criteria for appointments to school principal roles so that all schools have leaders with the right skills and expertise. The government also plans to strengthen incentives for the most capable principals to work in schools with the greatest challenges, which tend to be schools where children predominantly come from disadvantaged backgrounds. Third, the Ministry of Education will reduce the burden on school boards by simplifying or

removing infrastructure management and maintenance responsibilities and centralising key services, such as planned and preventative maintenance.

Figure 2.23. The influence of socio-economic background on PISA scores in literacy is greater than in many other countries

Variation in student performance explained by socio-economic background[1], 2018



1. PISA index of economic, social and cultural status. See Figure 2.1, note 2 for the definition of small advanced economies.
Source: OECD, *PISA database*

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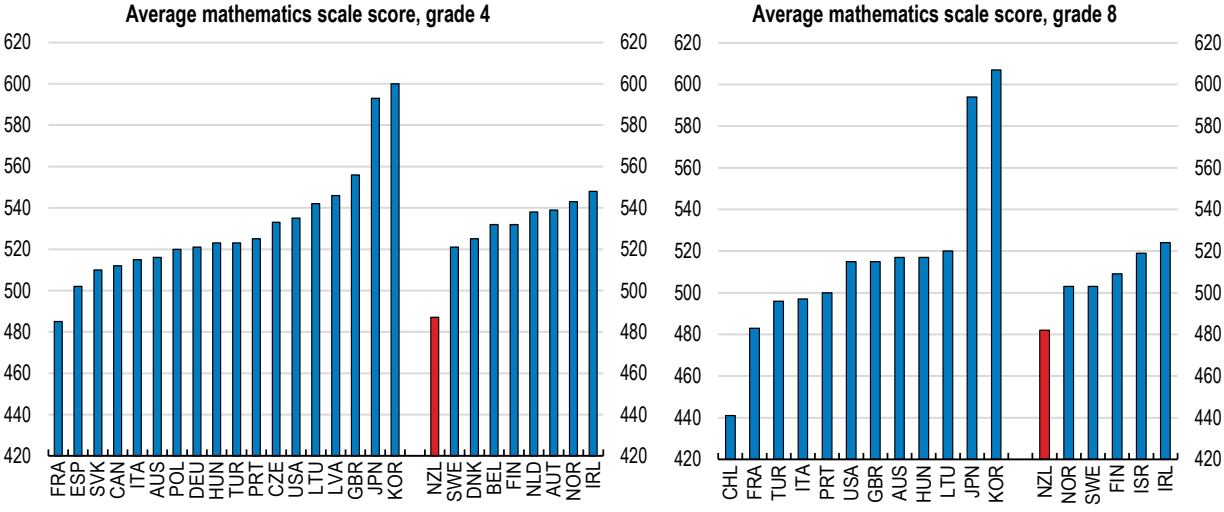
Figure 2.24. New Zealand primary and lower-secondary school students' mathematics knowledge is poor



Note : See Figure 2.1, note 2 for the definition of small advanced economies.
Source: Mullis et al. (2020), *TIMSS 2019 International Results in Mathematics and Science*

StatLink https://stat.link/of4zld

In mathematics, there also appear to be a number of problems with the way it is taught in New Zealand that have contributed to poor achievement. First, since the introduction of the Numeracy Project in 2000, teachers have been trained to put more emphasis on teaching children a range of strategies for solving

mathematics problems and less on basic mathematics knowledge. Direct instruction and explicit teaching can yield better results than enquiry-based learning, although in science the negative correlation between enquiry-based teaching and achievement is greatly attenuated when lessons are delivered in disciplined science classes (Mostafa, Echazarra and Guillou, 2018[77]). Equipping children with basic mathematics knowledge enables them to proceed to higher levels of mathematics reasoning without becoming cognitively overloaded. Second, many teachers lack the skills needed to teach mathematics effectively (Education Review Office, 2021[78]). There is a severe shortage of specialist mathematics teachers at both primary and secondary levels of education – only 53% of Year 9 mathematics teachers have a degree with a maths major according to Mullis et al. (2020[74]) − and teacher education courses devote little time to mathematics (or any other subject-specific) teaching. There is too little guidance for schools on the teacher training best suited to bring teachers' skills up to the required level. Third, the curriculum does not give schools clear enough guidance on what should be covered; it was deliberately designed to be generic so that schools could adapt it to the interests and needs of their local community. The Education Review Office (2021[78]) finds that in the absence of strong direction and clarity, reinterpretations of the National Curriculum have become embedded over time in the mathematics and statistics learning area - there is evidence of a slippage of expectations and a focus on numeracy to the exclusion of other strands.

Key elements of reforms to overcome these problems include: putting more emphasis in teaching strategies on children acquiring basic mathematics knowledge and less on enquiry-based discovery; raising teacher education quality and entry standards (current minimum entry standards for teaching programmes are relatively low) and improving incentives for teachers to gain specialisation in mathematics and to attract graduates into mathematics teaching; supporting professional learning and development that lifts the capability of current teachers in mathematics, ideally with greater programme direction from the Ministry of Education; giving stronger direction and clearer guidance on what is required to achieve the standards in the National Curriculum for mathematics; and supporting school leaders to lead a collaborative, data- and evidence-informed teaching culture that emphasises all aspects of the mathematics curriculum. Consideration should also be given to estimating value added by teachers and schools (i.e., increase in student achievement) controlling for factors such as students' socio-economic background, as in Hernandez (2021[79]), so as to identify and diffuse best practice and to provide greater incentives for better teaching; obviously, such a reform is potentially relevant for all disciplines, not just mathematics. The government has commissioned The Royal Society Te Apārangi to produce an independent academic paper by end-2021 on what mathematics knowledge and skills learners need to know and by when and what needs to change in the New Zealand Curriculum and in how mathematics is taught for more students to reach these levels.

Foundational skills now include general digital skills. New Zealand students perform well in critical literacy, which is taught in English classes. Up to 80% of 15-year-old students report learning about aspects such as the consequences of making information public online, judging whether to trust information from the Internet or comparing different webpages and deciding the relevance of information (Medina and Mcgregor, 2019[80]). In addition, 61% of 15-year-old students answered correctly when asked to distinguish fact from fiction (one item only), which was higher than the international average (47%) and similar to the results for Canada, Australia and the United Kingdom (Medina and Mcgregor, 2019[80]). Another strength is general collaboration skills. New Zealand 15-year-olds rank very highly on collaborative problem solving on computers (working with others to solve a problem through shared understanding and group focus) in a game-based format − only Singapore, Japan and Hong Kong China had significantly higher average scores (May, 2017[81]). This strength may also be related to PISA data that show that New Zealand students score relatively highly in evaluating and designing scientific enquiry.

New Zealand started implementing digital technologies through the Technology curriculum in compulsory education from 2020, with all schools now expected to include digital technologies in their curriculum. This curriculum area aims at fostering critical thinking in cyber space and digital fluency and involves a focus on both computational thinking (i.e., the ability to frame problems in ways that computers can help solve

them) and designing and developing digital outcomes. The impact of the new curriculum is being assessed for years 4 and 8 as part of the National Monitoring Study of Student Achievement (NMSSA) in 2021. Take-up of the new curriculum has been slow, as many schools were not ready or lacked the capabilities needed to implement it. The Ministry of Education should ask schools to self-review readiness and capability to implement the curriculum so that support can be directed to where it is most needed.

There is a need to provide high-quality training to teachers on how best to integrate technology in their pedagogical practices. In the 2018 PISA study, mathematics scores were lower for New Zealand students who used devices during classes than for who did not (Sutcliffe, 2021[82]). Conversely, the best readers used devices with their teachers for more than an hour per week (Sutcliffe, 2021[82]). Many New Zealand teachers were deemed to lack the time, incentives, or expertise to build their capability for effective digital integration for learning (Sutcliffe, 2021[82]). To properly integrate ICTs in the classroom, teachers need not only basic digital skills that allow them to use a computer but also more complex digital skills that enable them to tailor the use of technology to their own teaching (OECD, 2019[70]). Following the Education Review Office (2019[83]) report, which found that teachers in only 7% of schools in 2019 reported having enough knowledge and skills to implement the digital technologies curriculum, additional professional learning development for 34 000 teachers was made available through 2021. Consideration should also be given to including digital education in the early learning curriculum to enhance the effectiveness of school-level digital education.

Increasing the domestic supply of specialised digital skills

The diffusion of digital technologies is increasing demand for workers with advanced digital skills, such as software programming, managing and analysing big data, managing digital hardware and networks, and cyber security. As in other countries, there are shortages of experienced workers with these skills in New Zealand, especially in data science and machine learning. In all sectors across OECD countries, wage returns to ICT skills are twice as high as those related to numeracy skills (OECD, 2019[70]). ICT jobs are well paid in New Zealand - the median base wage for ICT workers in 2021 was 73% higher than the median base wage across all occupations (Absolute IT, 2021[84]).

New Zealand firms have preferred to recruit experienced workers with advanced digital skills rather than offering career paths to existing employees or ICT graduates that lead to these posts (New Zealand Digital Skills Forum, 2021[85]). Employers have sourced most such employees through immigration: for example, 3 683 ICT workers entered New Zealand on work visas in 2019, which is equivalent to 75% of all ICT jobs created that year (ibid). Given that global demand for such workers is also high and growing fast, such heavy reliance on immigration is risky, as the COVID-19 border closure in New Zealand has highlighted. Very few visas have been issued for ICT workers since the beginning of the pandemic and employers report losing experienced high-skilled staff who have returned to their countries (ibid), often because they could not bring family members to New Zealand.

While a rapid easing in immigration restrictions on hiring experienced, high-skilled ICT workers from abroad is vital for the development of firms requiring such workers over the next few years, there also needs to be a greater focus on strengthening the domestic pipeline of IT skills both to reduce the risk of shortages and to give more New Zealanders the opportunity to develop high-paying IT careers. For this to occur, IT employers will need to develop efficient, ongoing upskilling processes. Providing experienced senior staff with new skills may be more efficient in the long term than continual recruitment activity in a high-cost competitive market (New Zealand Digital Skills Forum, 2021[85]). Unfortunately, the domestic pipeline is narrowing, partly as young New Zealanders seek to avoid a dead-end pathway where employers prefer to recruit experienced workers with high digital skills rather than to offer career paths to existing employees or ICT graduates. The share of upper-secondary students participating in National Certificate of Education Achievement (NCEA) Technology standards has been slowly declining in recent years as have the shares participating in mathematics and science standards, which are pathway subjects for computer science.

Very few (20% in 2019) Year 13 students who pass NCEA technology courses go on to some form of IT tertiary education, of which only one half take an IT degree-level course in the following year, although most of these standards (26/36) at Level 3 are not Digital Technologies standards; the Review of Achievement Standards proposes to create fewer, larger standards for each subject and to split Digital Technologies into two subjects to create clearer pathways. Enrolment in tertiary technology courses has been declining in recent years, despite a solid increase in enrolments in degree-level courses, reflecting a sharp decline in sub-degree-level courses (New Zealand Digital Skills Forum, 2021[85]). However, growth in degree-level enrolments has been almost entirely attributable to international students, most of whom do not stay in New Zealand once they have finished their studies (New Zealand Digital Skills Forum, 2021[85]). The total number of domestic students graduating with degree-level IT qualifications (1750 in 2019) is less than half the number of new jobs created each year that require such qualifications.

Better information about the skills in demand could feed back into improvements in education pathways, making graduates more attractive to employers. The reform of vocational education underway aims to make the tertiary education system more responsive to the skill needs of industry. Six Workforce Development Councils were established in May 2021, one of which covers technology, to identify future skills needs and provide industry with greater influence over the training system. Collaboration across Workforce Development Councils where the needs of the different industries they represent align provides an opportunity for the IT industry to shape the provision of teaching, learning and skills across different areas and ensure that programmes at NCEA Levels 3-7 (excluding degree level) meet the needs of employers and learners.

Digital apprenticeships, as in the United Kingdom, would provide opportunities for people who may have the capabilities but not the resources to undertake a digital technology education by enabling them to earn while they learn; introducing such work-integrated learning would conform with Objective 4 in the Tertiary Education Strategy, which includes a review of the tertiary education investment system to introduce a stronger focus on work-integrated learning across a broader range of disciplines. This opportunity would be especially valuable to Māori and Pasifika students who are grossly underrepresented in digital careers and often have to renounce fulltime education, including before finishing secondary education, to earn a living (New Zealand Digital Skills Forum, 2021[85]). It could also provide a clear pathway for people returning to work or looking to move to a digital career. In addition, apprenticeships would provide better integration of employers, education and job opportunities. Industry and providers working through the Technology Work Development Council (and potentially supported by the Tertiary Education Council) should co-design and pilot some sub-degree pathways, as recommended by the Digital Skills Forum, and, depending on the results, extend the concept to degree-level pathways if that appears to be promising.

Internships also provide a valuable opportunity for students to gain relevant work experience and for employers to provide feedback on the skills acquired through education programmes as well as helping employers to identify promising candidates for recruitment. The Employer Engagement function within the Ministry of Education is focused on transitions for learners between schooling and further education and/or employment and has worked with schools and employers to develop a number a number of Work Integrated Pathways in technology (Fusion Networks and Tamaki College; IBM P-Tech and Aoere College and Manurewa High School). However, most IT firms are unwilling to offer internships because they find them too costly. As a result, student demand for internships far exceeds supply. For Summer of Tech, which is New Zealand's largest technology internship, the supply of interns has consistently outstripped places available. Less than 20% of students who apply manage to get an internship each year, but of those that do, 70% end up being employed. Where grants have been provided for internships, via the Callaghan Innovation R&D Experience Grant, there has been a large increase in uptake. As recommended by the Digital Skills Forum (2021[85]), broadening this grant beyond R&D to something more general like innovation or software development and simplifying the process by allowing Callaghan to provide bulk funding to accredited or preferred providers so they can provide the intern and the funding in a single process could be effective ways to increase the supply of IT internships. The Forum also recommends that

consideration should be given to creating specific roles within an agency to help small firms that do not have human resource staff develop work plans for interns. The Unified Funding System for vocational education and training, which is to be rolled out in 2023, will support and incentivise more work-integrated learning. The Career Connect programme in Washington State could provide a role model for expanding career-connected learning opportunities (Box 2.5).

Box 2.5. Expanding career-connected learning: the example of Career Connect Washington

The Career Connect Washington programme aims to significantly expand the scale of career-connected learning opportunities in the state through a system-wide approach. The Career Connect Task Force identified opportunities to expand the provision of career-connected learning at both secondary and post-secondary levels, including:

- career exploration programmes, such as career fairs or courses proposing work-based problem solving;
- career preparation programmes, which include short internships or concentration of vocational courses in secondary education ("Career and Technical Education concentrators");
- career launch programmes, such as registered apprenticeship and programmes requiring work-based learning in two- and four-year institutions.

Career Connect Washington is funded through the Washington Workforce Education Investment Act 2019, which calls for:

- cross-sector co-ordination through a cross-agency work group across the state;
- resources to K-12 and higher education partners to support enrolment in career launch and registered apprenticeship programmes, as well as other career-connected learning opportunities;
- regional leadership and co-ordination to facilitate connections between industry and education;
- creation of a grant programme tailored to the local needs of students and employers, and designed for students to receive dual credit; this includes supporting career-connected learning programme intermediaries working within and across regions.

The programme is supported by close to USD 40 million in 2019-21. The funding supports the creation of new career-connected learning opportunities through competitive funding allocated to programme intermediaries, regional networks and education district co-ordinators; increased enrolment in existing career-connected programmes; supports for low-income students and those in underserved areas to participate, including for transportation; as well as start-up and capital funding.

As part of Career Connect Washington, funding has been allocated to the development of new registered apprenticeships in non-traditional fields such as information technology (USD 2 million), health care (USD 1.6 million), and advanced manufacturing.

Source: (OECD, 2020[86]).

The Industry Transformation Plan with the Digital Technologies sector has developed a new Digital Skills Plan (replacing the previous Digital Skills Forum). This includes actions to develop pathways between education and work – including digital apprenticeships, and greater emphasis on internships and micro-credentials. Implementation planning is underway.

Despite being the largest employers of IT graduates, most public-sector organisations recruit individually and few take on interns (New Zealand Digital Skills Forum, 2021[85]). The central government has a small but successful GovTechTalent graduate programme in place, where IT graduates spend 24-months rotating through three of the participating agencies, spending eight months in each. This programme, or

similar programmes, should be opened to all public-sector organisations to enable them to engage with digital technology graduates and better coordinate internships. The same mechanism should also be expanded to provide internships for digital technology students to help them gain work experience while studying. This would improve the quality of graduates and support the difficult transition from education to employment.

There is also scope to strengthen the digital skills pipeline by encouraging underrepresented groups – women, Māori and Pasifika – to pursue digital careers, which would help to reduce the wellbeing gaps for these groups highlighted in the 2019 *OECD Economic Survey of New Zealand*. By the final year of secondary school (Year 13), the proportion of women taking NCEA Technology Standards is much lower than for men (Table 2.3). Moreover, smaller shares of women, Māori and Pasifika than men and the rest of the population, respectively, are enrolled in mathematics, which is an important pathway subject to a digital career; however, more women than men are enrolled in science, which can also be an important pathway subject depending on the scientific field concerned. Gender and ethnic inequality is greater again at the tertiary education level, with women, Māori and Pasifika comprising only 25%, 5% and 3%, respectively, of IT-degree graduations (2019 data). Respondents to the 2020 Digital Skills Survey indicated that only 27% their digital teams were women, 4.1% Māori and 2.8% Pasifika. Public-private partnerships, such as those in Washington State, that focus on promoting interest in STEM fields, particularly among under-represented groups, could help to close these gaps (Box 2.6).

Table 2.3. Female, Māori and Pasifika secondary students are underrepresented on pathways to digital careers

Funding Year Level Year 13 enrolments, 2020, %

	Share of students enrolled in the subject and in total			Share of total enrolments in the subject and in total	
All ethnicities	Female	Male	Total	Female	Male
Technology Standards	25.6	47.9	36.3	36.8	63.2
Mathematics	69.5	81.2	75.1	48.3	51.7
Science	81.2	76.4	78.9	53.7	46.3
Total	52.2	47.8		52.2	47.8
Māori					
Technology Standards	24.0	43.9	33.4	6.1	10.0
Mathematics	53.0	59.1	55.9	6.5	6.5
Science	55.5	48.3	52.1	6.5	5.0
Total	52.9	47.1		9.2	8.2
Pasifika					
Technology Standards	21.9	48.2	34.5	3.6	7.3
Mathematics	61.0	62.7	61.8	4.9	4.6
Science	48.9	41.0	45.1	3.7	2.9
Total	52.3	47.7		6.0	5.5

Source: Ministry of Education, Secondary Subject Enrolment and July Roll Return total response ethnicity data.

Box 2.6. Public-private partnerships in Washington State to help socially disadvantaged students access high-demand, high-earning fields of study

Washington STEM

Washington STEM is a state-wide, independent non-profit organisation comprised of STEM experts whose role is to identify and foster innovative STEM programs and partnerships. It seeks smart and

scalable solutions that lead to opportunities for students underserved and under-represented in STEM fields. Washington STEM supports policymaking through advocacy, identifies areas of focus on which it collects data (such as early math achievement), and supports regional STEM networks. These 11 regional STEM networks bring educators, business leaders, STEM professionals, and community leaders together to build student success and connect them with STEM career opportunities in their communities.

The Washington State Opportunity Scholarship (WSOS)

The WSOS was created in 2011 to address needs in sectors including aerospace, engineering, technology and health care and rising tuition costs at Washington institutions. The programme consists of scholarships for low- and middle-income students to pursue these fields of study at baccalaureate level and in Career and Technical Education programmes; funds are provided by industry and philanthropic organisations and are matched dollar-for-dollar by the state. This initiative has served close to 20 000 students and outcomes are promising: 61% of students served are women, 64% are students of colour and 65% are first-generation college students. While the average family income of the most recently awarded cohort of baccalaureate scholars was just over USD 41 000 at the time of acceptance into WSOS, the average salary of recent WSOS graduates employed full-time was USD 62 297. Almost 95% of WSOS Baccalaureate graduates are employed or in graduate school, and most (81%) live in Washington state.

Washington Mathematics, Engineering, Science Achievement (MESA)

Washington's MESA programme aims to improve diversity and retention with an emphasis on traditionally under-represented students in STEM fields, including African Americans, Native Americans, Hispanic/Latinos, Pacific Islanders, and women. This programme is one of eleven state programmes co-ordinated by a national body. It benefits from industry sponsorship to fund various supports in schools, community colleges and engineering programmes. These supports are diverse, including teacher training, academic tutoring/counselling, internships, field trips, and recognition events to support both student access and retention into STEM.

Source: (OECD, 2020[86]).

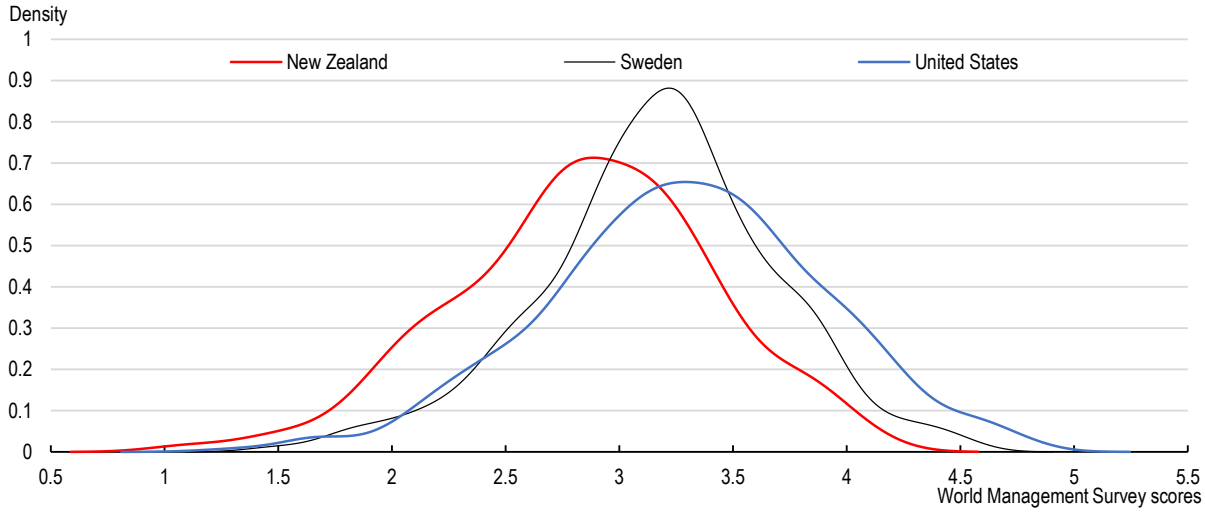
The NCEA Change Programme seeks to address inequity in qualifications. By giving equal status to Māori knowledge, the Programme aims to help Māori learners see themselves studying these subjects. The Review of Achievement Standards also aims to enhance equity by applying quality criteria from four critical perspectives (Māori learners, Pacific learners, pathways and accessibility) to each Standard developed to help ensure that it is as suitable as possible for a diverse range of students.

Enhancing management skills

Managerial practices in New Zealand lag behind other advanced OECD economies, holding back the adoption and effective uses of digital technologies. Management practices have been lagging partly owing to weaker competitive pressure in New Zealand's small, geographically isolated market (de Serres, Yashiro and Boulhol, 2014[31]; OECD, 2017[21]). Indeed, New Zealand underperforms in the distribution of managerial quality against the United States and Sweden (Figure 2.25). Smaller New Zealand firms, especially family-owned firms, trail behind larger firms in managerial quality (Green and Agarwal, 2011[87]).

Figure 2.25. New Zealand lags behind in managerial practices

Distribution of management quality, Kernel distribution



Note: The figure depicts the Kernel distribution of scores in the World Management Survey conducted against firms in New Zealand, Sweden and the United States. The Survey captures the quality of management practices in operations management, performance monitoring, target setting, leadership management and talent management (see the source for more information). The longer left tail in New Zealand's distribution indicates the existence of firms with a very low score (poor managerial practices), which are less frequent or not found in Sweden and the United States.

Source: *The World Management Survey Database*

StatLink https://stat.link/m23fgb

Weakness in management skills has prevented managers from recognising the return from digital take-up and identifying which digital technologies they should adopt (Better for Business, 2020[19]). It is also an important barrier to unlocking productivity growth through digital transformation, considering that reaping the full benefits of digital take-up requires investing in complementary organisational changes (Box 2.7). The deficit in management skills results in low dynamic capabilities, which is holding back New Zealand firms from grasping changes in business environments and investing in strategic intangible capital to capture new business opportunities or respond to threats (Teece and Brown, 2020[88]). Management boards in New Zealand's firms are often more focused on preserving existing value and regulatory compliance than on growth strategies that involve productivity-enhancing investments and international expansion (Smith and Garden, 2020[89]). In particular, there is a shortage of board members with rich managerial experience as opposed to a preponderance of those from accounting and legal backgrounds. In addition, tolerance by shareholders towards failed ventures is low.

Box 2.7.Digital transformation requires good management and organisational changes

The benefits of digital technologies are conditional on complementary investment in organisational change (Garicano, 2010[90]; Cardona, Kretschmer and Strobel, 2013[91]; Corrado et al., 2021[5]). These changes include new organisational processes and structures, knowledge sharing, and redesigned monitoring, reporting, and incentive systems (Brynjolfsson, Hitt and Yang, 2002[92]). Investment in such organisational changes is often risky and typically costs more than the direct financial costs of adopting digital tools like fast broadband or digital services like cloud computing (Brynjolfsson, Rock and Syverson, 2021[3]). However, a successful combination of digital technologies and organisational capital acts as a source of competitive advantage, which competitors find difficult to replicate (OECD GFP, 2019[93]).

Although it is difficult to capture the exact organisational changes made by firms during their digital transformation, some aspects have been documented. For instance, (Bloom, Sadun and Van Reenen, 2012[94]) reported that US multinational enterprises operating in Europe use digital technologies more intensively than European firms and reap higher productivity from ICT capital. They find that higher productivity of ICT capital is mostly explained by superior human resource management by US multinationals, suggesting that better people management practices boost the benefits of digital technologies. (Black and Lynch, 2001[95]) estimated the contribution of various workplace practices to US firms' productivity and found that a higher share of non-managerial workers using computers is associated with higher plant-level productivity, while, interestingly, a higher share of managers using computers is not. Their finding that the usage of computers by mid- to low-level workers improves firm performance is in line with findings that lower costs in gathering information enabled by digital tools increase the value of more decentralised decision making (Bloom et al., 2014[96]).

While the government cannot intervene in corporate boards nor change their risk-averse culture, it can promote the diffusion of good managerial practices that so far are concentrated among the most productive firms (Fabling, 2021[97]). For instance, the government could provide or subsidise the use of in-firm management consulting services, which are found to improve managerial practices in a relatively short time and have lasting impacts (Bloom et al., 2020[98]; Bruhn, Karlan and Schoar, 2018[99]). Classroom-based training programmes for managers could also be provided, although their effectiveness is found to hinge on the quality and intensity of training (McKenzie, 2021[100]). The government could also experiment with various approaches to effectively diffuse good management practices, by involving social partners, academia, and public sector organisations. For example, in 2018 the United Kingdom launched the Business Basics Programme, which provides competitive funds to projects testing innovative ways to encourage SMEs to adopt existing technologies and management practices to improve their productivity. Academic research on management science, especially on advanced management techniques for exploiting digital technologies and dynamic capabilities, should be strengthened as well. Despite their relatively large presence in academia, business scholars are under-represented in panels in the Marsden Fund, which distributes the government's research grants, and are less successful in raising research funds (Godfrey and Freeman, 2019[101]).

To prevent strong risk aversion from biasing management decisions, the government should reform the insolvency regime to facilitate timelier restructuring of non-viable businesses and lessen the penalty for failed entrepreneurs. Although the efficiency of New Zealand's insolvency regime is middle of the range for OECD countries, there is room to make it more conducive to resource reallocation and entrepreneurial risk-taking, as discussed in the 2017 *Economic Survey of New Zealand*. For instance, the government could consider reducing the debt discharge period in personal bankruptcy from three years to less than one year, as in the United States, the United Kingdom and Canada. This would encourage small business owners to experiment with new work organisations that leverage digital tools.

Reducing regulatory barriers to digital innovation

Making regulations more agile and accommodative to digital innovation

Product market regulations need to be agile and responsive to digital innovation in order to accommodate disruptive innovation and avoid killing off technology development while preventing harmful digital activities. New digitally-driven business models often challenge regulations by transcending existing administrative and market boundaries. This creates a void where new businesses are unbound by regulations applied to incumbents, generating unwarranted competitive advantage, and may expose consumers to risks. However, if regulations are too restrictive or prescriptive, they risk deterring digital innovation and its contribution to the economy and society. Regulations that are not technology neutral also prevent the use of more efficient technologies that would have allowed for better compliance.

The government can make its regulations more agile by identifying emerging key technologies and anticipating reform needs arising from these technologies (World Economic Forum, 2020[102]). Having good foresight prevents risks of ill-timed interventions that fail to maximise the potential of digital innovation or mitigate risks to consumers. Several OECD countries have units in place that advise regulators on technological innovation and potential reform needs. For instance, Sweden's Committee for Technological Innovation and Ethics (Komet) helps the government identify policy challenges regulators would face from Fourth Industrial Revolution technologies, and proposes solutions to promote responsible use of these technologies. New Zealand would benefit from having a similar body of experts and social partners in place. Although the production process of Industrial Transformation Plans involved identifying sector-specific challenges and policy priorities, it did not provide holistic insights on how regulations should adapt to technological change.

The government can increase its capacity to accommodate new technologies by shifting from prescriptive rule-based regulations toward goal- or principle-based regulations. Goal-based regulations stipulate objectives that need to be achieved but do not define technologies and activities that are permitted or forbidden (OECD, 2021[103]). Several OECD countries are adopting this regulatory approach, especially in areas where there is great uncertainty about technological progress (Box 2.8). Goal-based regulations are future-proof because the principles behind them are unlikely to become obsolete even if new technologies blur the boundary of regulated activities. For example, the goal of road safety regulations, preventing accidents, will not be obsolete in the face of new modes of transport, like electric scooters.

New Zealand's copyright regime is one area where a goal-based approach would be effective. Due to the lack of principles that define "fair use" exceptions of copyright, New Zealand's copyright law has been progressively patched with narrow exceptions that are soon overtaken by the development of new technologies (Australian Productivity Commission and New Zealand Productivity Commission, 2019[34]). For example, current exceptions in New Zealand's copyright law limit ordinary uses of cloud services (InternetNZ, 2018[104]). It also does not allow some activities that underpin machine learning and artificial intelligence technologies, such as data and text mining, and other non-expressive uses of copyright material (Deloitte, 2018[105]). Copyright protection should be made future-proof by defining its objectives while allowing for the use of various technologies so long as they are consistent with these objectives.

One concern for moving from a prescriptive- to a goal-based regulatory approach is that it can increase regulatory uncertainties if firms cannot assess correctly whether their compliance efforts will be considered sufficient in achieving regulatory objectives. This can lead to over- or under-compliance, especially for younger or smaller businesses with limited capacity to interpret regulatory objectives. In case of the copyright regime above, moving away from prescriptive copyright exceptions (referred to as "fair dealing") to principle-based regulation risks ending up in case-by-case determination of "fair use" by the court, which would increase uncertainties and transaction costs. These regulatory uncertainties can be reduced by complementing goal-based regulations with guidelines or non-binding standards like codes of conduct. These guidelines should be produced and revised regularly in partnership with social partners with information on the latest technologies and new business models that could challenge existing regulations (OECD, 2020[106]). Such a co-regulation process could work well in New Zealand given that policymakers benefit from constructive relationships with social partners. However, it will be important for the government to reach out to market participants that are not well represented by existing organisations, such as start-ups.

Goal-based regulations may not be feasible if the government lacks capacity to assess whether firms' use of digital technologies is consistent with regulatory goals or to hold businesses accountable where this is not the case. An alternative way of making regulations more flexible is experimentation. Several OECD countries have adopted regulatory sandboxes, which enable selected firms to test innovative products or services with minimal regulatory requirements. Regulatory sandboxes were initially used mainly in fintech, but have since expanded to other industries, including transport (drones, autonomous vehicles), energy (smart meters), health (mobile health apps) and ICT (5G) (Attrey, Lesher and Lomax, 2020[107]). New

Zealand has not adopted regulatory sandboxes for fintech to date because the Financial Market Authority's broad power enables exemptions that reduce disclosure and licensing obligations on a case-by-case basis. However, this measure is not intended to promote experimentation of new technologies. The government should consider introducing regulatory sandboxes or similar measures to encourage experimentation across industries. For example, Italy introduced in 2020 a legal provision allowing firms and research institutions to request a temporary derogation from regulations that inhibit new products or business models. Upon approval, innovators are granted a "Right to Innovate" exemption for a specified period.

Box 2.8. Japan's goal-based regulation on autonomous (self-driving) cars

In the near future, traditional cars will be replaced by partially-autonomous cars with automated functions like acceleration and steering, which nevertheless require drivers to remain engaged and monitor the environment, and eventually by fully autonomous cars performing all driving functions under all conditions.

To keep up with technological progress, Japan's Ministry of Land, Infrastructure, Transport and Tourism has built an agile goal-based regulatory framework. It established in 2018 the Basic Safety Guidelines for Self-Driving Vehicles, which define the safety goal to be met by automated cars as: "automated vehicle systems, under their operational design domain, shall not cause any traffic accidents resulting in injury or death that are rationally foreseeable and preventable." The Guidelines further provide more detailed goal-based requirements in areas including the safety of automated driving systems, compliance with the safety standards, human machine interface, installation of data recording devices, cyber security, safety requirements under autonomous driving modes, and so on. All of these requirements are qualitative and do not include numerical objectives or negative lists of specific technologies. This approach allows companies to experiment with a wide range of technologies to meet these safety requirements. The Ministry will also co-develop voluntary technical requirements with industry for experimenting with autonomous vehicles.

Because the safety of autonomous vehicles is governed primarily by the controlling software, which has to be updated regularly, the Ministry also requires automakers to obtain permits from the Ministry on such updates before they are installed in cars. This provision can be regarded as an example of agile safety regulation that evolves with the digitalisation of vehicles.

Source: Ministry of Land, Infrastructure, Transport and Tourism (2018[108]); Ministry of Economy, Trade and Industry (2020[109]); World Economic Forum (2020[102]).

Digital technologies are allowing firms to capture a larger share of revenue from online commerce and to develop business models that combine the most promising aspects of both traditional and e-commerce (OECD, 2020[1]). However, regulations have not always adapted to evolving business models in the retail sector and often impose artificial distinctions between online and offline commerce. Although many New Zealand firms sell online (see above), New Zealand only ranks 12th among OECD countries for the ease of doing digital business on e-commerce platforms (Chakravorti, Chaturvedi and Filipovic, 2019[110]). A factor in New Zealand's relatively poor showing is that retailers must have a bricks-and-mortar shop to be allowed to sell some goods and services online (OECD 2018 Product Market Regulation Indicator). The government should remove this barrier to online sales.

Establishing a consumer data right

Data are a key resource for digital innovation. Because data can be used simultaneously by multiple parties without engendering scarcity or diminishing their value, the benefits of data are maximised when they are widely shared and re-used across many entities insofar as this does not infringe any individual's privacy or corporate secrets. For instance, effective use of customer data can reduce search and switch costs, allowing consumers to shop around for the best services, or firms to introduce new services that respond

to consumers' unmet demand. The possibility of transferring customer data across digital services or platforms allows consumers and businesses to change more easily to new and potentially better data-driven services and platforms, fostering greater user choice, competition and innovation (OECD, 2019[111]). Data portability is a promising way to promote re-use of personal and business data, where a firm that collected an individual's data provides data in a commonly used, machine-readable format to the individual, or to a third party he or she has chosen (OECD, 2019[111]). A consumer data right provides a legal basis for data portability by establishing the rights of individuals or businesses to the data they generate. It gives them stronger control of their data and ensures that their data are only shared for their benefit, with their consent. Australia enacted legislation on consumer data rights in 2019, which enabled consumers in designated sectors to have certain information disclosed to them or to accredited third parties. It was applied first to the banking sector and is to be extended progressively to energy and telecommunications. New Zealand's current regulatory settings embody some barriers to consumers gaining access to their data from data holders (New Zealand Productivity Commission, 2021[10]). The government is preparing legislation rolling out a consumer data right on a sector-by-sector basis that should be presented to Parliament in 2022. Further decisions need to be made concerning the implementation of consumer data rights, including how to enforce them or in which sectors they should first be applied.

Safeguarding competition in digital services markets

Digital services are often characterised by large economies of scale and network effects that lead to entry barriers, winner-take-most dynamism and strong market concentration. Market dynamism, especially entry and growth by start-ups introducing new technologies, disruptive innovation and business models, is important as they can help break up concentrated markets or force less efficient incumbents to improve or exit. An eventual acquisition by large incumbents is often an important motivation for digital innovation by these start-ups. However, problems arise with regard to technology diffusion when incumbents decide not to commercialise technologies acquired from nascent firms, for instance because they cannibalise their existing services. In some cases, large incumbents seek to snuff out competition by acquiring nascent competitors holding valuable digital technologies, and discontinue their development (a case referred to as a killer acquisition) (OECD, 2020[112]). The competition authority should therefore be able to thoroughly scrutinise mergers and acquisitions (M&A) that potentially curb competition in digital markets, in particular acquisitions of nascent competitors.

In New Zealand, the Commerce Act prohibits mergers and acquisitions that have an effect, or likely effect, of substantially lessening competition. However, parties can apply to the New Zealand Commerce Commission (NZCC) for clearance on a voluntary basis. If the NZCC grants clearance, this provides immunity from prosecution under the Commerce Act for the transaction for 12 months. The NZCC can also decline to give clearance, if it is not convinced that the transaction will not have an effect, or likely effect, of substantially lessening competition. The voluntary notification regime, also adopted in the United Kingdom and Australia, contrasts with the ones in most OECD countries, where notification is obligatory for mergers that result in turnover or other criteria exceeding stipulated thresholds. On the one hand, this can prevent the NZCC from reacting to M&A that lessen competition in a timely way if the Commission is not aware of the transactions. On the other hand, New Zealand's regime can be more flexible, because it allows the competition authority to investigate smaller M&A that do not exceed stipulated thresholds, unlike most of the mandatory pre-merger notification regimes (OECD, 2020[112]).

If the merging parties do not notify the NZCC prior to the merger but the NZCC subsequently forms the view that the merger undermines competition, it can prosecute the parties and seek divestment remedies and pecuniary penalties against firms and/or individuals. The NZCC also has the ability to file to the court for an injunction to prevent transactions that it is aware of that may affect competition from completing. If prosecuting a transaction under the Commerce Act, the so-called burden of proof lies with the NZCC, that is, in order to prohibit or prosecute specific M&A, the NZCC needs to convince the court of the anti-competition effects of the merger. However, anticompetitive impacts of mergers in digital services are often hard to prove due to their dynamic markets, rapid innovation and complex business models. Anti-

competitive effects of nascent acquisitions are harder to prove, since this involves comparing the degree of market competition against the counterfactual where the nascent firm was allowed to grow. Such difficulty in reversing potentially anti-competitive M&A underscores the importance of ensuring that the NZCC thoroughly scrutinises them in advance.

This provides a case for equipping the NZCC with "call-in" power to order merger parties to apply for its clearance, whenever it sees a risk of substantially lessened competition. For example, the United Kingdom is consulting on introducing a new merger regime applied to firms with specific market status that allows the competition authority to intervene based on a realistic prospect that the merger or acquisition is expected to reduce competition. Germany, in its amended Competition Law, endowed the Federal Cartel Office with the power to order companies with worldwide revenue and a domestic market share exceeding stipulated thresholds to notify all acquisitions if it holds objective concerns that they significantly impede effective competition in Germany (Herrlinger et al., 2021[113]). This call-in power should be complemented with power to halt the integration of merger parties and require businesses to be run separately until the NZCC completes its investigation. Also, the NZCC currently lacks the powers to order merger parties based overseas to produce information or documents for its investigation, unlike the Australian competition authority. The NZCC therefore has to enter into agreements with foreign competition authorities to obtain these, which can be time-consuming. Equipping the NZCC with such power would help it make better and more timely decisions.

Strengthening trust in Internet environment and preparation against digital security risks

Preventing online extremism and algorithmic biases

Low trust in online security and digital privacy deters people from engaging more in the digital economy (OECD, 2019[114]). Ensuring a safe internet environment is thus key to reaping the benefits from new digital technologies. In 2020, almost 60% of New Zealanders chose at least once not to use an online service because of security or privacy concerns, and 46% of the New Zealanders were very or extremely concerned about the online security of their personal data (InternetNZ, 2020[51]). The top online privacy concerns are fear that credit card details get stolen and that private companies and public agencies share personal details without permission (Office of the Privacy Commissioner, 2020[115]). Other aspects of the Internet that concern New Zealanders, particularly the elderly and women, are cyber bullying and the possibility that young people get access to inappropriate content (such as hate speech or politically extremist material) (InternetNZ, 2020[51]). Following the 2019 terrorist attack in Christchurch, New Zealand, together with France, launched the "Christchurch call", an action plan to combat online extremism. So far 55 countries and 10 tech companies, including Google, YouTube and Facebook, have joined in, committing to measures including improved transparency in the removal of online content and ensuring that algorithms do not direct users towards violent extremist material. New Zealand also supports the OECD Voluntary Transparency Reporting Framework, aimed at improving the evidence base on terrorist and violent extremist content (TVEC) online by facilitating transparency reporting on TVEC by online content-sharing services within a common framework.

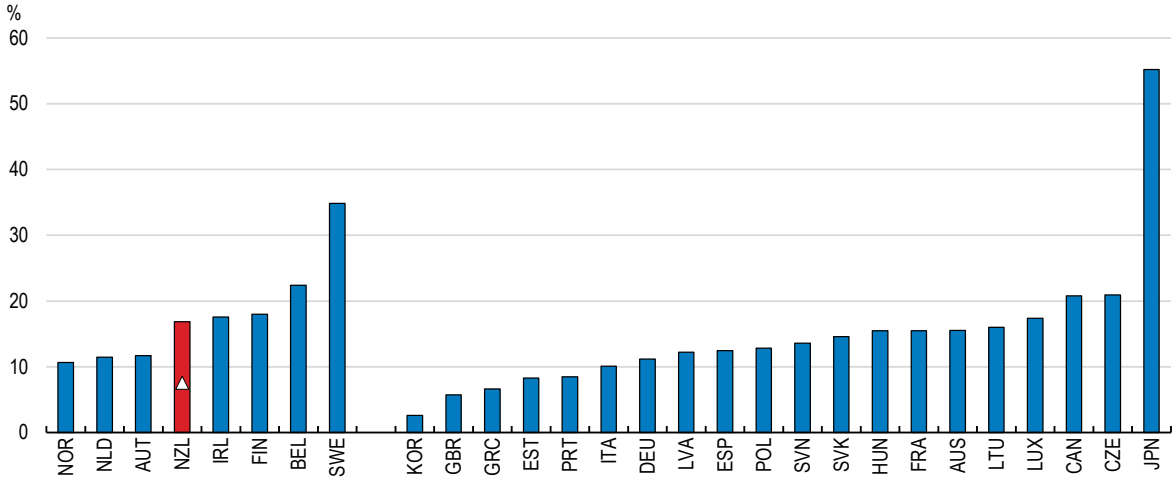
New Zealand is among the first countries in the world to develop of a set of standards to guide the use of algorithms by government agencies and as such a pioneer in pursuing the "Ethical Algorithm", which seeks to correct bias embodied in algorithms that leads to unfairness. In New Zealand, public agencies such as the Department of Corrections, the Accident Compensation Corporation and the Police use algorithms to estimate inmates' risk of re-offending, process insurance claims and identify faces or car number plates. There is a risk, however, that algorithms perpetuate biases or prejudices if the dataset used to develop them reflects historical injustices or fails to properly represent the larger population. In such cases algorithms might, for example, overestimate the risk of recidivism for certain groups. In 2018, Government Chief Data Steward and the Government Chief Digital Officer published an "Algorithm Assessment Report" (Department of Internal Affairs, 2018[116]) that reviewed the use of algorithms by 14 government agencies. It recommended that public agencies be transparent about the role of algorithms in their decision making

and carefully review their algorithms for any “unintended or adverse effects”. In 2019, The New Zealand Law Foundation (2019[117]) issued a report stressing that algorithms might suffer from biases even though they are supervised by humans and suggested the creation of an independent regulatory agency to scrutinize the algorithms used by public agencies. In 2020, New Zealand became the first country in the world to establish an “Algorithm Charter” to be used by government agencies. Agencies that have signed the charter pledge to be transparent about how their decisions are informed by algorithms, to peer review algorithms to avoid biases or other unintended consequences and to provide a channel for people to appeal against decisions informed by algorithms.

Strengthening digital security risk management

Concerns about cyber security and fraud are holding back more extensive use of digital technologies. For instance, 40% of firms seeking to adopt AI consider privacy and data security as the main barriers (The AI Forum of New Zealand, 2018[118]). The share of firms experiencing IT security breaches in New Zealand is indeed higher than the OECD average (Figure 2.26). The number of cyber-attacks has risen markedly worldwide since the Covid-19 pandemic, as firms increased their online activities (OECD, 2020[119]). In New Zealand, the total number of reported cyber-attack incidents rose by 65% between 2019 and 2020 (CERT, 2020[120]). The two most common types of cyber-attack, phishing and fraud, increased by 76% and 11% respectively, whereas reported malware incidents rose by a staggering 2008%, largely due to a surge in the Trojan malware Emotet. Many of the cyber-attacks that have increased drastically during 2020 were directed at business employees. According to Stats NZ’s Business Operation Survey, the most common security measures taken by New Zealand firms in 2020 were virus protection, anti-spyware software, spam filters and regularly back-ups of critical data. However, fewer firms made use of authentication software for external users or secured communication between clients and servers. Also, few firms educated staff on cyber security or put in place digital security policies.

Figure 2.26. A relatively high share of businesses report ICT incidents (security breaches), 2019



Note: Data for New Zealand come from Stats NZ (2020), Business Operations Survey and cover 2018 (bar) and 2020 (triangle). See Figure 2.1, note 2 for the definition of small advanced economies. These data only measure reported ICT incidents and not the actual number of incidents, which is likely to be higher.

Source: OECD, *ICT Access and Usage by Businesses database*; Stats NZ (2020), *Business Operations Survey*

StatLink https://stat.link/bmc62z

There is an urgent need to raise awareness about cyber-attack threats and to promote sound digital security risk management, especially among small businesses. The government could for instance encourage firms to conduct digital risk assessment practices, which are found to increase digital security measures by European SMEs (OECD, 2020[1]). It could also disseminate innovative safety measures undertaken by firms in other OECD countries (Box 2.9).

The government's capabilities to cope with digital security risks have been strengthened. In 2017, it established a Computer Emergency Response Team (CERT), which collaborates with its international counterparts, the Police and agencies such as the National Cyber Security Centre (NCSC) to keep abreast of the latest cyber threats. It also provides businesses with best practice guides on ICT security and help in case they have been subject to an attack. Moreover, the NCSC, which protects New Zealand's nationally significant organisations, has set up a specific Covid-19 page to advise firms who start working remotely on sound digital practices. In August 2021, the government laid out a Cyber Security Emergency Response Plan, which stipulates roles of government agencies and a coordination framework to respond to a cyber security emergency.

Box 2.9. IoT security labelling in Finland and the United Kingdom

Nascent digital industries sometimes suffer from adverse selection, as consumers struggle to tell which new products are secure and which are not. Customers then tend to choose products based on factors such as price and usability, which are sometimes at odds with digital security. Companies thus have incentives not to devote more resources than absolutely necessary to improve cyber security measures in their products. In more mature markets, such as those for laptops and smartphones, the fact that consumers most often bear the costs of cyber-attacks and that companies sometimes deliberately shorten their products' lifecycles could also lead to companies neglecting digital safety in their devices.

To deal with these market failures, OECD countries are increasingly taking measures to increase product transparency and reduce information asymmetries. In 2019, the Finnish security firm F-Secure found that IoT products, such as smart TVs and watches, sometimes lacked secure-by-default features and were increasingly targeted by cyber criminals. At the same time, a survey from the Finnish Transport and Communications Agency Traficom showed that Finnish consumers worried about cyber security and wanted smart devices to clearly display information on their information security. In the same year, Finland became the first country in Europe to launch a voluntary security label for IoT products. Companies can apply for the Cybersecurity Label at the Finnish Transport and Communications Agency (Traficom), which examines the product to determine if it meets the cyber security requirements set by Traficom's cyber security centre. The requirements are based on the European standards organisation ETSI EN 303 645, ensuring that products can be easily modified to comply with other international requirements.

The United Kingdom provides another example on how to deal with vulnerabilities in new IoT devices. In 2018 it published a "Code of Practice for Consumer IoT Security", setting out guidelines that summarise good practice in IoT security. In early 2021, the United Kingdom announced plans to put three IoT requirements into law. To comply with the planned new law, IoT devices must inform customers when security software will no longer be updated, not use pre-set universal default passwords, such as "password" or "admin" and provide a point of contact so that the customer can report vulnerabilities. Australia adopted a similar, but voluntary, code of practice in 2020 and is currently considering making the guidelines mandatory. In response to the code of practice, Australian firms said that they preferred guidelines based on international standards.

Source: OECD (2020[1]), Traficom (2021[121]).

Enhancing digital transformation by small firms

Promoting the adoption by small firms of digital technologies is central to their diffusion, given that 90% of New Zealand's enterprises were firms with five or less employees in early 2020 (Stats NZ Business Demography Statistics). Managers and owners of small businesses are often constrained in terms of time, skills and capital in adopting the latest digital technologies and investing in complementary organisational capital. Small New Zealand firms, especially family-owned firms, trail behind larger firms in managerial

quality (Green and Agarwal, 2011[87]), which constrains their ability to benefit from digitalisation (see above). Small firms are also less prepared against cyber-attack (see above). The first important step is therefore to raise their awareness of opportunities and threats presented by digital technologies. This should be followed by accessible and highly practical support schemes that enhance their capabilities to exploit and benefit from digital technologies while implementing up-to-date security measures. These schemes include hands-on technical assistance and financial support for efforts to exploit digital technologies in developing new products and business models, or to improve management practices. The government should also support small innovative firms that leverage digital technologies to grow faster by enhancing access to growth capital and providing opportunities for them to capture larger demand.

As a part of the massive fiscal policy response to COVID-19, the government announced a package of NZD 20 million aimed at promoting digital capabilities in small businesses and tourism operators through training and consultation. Half of this fund was used to launch the Digital Boost initiative, which provides free digital skills training and consultation to small businesses online. This welcome step should be followed up with reforms of existing policy schemes to bolster the digital transformation of small businesses.

Raising awareness of the benefits of digital technologies

Managers of small businesses in New Zealand rely mainly on their peers, friends or business advisers (like accountants) for advice on digitalisation and less on government agencies or business organisations (Better for Business, 2020[19]). Therefore, actual cases of small businesses thriving through digital take-up should be disseminated through peer learning and trusted intermediaries. The Digital Boost initiative includes a Spotlight Series where small business owners share their experiences in transforming their business through digital take-up. The government should also work with business partners of small businesses like regional financial institutions as well as regional bodies such as regional economic development agencies to raise digital awareness of small businesses through their daily interactions.

Strengthening technical assistance and knowledge transfer

There is a strong need for an organisation that is specialised in supporting digital take-up by small businesses with weak digital capabilities. Research institutions in New Zealand, such as universities or Crown research institutes, do not have strong channels to provide technical support to these firms. There are organisations facilitating technology transfer and commercialisation of innovation by connecting research institutions and firms, such as the Kiwi Innovation Network (KiwiNet), which manages the innovation outputs of 18 universities and research institutes receiving public funding. However, the collaboration projects proposed by these organisations involve advanced technologies, which only concern a handful of firms with high technological capabilities. The lack of effective channels to help firms with weak capabilities makes it harder for research institutions to inform them of opportunities and risks digital transformation brings, or to assist their digital take-up. Callaghan Innovation, the Government's business innovation agency, brokers technologies and innovation for firms and provides in-house R&D services. It is possibly the most promising provider of hands-on technical assistance to small businesses. In the year ending in June 2020, 63% of its customers were firms with five or fewer employees (Callaghan Innovation, 2020[122]). Yet, it may have little incentive to divert its resources from R&D services that generate an important share of its revenue and yield higher value added than technical assistance. While the launch of the Digital Boost Initiative in 2020 is welcome as the first measure targeting small businesses, both the scope and depth of support for the digitalisation of small firms should be stepped up, possibly through a new organisation that offers hands-on support. For example, Germany has set up 26 Mittelstand 4.0 Centres of Excellence that offer a wide range of services focused on digital take-up by SMEs, which include demonstration factories that reproduce corporate operations to provide managers with real-life examples of how digital technologies could transform their operations and opportunities to try out their own technical solutions. In Latvia, the Latvian Investment and Development Agency operates a one-stop shop that dispatches groups of researchers (technology scout teams) stationed in universities across the country to firms to help them deal with technological issues.

Technical assistance on digital take-up needs to be coupled with advice on management practices and organisational changes, in order to increase the likelihood that small firms achieve significant benefits from digitalisation, as do larger firms (see Figure 2.8). Small business owners in New Zealand often struggle to find digital advisers who are not only technically savvy but can also provide practical business advice highly specific to each firm (Ministry of Business Innovation and Employment, 2019[123]). New Zealand's research institutions do not have the capacity to offer advice on managerial practices or business strategies. The Competence Centres in Australia, Lithuania and Sweden not only disseminate knowledge on digital technologies but also provide tailored management counselling services (OECD, 2020[1]). Turkey's Competence Centre provides tailored advice on regulations relevant to new business models enabled by digital technologies with responses co-ordinated across the government. Germany's Mittelstand 4.0 Centres of Excellence help SMEs assess their own digital efforts, develop a digitalisation roadmap tailored to their individual needs, and support them as they select and implement specific actions, while providing advice as to whether a certain technical solution makes good economic sense. New Zealand's Digital Boost initiative provides one-on-one consultation online. It is important that such consultation provides extensive support to strengthen firms' managerial capabilities to leverage digital tools for their business strategy and organisational changes. The government should boost the capacity of the Digital Boost Initiative to meet diverse needs by small businesses in advancing their digital transformation. It should also ensure that this scheme receives stable funding, by reconfiguring some of the existing resources allocated to innovation support, if necessary.

Providing financial support for digital transformation

Several OECD countries provide financial support to small businesses, such as grants or tax credits, for adoption of digital technologies aimed at improving their product and management processes (Box 2.10). This is because benefits of adopting digital technologies can extend beyond the firms adopting digital tools. First, across OECD countries, there are considerable gaps in the take-up of the latest digital technologies between large productive firms and smaller less productive firms, which leads to wider productivity dispersion. This in turn results in larger wage dispersion across firms (OECD, 2021[9]). Promoting the diffusion of digital technologies among small, less productive firms thus helps reduce income disparities. Second, the adoption of digital technologies by a firm generates knowledge spillovers to other firms (Gal et al., 2019[20]). That is, it reduces the costs of digital adoption by other firms through demonstration effects. This positive spillover could be particularly strong in New Zealand, where small firms mainly refer to the experience of their peers when mulling their digitalisation strategy (see above). At the same time, the user cost of digital tools is considered by managers in New Zealand as one of the most important determinants of digital take-up (Better for Business, 2020[19]). The costs of adopting some digital technologies may be prohibitive for some firms, especially when added to the time and cost required to acquire the skills to use digital tools effectively. Introducing financial support to boost digital take-up by small firms would thus allow New Zealand to unleash these positive externalities.

Box 2.10. Grants and tax incentives for digital take-up

Some OECD countries provide direct financial support such as grants to help targeted companies cover the costs of accessing digital technologies and tools. For example, Korea provides grants for the use of cloud computing services. Portugal offers direct financial support for website development and maintenance, e-commerce, online marketing and big data. Denmark, Slovenia and Germany provide financial support to help businesses devise digitalisation strategies or augment digital capabilities and skills. Japan provides SMEs with indirect financial support for digital take-up, such as subsidies on digital tools like cloud computing and tax credits on ICT investment in both software and hardware.

Source: OECD (2020[1]).

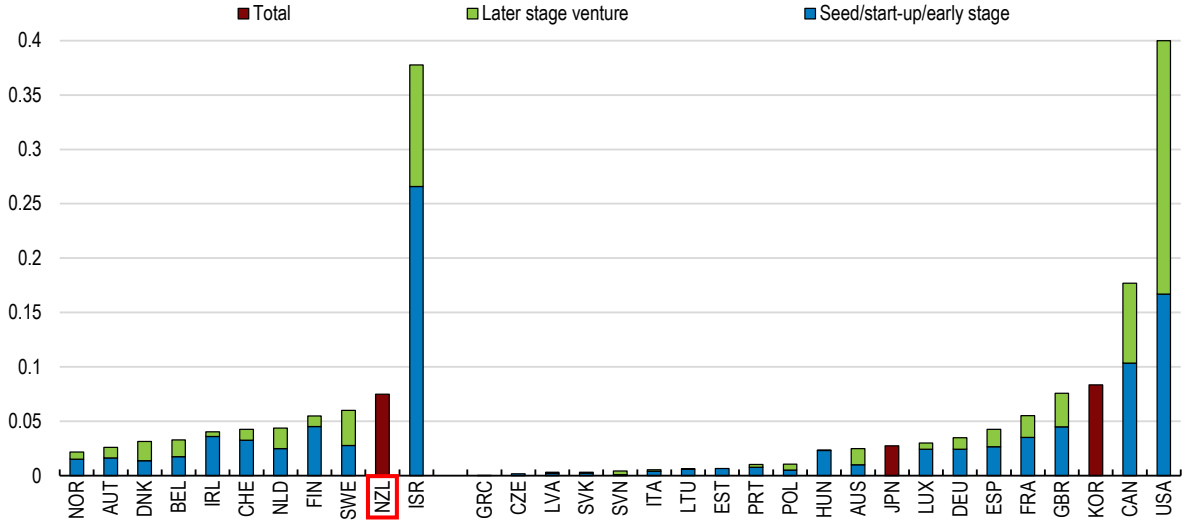
Enhancing access to growth capital

Good access to early-stage funding allows start-ups introducing novel digital solutions to expand in the market, and is thus essential for the diffusion of digital technologies. Seed and venture capital investment in New Zealand has been growing since the early 2000s, with the establishment of the government Venture Investment Fund (NZVIF) in 2002 and the Seed Co-Investment Fund in 2006 that developed early stage markets and a pipeline for the Venture Investment Fund (OECD, 2020[124]). The size of venture capital investment is comparable to that of the United Kingdom as a share of GDP (Figure 2.27). Nevertheless, a large funding gap in early-stage funding, namely in the venture series A and B funding that follows seed funding stage, is preventing many start-ups and high growth firms from reaching significant scale. Indeed, only 10% of New Zealand firms that raised seed funding can transition into venture capital Series A funding, a conversion rate that is considerably lower than in the United States, where the rate is about 40%, Australia or Singapore (New Zealand Treasury, 2019[125]).

The Treasury foresees an annual funding gap of NZD 150 million in Series A and B funding over the next five years, equivalent to 70% of foreseen demand (New Zealand Treasury, 2019[125]). Furthermore, venture capital supply is highly dependent on foreign sources. Only NZD 53 million Venture Capital was raised domestically while NZD 122 million was funded from abroad during 2012-17. The lack of sufficient early-stage funding prevents New Zealand's venture capital market from maturing and the ecosystem for commercialising digital innovation, which is much needed for the export competitiveness of digital services (New Zealand Productivity Commission, 2021[10]), from developing. It also encourages start-ups with high growth potential to relocate abroad in order to acquire the capital to scale up.

Figure 2.27. The venture capital market is relatively large compared with the size of the economy

Venture capital investments as a percentage of GDP, 2017 or latest available year



Note: Data for Japan refer to 2016 values and data for Israel refer to 2014 values. See Figure 2.1, note 2 for the definition of small advanced economies.

Source: OECD (2018), *Entrepreneurship at a Glance Highlights*

StatLink https://stat.link/n1p7da

The government launched the Elevate NZ Venture Fund (the Elevate Fund) in March 2020, a fund of funds programme that will allocate up to NZD 300 million into venture capital firms over the next five years, to increase investment in Series A and B funding high-growth tech businesses. The venture capital firms are required to raise matching capital from other investors that is at least equal to the commitment from the Elevate Fund, and are required to invest at least 75% of the fund into Series A and B funding. The

establishment of the Elevate Fund may stimulate a larger supply of funds in this domain, in the same way as the Seed Co-Investment Fund has helped develop a vibrant angel investment industry.

The Elevate Fund is required to invest at least 70% of its capital in venture funds in New Zealand while it may invest the remaining 30% alongside offshore funds, provided that they invest this capital in New Zealand entities. However, considering that foreign investors fund more than twice as much large venture capital as domestic investors (see above) and that there are urgent needs for Series A and B funding, the government should allow some flexibility in this requirement in the near term. This would allow the Elevate Fund to collaborate more intensively with foreign venture capital firms to bring in more Series A and B funding in the short run, while achieving the 70% domestic capital share in the medium run. Access to the global network of foreign investors can provide start-ups with not only a deeper pool of funds but also opportunities to absorb advanced managerial knowledge and expand in foreign markets. In bringing in foreign venture capital, the government should ensure good coordination between the NZ Growth Capital Partners (previously the NZVIF) that manages the Elevate Fund and the New Zealand Trade and Enterprise (NZTE), which has been connecting New Zealand firms seeking to raise growth capital for international expansion with international investors.

The government should address several structural challenges that are holding back the domestic supply of venture capital. They include incentives that encourage banks to favour loans for housing purchases over loans to businesses, limited exit options for venture capital, which is due to an absence of large domestic tech firms that seek to adopt new technologies through acquisition of tech venture firms, overall low recognition by large foreign tech firms despite some recent high profile acquisitions, and limited opportunities for high-growth firms to list on the stock market (New Zealand Treasury, 2019[125]).

There is also a need to strengthen the capacity of start-ups to raise funding both domestically and internationally. Start-ups that leverage digital technologies and invest intensively in intangible capital can struggle to communicate and sell their value proposition to investors, compared to those investing in tangible capital (OECD, 2013[126]). The government can for instance set up a scheme where experienced managers coach start-up owners on how to promote their project to investors and match promising start-ups with investors by leveraging their connections (Smith and Garden, 2020).

Boosting exports by firms leveraging digital technologies

On the one hand, exporting encourages firms' technology adoption, and this will in turn strengthen their export competitiveness, leading to more exports (Box 2.2). On the other hand, an effective use of digital technologies increases the chance that firms start exporting (Box 2.3). This interaction between export and digital take-up can be unleashed through stronger coordination between export promotion and innovation support measures. The government should provide seamless support for small firms leveraging digital technologies that seek to grow larger through exporting. In order to establish strong competitiveness and capture high value added from exports and participation in global value chains, New Zealand's firms need to specialise in highly differentiated and knowledge-intensive goods and services that are hard to replicate. However, competitiveness in these goods and services is founded on strong innovation capabilities and accumulation of intangible capital (OECD, 2013[126]). This underscores the importance of innovation support that is closely tied to export promotion.

New Zealand's export promotion is not strongly oriented toward increasing new exporters. The NZTE provides export promotion services, including support for using digital tools like online sales platforms to sell abroad. However, the NZTE uses around 80% of its financial resources to support intensively around 700 exporting firms with strong export competitiveness and growth orientation (New Zealand Trade and Enterprise, 2019[127]). Firms seeking to enter export markets are given lighter support, such as knowledge transfer on foreign markets and export strategy planning. A digital portal was launched in 2019 to reach out to more potential exporters and provide practical information and advice. While the strong focus on established exporters may help boost New Zealand's export performance more efficiently under a resource constraint, it may fail to identify and support innovative young firms that seek to internationalise at their

early stages. There is also a risk of deadweight losses where intensive support is provided to the most competent firms that would have gained export market shares without the support. The government should reserve a part of the resources for export promotion measures to identify potential exporters of knowledge-intensive, hard-to-replicate goods and services and to promote their successful sales in foreign markets. Close cooperation between the NZTE and Callaghan Innovation would be crucial to identify such firms. Indeed, the draft version of the government's Research, Science and Innovation Strategy states as one of the priorities: "providing integrated support and advice services to start-ups through Callaghan Innovation and NZTE to make it easier for them to access global markets and global customer insights, and to go global from day one of business."

Using government procurement to foster the growth of digital services

Public procurement is an important industry policy tool that provides strategic sectors with an opportunity to develop faster by tapping into large demand. As New Zealand's government progresses toward digital government (see above), it will need to invest in a wide range of digital infrastructure and systems in order to offer user-centred digital services. The government should actively use its ICT procurement to promote the growth of New Zealand firms introducing novel digital solutions.

The public procurement rule requires government agencies to seek opportunities to increase New Zealand businesses' access to government procurement. Nevertheless, MacLennan (2021[128]) reports that the government's ICT procurement that was publicly advertised in the Government Electronic Tender Service amounted to only 2% of annual government ICT expenditure in 2020. This indicates that most ICT procurement was made through exemptions to the procurement rule, namely through secondary procurement, where the procuring agency purchases from a panel of pre-approved suppliers (Chapter 1). Panel members are often large incumbent firms and the window of opportunity for new firms to join these panels is limited, effectively excluding them from public procurement. This practice is particularly harmful for the procurement of digital services that can play a large role in the growth of digital firms and diffusion of digital technologies. In 2018, the government opened the Marketplace, a digital procurement channel that connects registered government agencies and suppliers of innovative products and services. About 80% of suppliers applying for registration are domestic firms, often SMEs. Currently, the Marketplace is open for four types of digital services including Software as a Service (SaaS) and Consultancy and Professional Services. The government intends to shift away from the secondary procurement to this new scheme, which reduces barriers for suppliers doing business with government and time and costs spent by agencies. It should pursue this by increasing the scope of ICT products and services traded in the Marketplace. The government's Chief Digital Officer has been coordinating to streamline procurement processes for ICT products and services across agencies and establish a common set of procurement agreements. Such a common guideline should include abstention from secondary procurement.

Unleashing digital innovation in the agricultural sector

Digital innovation in the agricultural sector is held back by low awareness of the benefits of technology adoption as well as by shortages of skills for implementing transformative changes in production systems. A lack of access to fast speed Internet in rural areas also hampers the use of data-intensive digital technologies. Further issues relate to digital tools. For instance, the platforms for managing irrigation, fertilisers and tracking animals are fragmented, and are not necessarily cross operational and do not produce data that can be easily combined with those produced by other systems (Ministry of Business Innovation and Employment, 2020[23]). Such fragmentation inhibits the use of sophisticated digital tools that require large integrated data. Data sharing by farmers adopting digital technologies is also limited by a lack of clear governance concerning data ownership and appropriation of economic value generated by data, curtailing the opportunities for data-driven innovation (Ministry of Business Innovation and Employment, 2020[23]). Moreover, the growth of New Zealand's agritech exports has been weak, in contrast to agricultural exports (Agritech New Zealand, 2020[28]). Many agritech firms are competing in the small domestic market without reaching sufficient scale to become internationally competitive. Technological

innovations in New Zealand's agricultural sector are often based on the pastoral model, which are often not applicable to other countries employing different farming systems. Also, large players in the agricultural innovation ecosystem are often focused on addressing domestic production issues and have limited capabilities or interest in proposing innovative solutions to global agricultural problems (Ministry of Business Innovation and Employment, 2020[23]).

Enhancing competition

While agriculture is more exposed to global competition in New Zealand than in other OECD countries (see above), maintaining and strengthening healthy competitive pressure and low barriers to market entry are key to promoting technological adoption (Nicoletti, von Rueden and Andrews, 2020[129]). The dairy industry, New Zealand's largest export industry, has undergone large structural changes since the Dairy Industry Restructuring Act 2001 (DIRA) that established Fonterra, a giant farmer-owned cooperative that controlled 96% of milk production in New Zealand. The DIRA, however, included provisions allowing farmers to exit the Fonterra Cooperative to supply other dairy processors and re-enter the Cooperative freely. It also stipulated that other dairy processors could obtain the raw milk necessary for them to compete in dairy markets (OECD, 2021[22]). Furthermore, the DIRA effectively deregulated dairy exporting by permitting all dairy processors to sell their products on international markets. These reforms led to entry by new dairy processing firms that introduced innovative business models and specialised in high value added niche products (New Zealand Productivity Commission, 2021[10]). The 2020 amendment to the DIRA will remove the open-entry provision from June 2023 that mandated Fonterra to take back any farmers who had left it to supply another milk company. This risks locking farmers into Fonterra's supply chain, thereby curbing competition and dynamism in the dairy processing industry, which is still dominated by Fonterra. Reduced competitive pressure could hold back diffusion of digital technologies. Fonterra would have less incentive to innovate and take up digital technologies to enhance its cost efficiency. Younger and more agile firms that are more likely to introduce disruptive digital innovation will be put at a disadvantage. The government should carefully consider the implications of this DIRA amendment on market dynamism and innovation in New Zealand's most important industry, and reverse it if necessary.

Building the capacity to exploit digital technologies

Policy support is needed to help farmers identify technologies and knowledge needed to address market and environmental challenges and to ensure that the agricultural workforce is endowed with the digital and management skills needed to exploit digital tools and adjust their work organisation in a way that maximises the effectiveness of digital tools. Previously, the New Zealand government provided proactive technology transfer through extension services in the 1970s and 1980s, which contributed to fast technology adoption by farms. Such direct support to farmers was removed in the late 1980s as part of wider public sector reforms, and government extension services were eventually privatised in 1996. Government support for agriculture has since focused on R&D while promoting the uptake and extension of new technologies has largely been left to other actors in the sector. However, the importance of accessible, up-to-date extension programmes is greater than ever, particularly in face of tighter environmental constraints and fast technological change. The Ministry of Primary Industries has recently re-entered the extension services space to help farmers make decisions that support sustainable land use and improve farming outcomes. Some NZD 35 million was allocated until June 2023 to support up to 2 200 producers. While this is welcome, ensuring the success of this new extension programme will require strong involvement by industry groups and other trusted parties to secure buy-in from farmers. It will also require close and highly effective collaboration with farmers and researchers to co-produce knowledge and effective solutions (Casalini, Bagherzadeh and Gray, 2021[25]) given that policy resources available are much smaller than in the 1970s and 1980s.

Another promising new channel of technology transfer and capacity building is the Centre of Vocational Excellence (CoVE) for Food and Fibre, launched in March 2021 by a Consortium of 54 organisations including industry associations, tertiary education providers, Māori, employers and employees. The Centre

is one of three prototypes that will receive funding of NZD 18 million over four years, and is tasked to identify excellence in vocational education in the area of food and fibre and drive innovation by funding specialised projects testing new ideas. It will also share applied research with firms and provide training support for firms. While the detailed activities of the CoVE for Food and Fibre are still being developed, the government should leverage the CoVE as an effective tool to diffuse digital innovation and managerial practices that complement digital technologies.

Improving interoperability and open data

The government should take the initiative in setting uniformly recognised or adhered-to standards for agritech products and services in order to ensure interoperability across digital tool platforms. It should require agritech players to converge to specific standards, while letting them choose the most suitable standards compatible with their commercial interests. Such standards may be some of the established standards in the world's agritech markets, which would facilitate agritech exports by ensuring interoperability with foreign systems. Access to valuable data underpins the effectiveness of digital innovation in providing solutions to the agricultural challenges. The government should propose a governance framework for agricultural data that balances protecting data privacy and confidentiality with farmers' economic interests in data they generate, while promoting wide access to these data to leverage their potential for the sector's growth and innovation (Jouanjean et al., 2020[130]). One way is to establish property rights over these data, for instance by extending the framework for the consumer data right (see above). Lastly, the government should also share the data collected for regulatory purposes in an easily usable format to support farmers' efforts to exploit digital tools to better comply with environmental regulations. The government should address the lack of consistency across councils' measurement and reporting requirements, particularly for environmental standards, which is reducing the usefulness of government data for agritech (Ministry of Business Innovation and Employment, 2020[23]). The government should also respond to unmet data needs of farmers and agritech by collecting useful data, such as those that help farmers prepare against natural disasters (Casalini, Bagherzadeh and Gray, 2021[25]).

Fostering the growth of agritech through exports

Agritech will be key to the diffusion of digital technologies in the agriculture sector. It will provide technologies and business solutions that allow the agricultural sector to boost productivity and capture a larger share of value added from global food value chains. The innovation ecosystem of agritech is developing, supported by the establishment and expansion of Agritech New Zealand, a consortium of large agri-businesses and start-ups, research institutions, government agencies and tech companies. The government's recent measure to boost early-stage venture capital funding (see above) would support further development of this ecosystem. The agritech industry was also selected as one of the strategic industries by the government, and received a NZD 11.4 million fund to develop the Agritech Industry Transformation Plan laying out strategies for the growth and scaling of agritech.

Nevertheless, agritech needs stronger exports to grow further. It is important that agritech researchers and firms shift their focus from domestic agricultural needs to international challenges and explore export opportunities, in order to capture larger returns from their innovation. However, there are so far no specific support measures for promoting agritech exports. In July 2020, the government launched Fit for a Better World, a ten-year roadmap designed to boost agriculture sector export earnings by NZD 44 billion over the next decade (Ministry for Primary Industry, 2020[131]). However, agritech has not been given a prominent emphasis in this roadmap. The government should define agritech exports as an integral part of the agriculture exports and allocate innovation support and export promotion measures accordingly. Furthermore, it should leverage the enactment of the Regional Comprehensive Economic Partnership (RCEP), which accounts for more than half of New Zealand's agro-food exports and imports, as an opportunity for promoting agritech exports.

FINDINGS	RECOMMENDATIONS [Key recommendations shown in bold]
Implementing a comprehensive digitalisation strategy	
New Zealand embarked on the production of a national digitalisation strategy, which aims to promote trust, inclusiveness and growth in the digital economy and society	**Advance the national digitalisation strategy by providing a strong mandate for strategic coordination across all relevant policy areas and by collecting the data needed to support it.**
Improving access to high quality communication infrastructure	
High-speed broadband is being rolled out rapidly, but there are unserved areas in rural areas, holding back the use of data-intensive digital technologies in agriculture	Accelerate the mobile network infrastructure investment funded by the Mobile Black Spot Fund.
The cost of digital devices has surged due to COVID-related increases in transportation costs and disruptions in global supply chains, which risks excluding poor households from accessing the Internet.	Consider providing subsidies to low-income households for the costs of accessing high-quality connectivity, which includes broadband subscription and digital devices.
Strengthening digital skills and management quality	
The domestic pipeline of advanced ICT skills is weak. Poor mathematics achievement limits the proportion of school students who can obtain the university qualifications needed for ICT careers.	**Improve mathematics and science teaching in primary schools, including by putting more emphasis on inquiry plus guided teaching using well-articulated knowledge bases for both the student and the teacher.** **Develop digital apprenticeships and internships and expand the GOVTechTalent graduate programme to all public sector organisations.** **Develop programmes to help Māori and women pursue digital careers**.
Weakness in management skills is preventing digital take-up and investment in complementary organisational changes needed to unlock productivity growth through digital transformation.	Promote diffusion of good managerial practices through in-firm management consultancy, training programmes or other innovative approaches. Strengthen academic research on management science.
Reshaping regulations for the digital age	
Some of New Zealand's regulations lack flexibility to accommodate disruptive digital innovation, a framework to support data portability, and agility to prevent anticompetitive mergers and acquisitions in digital services.	**Move toward goal-based regulations that stipulate regulatory objectives while allowing flexibility in technologies used.** **Equip the NZ Commerce Commission with powers to order merger parties to apply for its clearance. Also endow it with the powers to halt integration between parties during its investigation and order the merger parties which are overseas entities to produce information for its investigation.**
Ensuring a safe digital environment	
Cyber-attacks have increased in the wake of the COVID-19 lockdown but few firms have adopted more robust security technologies, educated staff on cyber security or put in place digital security policies.	Raise awareness about cyber-attack threats and the need for sound digital security management, especially among small businesses. Encourage firms to conduct digital risk assessment practices.
Promoting the digital transformation of small businesses	
Research institutions do not have strong channels to provide technical support to small businesses with weak digital capabilities or advice on organisational changes needed to make best use of digital technologies.	Boost the capacity of the Digital Boost Initiative to provide both technical and managerial advice to small businesses. Ensure its stable funding.
A wider adoption of digital technologies by small firms facilitates the digital take-up by other small firms which learn from their peers, but is held back by its financial costs.	Consider introducing financial support for digital take-up by small firms.
The lack of sufficient early-stage funding is holding back the commercialisation of digital innovation. The government launched the Elevate NZ Venture Fund that co-invests with venture capital funds in Series A and B funding, but the Elevate Fund is required to invest at least 70% of its funds in New Zealand's venture capital funds, which have been providing only a minor fraction of early-stage funding so far.	Allow the Elevate Fund to invest more than 30% of its capital in offshore funds in the short run provided that they invest this capital in Series A and B funding for New Zealand companies. Aim to achieve the 70% share in the medium to long run.
Policy support for digital innovation and export promotion measures are not well linked.	**Provide seamless support to innovative digital start-ups for their early global expansion through better coordination between Callaghan Innovation and New Zealand Trade Enterprise.**
Government procurement through panels of pre-approved suppliers (secondary procurement) is depriving young innovative firms of an opportunity to grow faster by tapping into this large market.	Move away from secondary procurement in the procurement of ICT products and services by making greater use of the Marketplace.
Unleashing digital innovation in the agricultural sector	
The 2020 amendment to the Dairy Industry Restructuring Act (DIRA) 2001 will remove the open-entry provision that mandated Fonterra, the giant farmer-owned cooperative, to take back any farmers who had left it to supply another	Carefully monitor the impacts of the DIRA amendment on market dynamism and innovation in the dairy sector, and reverse it if necessary.

milk company. This risks undermining competition and innovation in the dairy processing industry by providing an unwarranted advantage to Fonterra over younger and more agile firms that are more likely to introduce disruptive digital innovation.	
Digital innovation in the agricultural sector is held back by low awareness of the benefits of technology adoption as well as shortages in skills for implementing transformative changes in production systems.	Ensure the effectiveness of the new extension programme through strong involvement by industry groups and other trusted parties. Leverage the Centre of Vocational Excellence for Food and Fibre to diffuse digital innovation and managerial practices that complement digital technologies.
The digital platforms for managing irrigation, fertilisers and tracking animals are not necessarily inter-operational, nor do they produce data that can be easily combined.	**Ensure interoperability across digital tool platforms by requiring agritech players to adopt common standards, while letting them choose the most suitable common standards to converge to.**
Many agritech firms are competing in the small domestic market, without reaching sufficient scale to exert strong competitive pressure.	Promote agritech exports as a part of wider agricultural exports. Support innovation collaboration with foreign firms and research institutions.

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The New Zealand economy recovered quickly from the COVID-19 shock thanks to effective virus containment, measures to protect jobs and incomes and highly expansionary macroeconomic policies but is now overheating and house prices have soared. The Reserve Bank has begun to tighten monetary and macroprudential policies with a view to achieving its price and financial stability objectives. Together with policy measures to increase housing supply, this should help moderate housing price inflation. While the fiscal deficit has begun to fall from the highs reached during the first wave of the COVID-19 shock, additional consolidation measures will be needed to put public finances on a sustainable path, including an increase in the pension eligibility age. New Zealand has considerable scope to boost productivity by fostering growth of its digital sector and stimulating digital innovation. This requires strengthening the domestic pipeline of digital skills, making sure that regulations evolve with technological change and facilitating exports by firms exploiting digital technologies. New Zealand has a solid institutional framework to reduce greenhouse gas emissions but needs to implement additional abatement measures to meet its objectives. The carbon price needs to increase substantially, combined with efficient complementary measures.

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