OECD Economic Surveys
NEW ZEALAND

JUNE 2017

OECD

OECD Economic Surveys: New Zealand 2017

OECD

BETTER POLICIES FOR BETTER LIVES

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Please cite this publication as:
OECD (2017), *OECD Economic Surveys: New Zealand 2017*, OECD Publishing, Paris.
http://dx.doi.org/10.1787/eco_surveys-nzl-2017-en

ISBN 978-92-64-27711-3 (print)
ISBN 978-92-64-27712-0 (PDF)
ISBN 978-92-64-27715-1 (epub)

Series: OECD Economic Surveys
ISSN 0376-6438 (print)
ISSN 1609-7513 (online)

OECD Economic Surveys: New Zealand
ISSN 1995-3100 (print)
ISSN 1999-0162 (online)

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Photo credits: Cover © iStockphoto.com/George Clerk.

Corrigenda to OECD publications may be found on line at: *www.oecd.org/about/publishing/corrigenda.htm*.

© OECD 2017

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of the source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to *rights@oecd.org*. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at *info@copyright.com* or the Centre français d'exploitation du droit de copie (CFC) at *contact@cfcopies.com*.

Table of contents

Basic statistics of New Zealand, 2016 8
Abbreviations and acronyms 9
Executive summary 11

Assessment and recommendations 15
New Zealand is enjoying a strong, broad-based economic expansion 19
Ensuring price and financial stability 25
Adjusting fiscal policy to enhance growth and prepare for future shocks and population ageing 31
Improving productivity in New Zealand's economy 34
Adapting to the changing labour market 43
Making growth more environmentally sustainable 62
Bibliography 67

Annex. **Progress in structural reform** 71

Thematic chapters

Chapter 1. **Improving productivity in New Zealand's economy** 77
New Zealand's productivity performance in an international context 78
Factors contributing to New Zealand's poor productivity performance 84
Policy measures to facilitate global connections 88
Fostering competition and addressing policy barriers to agglomeration 99
Facilitating capital investment 107
Investment in innovation 111
Recommendations to improve productivity in New Zealand's economy 115
Bibliography 116

Chapter 2. **Adapting to the changing labour market** 123
The labour market implications of technical change 125
Adapting to technical change that favours high-skilled workers 140
Recommendations to enhance adaptation to the changing labour market 170
Bibliography 171

Boxes

1. Macro-financial vulnerabilities 27
1.1. Cross-country comparison of business sector productivity 81
1.2. Industry-level comparison of labour productivity in New Zealand and Australia 83
1.3. New Zealand-Australia economic relations 98

1.4. The effects of weak competition on construction industry productivity 100
2.1. Measuring qualifications, field-of-study and skills mismatches 151
2.2. Skills mismatch, productivity and policies in New Zealand: Evidence from PIAAC 161

Tables

1. Macroeconomic indicators and projections 21
2. Possible extreme shocks affecting the New Zealand economy 25
3. Past OECD recommendations on price and financial stability 30
4. Fiscal consolidation is set to continue 33
5. Past OECD recommendations on policies to prepare for future shocks and population ageing 34
6. Past OECD recommendations on improving productivity 39
7. Levels and changes in occupational employment shares in New Zealand, 1991-2011 45
8. Impact of net migration on the skills of the population 48
9. Earnings premiums for NZ workers by level of educational attainment 48
10. Educational attainment by highest level of qualification 48
11. Past OECD recommendations on adapting to the changing labour market . . . 54
12. Prevalence of field-of-study mismatch by field 57
13. Past OECD recommendations on making growth more environmentally sustainable 64
1.1. Industry composition of market sector productivity differences 84
1.2. Key advantages and disadvantages of introducing a broad-based capital gains tax 110
1.3. Relative strengths of tax incentives and grants to support business R&D 114
2.1. Levels and changes in occupational employment shares in New Zealand, 1991-2011 127
2.2. Impact of net migration on the skills of the population 132
2.3. Earnings premiums for NZ workers by level of educational attainment 132
2.4. Education attainment by highest level of qualification 133
2.5. Employment, unemployment and inactivity rates by educational attainment and age group 133
2.6. Prevalence of field-of-study mismatch by field 154
2.7. Mismatch and labour productivity in OECD countries: controlling for the overlap between the components of qualification and skills mismatch 159
2.8. The effect of policy-related factors on skills mismatch 161

Figures

1. Inclusiveness and well-being 17
2. Sources of real income differences across OECD countries, 2015 18
3. Breakdown of GDP per capita growth, 1995-2015 19
4. Factors driving the economic expansion 20
5. Labour market developments 22
6. Expected and actual inflation and interest rates 23
7. External sector indicators 24
8. House prices 26

9. Evolution of macro-financial vulnerabilities since 2007 27
10. House prices and population pressure 28
11. Household debt and bank market funding 30
12. Fiscal indicators 32
13. Labour productivity 35
14. Gross fixed non-residential capital formation. 36
15. Expenditure on research and development 36
16. Inward direct investment stock 37
17. Corporate income tax rates, 2016 41
18. Direct and indirect funding of business R&D by governments 42
19. Firms collaborating on innovation with higher education or research institutions 43
20. Long-run broad occupational employment shares 44
21. Educational attainment gap between young and old, 2015 46
22. Level of educational attainment of the young, 2015 47
23. Firms facing skills shortages 49
24. Risk of job automation 50
25. Share of NZ workers with high automation potential by education attainment and income level 50
26. Information-processing skills 51
27. Proficiency in problem solving in technology-rich environments among adults 52
28. New Zealand's average PISA scores have fallen 52
29. Percentage of students at each proficiency level. 53
30. PISA performance in mathematics, 2015 53
31. Influence of socio-economic background on PISA scores in mathematics 54
32. Qualifications and field-of-study mismatch 56
33. Percentage of workers with literacy skills mismatch 59
34. Counterfactual productivity gains from reducing skills mismatch 60
35. Estimated gains to labour productivity from adopting best-practice policies to reduce skills mismatch. 61
36. Growth of nitrogen balances and milk production in New Zealand 63
37. Marine and terrestrial protected areas, selected OECD countries 65
38. Environmental indicators 66
1.1. GDP per capita and hourly labour productivity 79
1.2. Labour productivity growth decomposition. 80
1.3. Gross fixed non-residential capital formation. 80
1.4. Productivity trends in the business sector 82
1.5. New Zealand labour productivity relative to Australia. 83
1.6. Average management quality score in the manufacturing and retail sectors 86
1.7. Job creation by new firms and age composition of small businesses 86
1.8. Enterprise birth and death rates 87
1.9. Comparison of long-term real interest rates 88
1.10. Sources of finance 89
1.11. Expenditure on research and development 90
1.12. Investment in knowledge-based capital, 2015. 90
1.13. Fixed broadband indicators 91

1.14. Mobile broadband indicators 92
1.15. Services trade restrictiveness index by sector 93
1.16. Global value chain participation, 2011 94
1.17. Trade facilitation measures 95
1.18. Inward direct investment stock 96
1.19. Corporate income tax rates, 2016 109
1.20. Collaboration by NZ researchers 112
1.21. Direct and indirect funding of business R&D by governments 113
2.1. Long-run broad occupational employment shares 126
2.2. Job polarization: employment growth of occupations by computer use in the United States 128
2.3. Educational attainment gap between young and old, 2015 129
2.4. Level of educational attainment of the young, 2015 130
2.5. Decomposition of tertiary education attainment by age group, 2015 131
2.6. Firms facing skills shortages 134
2.7. Employment at high risk of automation 135
2.8. Risk of job automation 136
2.9. Share of NZ workers with high automation potential by education attainment and income level 137
2.10. Disability benefits 138
2.11. Employment rates of lone parents vs partnered mothers 139
2.12. Information-processing skills 142
2.13. Proficiency in problem solving in technology-rich environments among adults 143
2.14. Return to numeracy skills across PIAAC countries 143
2.15. The age profile of information-processing skills 144
2.16. Use of information-processing skills 145
2.17. High-performance work practices 146
2.18. New Zealand's average PISA scores have fallen 147
2.19. Percentage of students at each proficiency level 147
2.20. PISA performance in mathematics, 2015 148
2.21. Influence of socio-economic background on PISA scores in mathematics 148
2.22. Qualifications and field-of-study mismatch 152
2.23. Overlap of over-qualification and field-of-study mismatch 153
2.24. Participation in formal/non-formal education 156
2.25. Percentage of workers with literacy skills mismatch 160
2.26. Counterfactual productivity gains from reducing skills mismatch 160
2.27. The probability of skills mismatch and policies 163
2.28. Estimated gains to labour productivity from adopting best practice policies to reduce skills mismatch 164
2.29. The notice period for individual dismissals in New Zealand is among the shortest 165
2.30. Disability policy in OECD countries 169
2.31. Effective tax rate for a sole parent moving to low-paid full-time work 170

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 20 April 2017. The draft report was then revised in the light of the discussions and given final approval as the agreed report of the whole Committee on 24 May 2017.

The Secretariat's draft report was prepared for the Committee by David Carey and Andrew Barker under the supervision of Mr. Peter Jarrett. Research assistance was provided by Ms. Isabelle Luong. Ms. Heloise Wickramanayake formatted and produced the layout. The previous Survey *of New Zealand was issued in June 2015.*

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

Follow OECD Publications on:

http://twitter.com/OECD_Pubs

http://www.facebook.com/OECDPublications

http://www.linkedin.com/groups/OECD-Publications-4645871

http://www.youtube.com/oecdilibrary

http://www.oecd.org/oecddirect/

This book has...

StatLinks

A service that delivers Excel® files from the printed page!

Look for the *StatLinks* at the bottom of the tables or graphs in this book. To download the matching Excel® spreadsheet, just type the link into your Internet browser, starting with the *http://dx.doi.org* prefix, or click on the link from the e-book edition.

BASIC STATISTICS OF NEW ZEALAND, 2016

(Numbers in parentheses refer to the OECD average)*

LAND, PEOPLE AND ELECTORAL CYCLE

Population (million)	4.7		Population density per km^2	17.1	(35.4)
Under 15 (%)	19.6	(18.0)	Life expectancy (years)	82.4	(81.0)
Over 65 (%)	14.9	(16.5)	Men	80.8	(78.4)
Foreign-born (%, 2013)	22.4		Women	81.3	(80.6)
Latest 5-year average growth (%)	1.3	(0.6)	Latest general election	September 2014	

ECONOMY

Gross domestic product (GDP)			Value added shares (%, 2015)		
In current prices (billion USD)	182.0		Primary sector	5.2	(2.5)
In current prices (billion NZD)	261.2		Industry including construction	23.4	(26.6)
Latest 5-year average real growth (%)	2.9	(1.8)	Services	71.4	(70.9)
Per capita (000 USD PPP)	38.1	(42.1)			

GENERAL GOVERNMENT

Per cent of GDP

Expenditure (2015)	41.4	(40.9)	Gross financial debt[a]	38.6	(112.3)
Revenue (2015)	41.4	(38.0)	Net financial debt[a]	4.9	(72.8)

EXTERNAL ACCOUNTS

Exchange rate (NZD per USD)	1.435		Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	1.453		Food and live animals	54.2	
In per cent of GDP			Crude materials, inedible, except fuels	12.8	
Exports of goods and services	26.8	(53.8)	Machinery and transport equipment	7.2	
Imports of goods and services	26.0	(49.3)	Main imports (% of total merchandise imports)		
Current account balance	-2.7	(0.3)	Machinery and transport equipment	40.1	
Net international investment position	-60.9		Miscellaneous manufactured articles	14.7	
			Manufactured goods	11.5	

LABOUR MARKET, SKILLS AND INNOVATION

Employment rate for 15-64 year-olds (%)	75.6	(67.0)	Unemployment rate, Labour Force Survey (age 15 and over) (%)	5.1	(6.3)
Men	80.7	(74.7)	Youth (age 15-24, %)	13.2	(13.0)
Women	70.6	(59.3)	Long-term unemployed (1 year and over, %, 2015)	0.7	(2.2)
Participation rate for 15-64 year-olds (%, 2015)	79.0	(71.3)	Tertiary educational attainment 25-64 year-olds (%, 2015)	34.0	(35.0)
Average hours worked per year (2015)	1 757	(1 766)	Gross domestic expenditure on R&D (% of GDP, 2015)	1.3	(2.4)

ENVIRONMENT

Total primary energy supply per capita (toe, 2015)	4.5	(4.1)	CO_2 emissions from fuel combustion per capita (tonnes, 2014)	6.9	(9.3)
Renewables (%, 2015)	40.5	(9.6)	Water abstractions per capita (1 000 m^3, 2010)	1.2	
Exposure to air pollution (more than 10 µg/m^3 of $PM_{2.5}$, % of population, 2015)	5.8	(75.2)	Municipal waste per capita (tonnes, 2015)	0.7	(0.5)

SOCIETY

Income inequality (Gini coefficient, 2012[b])	0.333	(0.311)	Education outcomes (PISA score, 2015)		
Relative poverty rate (%, 2012[b])	9.9	(11.1)	Reading	509	(493)
Median disposable household income (000 USD PPP, 2012[b])	23.3	(22.0)	Mathematics	495	(490)
Public and private spending (% of GDP)			Science	513	(493)
Health care (2015)	9.4	(9.0)	Share of women in parliament (%)	31.4	(28.7)
Pensions (2014[b])	5.1	(9.1)	Net official development assistance (% of GNI)	0.25	(0.39)
Education (primary, secondary, post sec. non tertiary, 2013)	4.7	(3.7)			

Better life index: *www.oecdbetterlifeindex.org*

* 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 29 member countries.

a) 2015 data for the OECD.

b) 2013 data for the OECD.

Source: Calculations based on data extracted from the databases of the following organisations: OECD, International Energy Agency, World Bank, International Monetary Fund and Inter-Parliamentary Union.

Abbreviations and acronyms

AI	Artificial Intelligence
ANZ Bank	Australia and New Zealand Banking Group
BLI	Better Life Index
CERTA	Closer Economic Relations Trade Agreement
CPI	Consumer Price Index
CWS	Contingent Work Survey
DTI	Debt to Income
ETS	Emissions Trading Scheme
FDI	Foreign Direct Investment
GDI	Gross Domestic Income
GDP	Gross Domestic Product
GST	Goods and Services Tax
GVCs	Global Value Chains
HPWI	High-Performance Working Initiative
HPWP	High-Performance Work Practices
ICT	Information and Communications Technology
IMF	International Monetary Fund
ISCO	International Standard Classification of Occupations
LCI	Labour Cost Index
MBIE	Ministry of Business, Innovation and Employment
Mbps	Megabits per second
MFP	Multi-factor Productivity
NCEA	National Certificate of Educational Achievement
NZD	New Zealand dollar
NZIER	New Zealand Institute of Economic Research
NZPC	New Zealand Productivity Commission
NZVIF	New Zealand Venture Investment Fund
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
PPP	Public-Private Partnership
R&D	Research and Development
RBNZ	Reserve Bank of New Zealand
SOEs	State-Owned Enterprises
TEC	Tertiary Education Commission
TIMSS	Trends in International Mathematics and Science Study

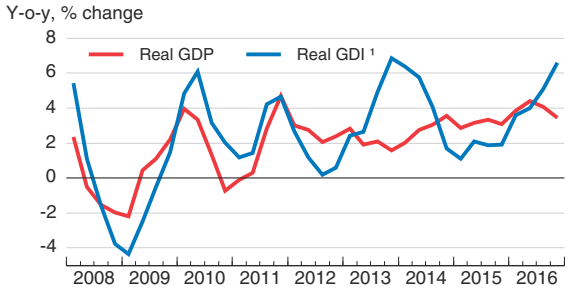
© OECD 2017

Executive summary

- *New Zealand continues to enjoy a strong, broad-based economic expansion*
- *Productivity remains well below that of leading OECD countries*
- *Employment has been shifting towards high-skilled occupations*

New Zealand continues to enjoy a strong, broad-based economic expansion

Economic growth is robust



1. Real GDI equals real GDP adjusted for changes in the terms of trade.

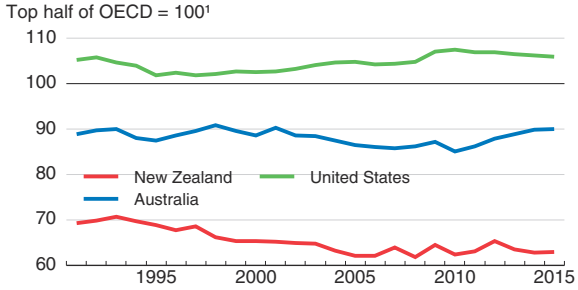
Source: OECD, Economic Outlook Database.

StatLink http://dx.doi.org/10.1787/888933497083

Strong economic growth is being driven by booming tourism, strong net inward migration, solid construction activity, and supportive monetary policy. The fiscal position is sound, with low public debt and a balanced budget. The major vulnerability facing the economy is high levels of household debt associated with rapid house price increases, particularly in Auckland. New Zealand is also exposed to protectionist trade policies abroad and to slowing Chinese economic growth. While the short-term economic outlook is strong, there are long-term challenges from low productivity growth and a changing labour market.

Productivity remains well below that of leading OECD countries

Labour productivity continues to lag



1. Population-weighted average for the top 17 OECD countries for labour productivity, calculated using 2010 purchasing power parity exchange rates.

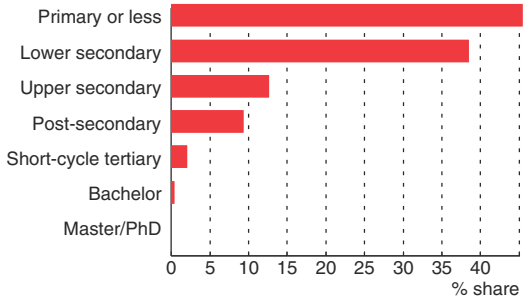
Source: OECD (2017), *Economic Policy Reforms: Going for Growth 2017*.

StatLink http://dx.doi.org/10.1787/888933497099

Labour productivity is well below leading OECD countries, restraining living standards and well-being. Productivity is held back by a lack of international connections, agglomeration economies and scale; weak competitive pressures; low rates of capital investment; and meagre research and development activity. Opportunities to address these factors include reducing barriers to foreign direct investment, lowering the corporate tax rate, expanding infrastructure funding options to increase housing supply (preferably through densification), reviewing the insolvency regime and the current provisions for misuse of market power, and increasing support for business innovation.

Employment has been shifting towards high-skilled occupations

NZ workers with high automation potential,[1] 2015



1. Workers are in jobs at high risk of automation if at least 70% of their tasks are automatable.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2015).

StatLink http://dx.doi.org/10.1787/888933497100

Employment has shifted towards high-skilled occupations, a trend that is likely to continue with further diffusion of digital technologies, including Artificial Intelligence. New Zealand has high levels of skills but also high levels of mismatch between jobs and qualifications. As in other countries, people will need to acquire more initial education in fields in demand and upgrade or reorient their skills during their working lives. Improving education achievement in mathematics would provide more young people with good job prospects in fields such as engineering and computing. With more workers likely to be displaced over the next 10-20 years, there may be a need to strengthen New Zealand's limited arrangements for supporting displaced workers.

MAIN FINDINGS	KEY RECOMMENDATIONS
Making growth more sustainable and greener	
High household debt and rapid growth in house prices raise financial system risks.	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.
The government budget is balanced, and net debt is low. The government intends to reduce net core Crown debt to 10-15% of GDP by 2025.	Gradually reduce net public debt in line with the government's fiscal strategy. Increase spending that enhances well-being and reduce taxes within the constraints of this strategy.
The age of eligibility for public pensions will rise by six months each year from 2037, reaching 67 by 2040.	Bring forward this increase, lengthen the transition period, and then index the pension age to life expectancy.
Strong growth in primary industries may jeopardise environmental quality. Pollution from farming and urbanisation is reducing water quality, and water scarcity is an increasing concern.	Develop a long-term vision for a transition towards a low-carbon, greener economy. Introduce pollution charges or cap-and-trade measures. Expand water trading and pricing to ensure scarce water goes to its best use.
Greenhouse gas emissions are high and continue to grow. While half of emissions come from agriculture, total transport and industry emissions are rising fastest.	Increase the price of carbon to a level consistent with New Zealand's intended transition to a low-carbon economy. Adopt alternative pricing or regulatory measures to reduce biological emissions. Support research in new mitigation technologies, especially for farming.
New Zealand has one of the world's largest shares of threatened species.	Intensify protection of species by continuing to develop a National Policy Statement on biodiversity.
Improving productivity	
Poorly targeted screening reduces productivity benefits from foreign direct investment.	Progressively narrow screening of foreign investment. Continue to reduce compliance costs and boost predictability for investors.
A high corporate tax rate reduces capital investment.	Undertake a tax review that considers corporate and personal income tax settings and potential new tax bases.
Limitations on the ability and incentives for local governments to fund land transport and water infrastructure has restricted housing supply.	Enhance councils' incentives to accommodate growth, for example by sharing in a tax base linked to local economic activity. Apply user charging more broadly for infrastructure, including congestion charging.
Significant price–cost margins and survival of less productive firms suggest that competition could be sharpened.	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.
Expenditure on R&D is low as a share of GDP, most notably in the business sector. Collaboration between firms, education and research institutions is low.	Increase fiscal support for business research and development. Maintain or increase long-term support for successful collaboration between research institutions and industry.
Adapting to the changing labour market	
Weaknesses in mathematics teaching and variability in students' exposure to the mathematics curriculum undermine the acquisition of core mathematics skills at school, precluding access to some higher-skilled fields.	Improve competence to teach mathematics by supporting professional development and evidence-informed teaching and raising initial teacher education quality and entry standards. Review minimum numeracy requirements for school qualifications and the minimum education required by all school leavers. Help schools to make more effective use of ability grouping strategies.
Many New Zealanders are over-qualified for their jobs. They earn less than people who are not over-qualified. Most over-qualified people work outside their field of training.	Merge Careers New Zealand into the Tertiary Education Commission, as the government has proposed, to increase the extent to which young people choose study fields in demand and tertiary institutions adapt their programmes to employer requirements.
Housing supply restrictions hinder the allocation of workers to jobs.	Increase infrastructure investment needed to support better housing. Allow greater urban densification.
Displaced workers bear most of the burden of being laid off. Most do not qualify for the means-tested unemployment benefit, half do not receive redundancy pay and few benefit from activation measures.	Consider introducing unemployment insurance or, alternatively, longer notice periods and mandatory notification of layoffs. Also consider expanding training, guidance and counselling for displaced workers.

© OECD 2017

Assessment and recommendations

- *New Zealand is enjoying a strong, broad-based economic expansion*
- *Ensuring price and financial stability*
- *Adjusting fiscal policy to enhance growth and prepare for future shocks and population ageing*
- *Improving productivity*
- *Adapting to the changing labour market*
- *Making growth more environmentally sustainable*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. the use of such data by the OECD is without prejudice to the status of the Golan Heights, east Jerusalem and Israeli settlements in the West Bank under the terms of international law.

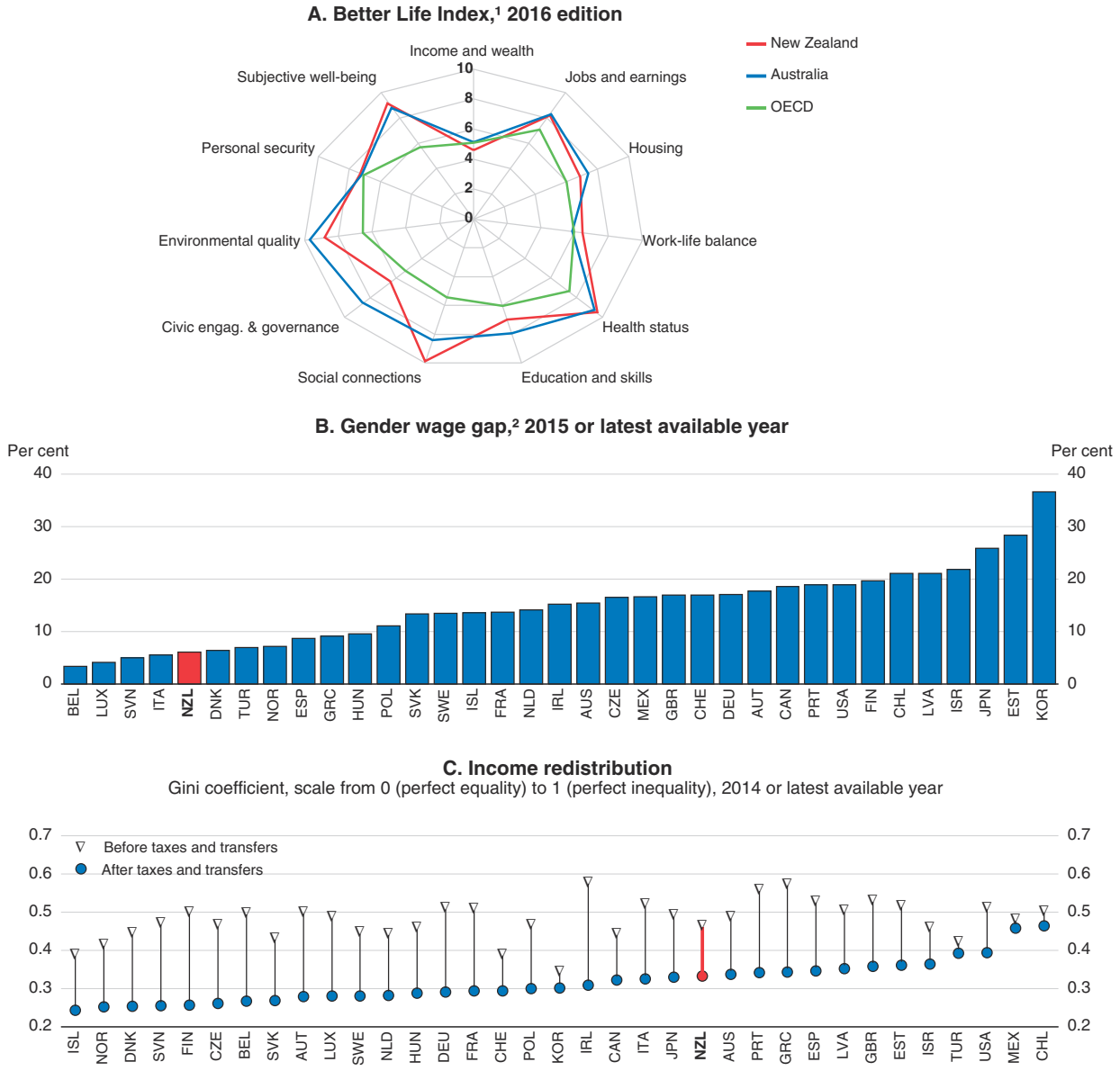
New Zealand has experienced robust economic growth since 2012, buoyed by record levels of inward migration and strong terms of trade. Employment has expanded vigorously, reversing much of the increase in unemployment since the onset of the global financial crisis. Inflation has been very low for some time but is on track to return sustainably to 2% by the end of 2018. The government budget is near balance, and external deficits are considerably smaller than in past expansions.

New Zealanders enjoy high living standards, with all components of the Better Life Index stronger than the OECD average except household disposable income and wealth (Figure 1, Panel A). New Zealand substantially outperforms most other OECD countries on social connections, health status and overall environmental quality. High living standards are also reflected in a superior subjective measure of well-being. They are underpinned by robust institutions, good governance, generally best-practise policy settings, a stable macroeconomy and a high-quality education system. New Zealand also performs well on gender inclusiveness, with one of the smallest gender wage gaps in the OECD (Panel B). However, disposable income inequality is above the OECD average, reflecting less-than-average redistribution through taxes and transfers (Panel C), and the child poverty rate, which is around the OECD average, is more than double the rate in the best performing OECD countries. Living standards and economic growth also vary considerably ethnically and geographically.

GDP per capita is below the OECD mean owing to low labour productivity (Figure 2), and improving productivity growth is a major long-term challenge for improving inclusiveness and living standards. Growth in GDP per capita over the past two decades has been in line with other OECD countries (Figure 3), which is an improvement on previous decades' performance. Low multi-factor productivity growth and weak capital investment account for New Zealand's poor productivity performance (Figure 2). Key issues to address in this domain include a lack of international connections and agglomeration, high rates of qualification and skills mismatches, muted competitive pressures, and low rates of capital investment and research and development activity. There are opportunities to address inequality and weak productivity growth through win-win policies that deliver improved inclusiveness as well as productivity growth (OECD, 2016a). For example, removing barriers to foreign investment, facilitating exit by non-viable firms, boosting support for collaboration between research institutions and industry, and sharpening competitive pressures have the potential to increase wages, reduce wage dispersion and provide benefits to consumers through lower prices.

New Zealand also faces the common worldwide challenge of adapting to changes in the labour market caused by technical progress. As elsewhere, digitalisation has been increasing the demand for high-skilled workers but has been creating more difficult labour-market conditions for their low-skilled counterparts. These pressures are likely to grow, especially in light of progress in areas such as automation and artificial intelligence. As technological advances continue, workers will need to acquire complementary skills.

Figure 1. **Inclusiveness and well-being**



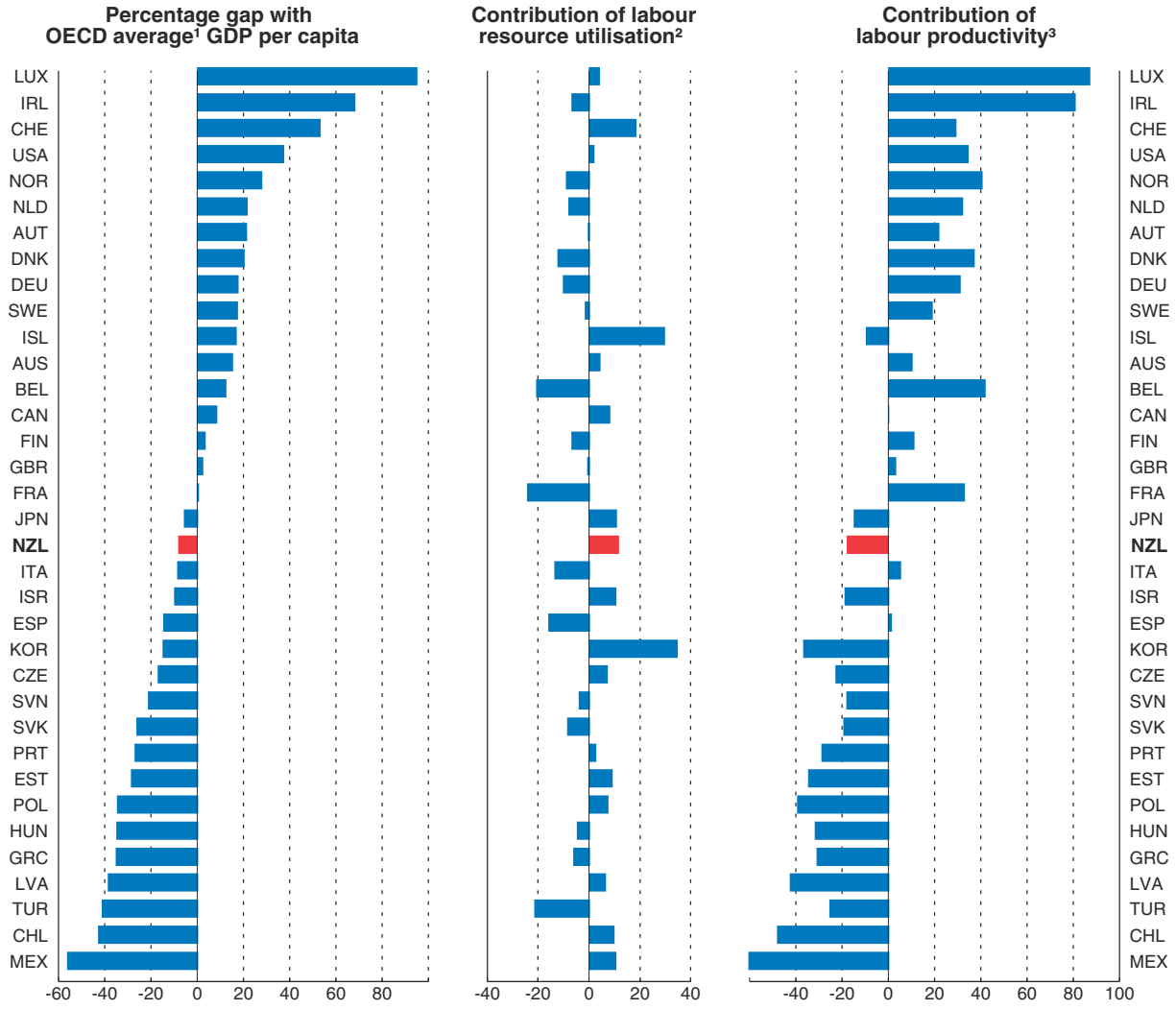
1. Each dimension is measured by one to four indicators from the OECD Better Life Index (BLI) set. Normalised indicators are averaged with equal weights. Indicators are normalised to range between 10 (best) and 0 according to the following formula: (indicator value – minimum value)/(maximum value – minimum value) × 10. The OECD aggregate is weighted by population. Please note that the OECD does not officially rank countries in terms of their BLI performance.
2. Defined as the difference between median wages of men and women relative to the median wages of men.

Source: OECD (2016), *OECD Better Life Index*, *www.oecdbetterlifeindex.org*; OECD, Labour Earnings Database; OECD, Income Distribution Database.

StatLink *http://dx.doi.org/10.1787/888933497112*

The young will need to continue their education to higher levels than in the past and acquire skills that are more highly valued in the labour market, and it will be necessary to pursue more lifelong learning. For this upskilling to occur, the education system must become more responsive to demands emanating from the labour market. Insofar as automation worsens labour-market outcomes for low-skilled workers, it may be appropriate to increase redistribution through the tax-transfer system to meet societal goals for fairness as determined through the political process.

Figure 2. **Sources of real income differences across OECD countries, 2015**



1. The OECD GDP per capita is a population-weighted average of nominal GDP converted using 2015 purchasing power parities. Note that the population of Luxembourg is augmented by cross-border workers and Norway GDP refers to the mainland.
2. Labour utilisation is measured as total number of hours worked per capita.
3. Labour productivity is measured as GDP per hour worked.

Source: OECD (2017), *Economic Policy Reforms: Going for Growth 2017*.

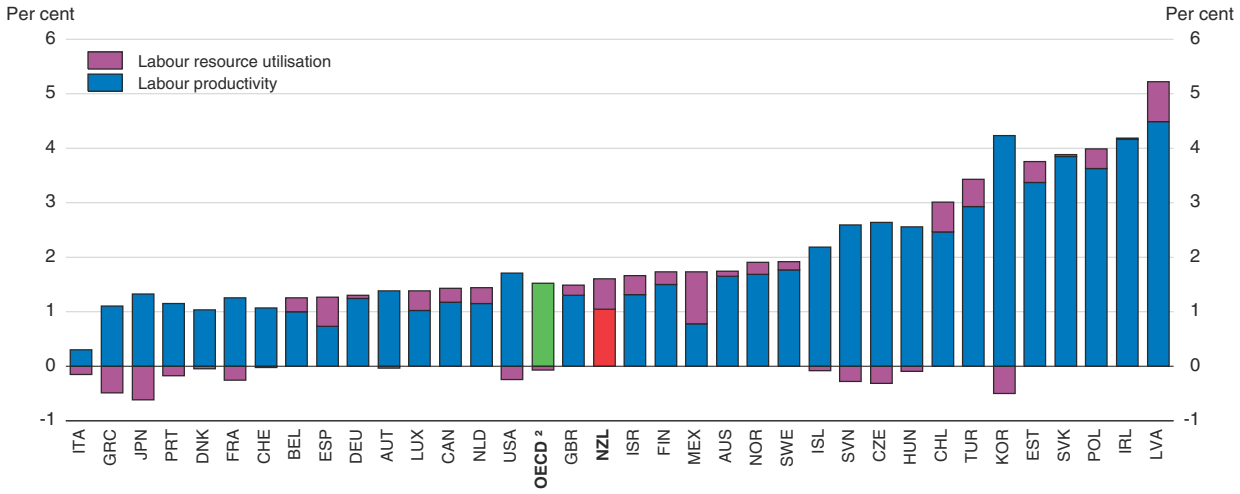
StatLink http://dx.doi.org/10.1787/888933497123

New Zealand ranks highly overall on environmental outcomes. However, its water quality has deteriorated (mainly due to expansion of intensive dairy farming), biodiversity is threatened, and its greenhouse gas emissions, which are high per capita and per unit of GDP, continue to grow. Declining water quality and species diversity have the potential to detract from economic growth by undermining the "clean green" image so important for the tourism industry.

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

- The economy is growing strongly, and the well-being of New Zealanders is high on almost all dimensions. A wide range of reforms to boost productivity would improve this performance further.

Figure 3. **Breakdown of GDP per capita growth, 1995-2015**[1]



1. 2000-15 for Estonia.
2. Population-weighted average.

Source: OECD (2017), National Accounts and Labour Market Statistics Databases.

StatLink http://dx.doi.org/10.1787/888933497134

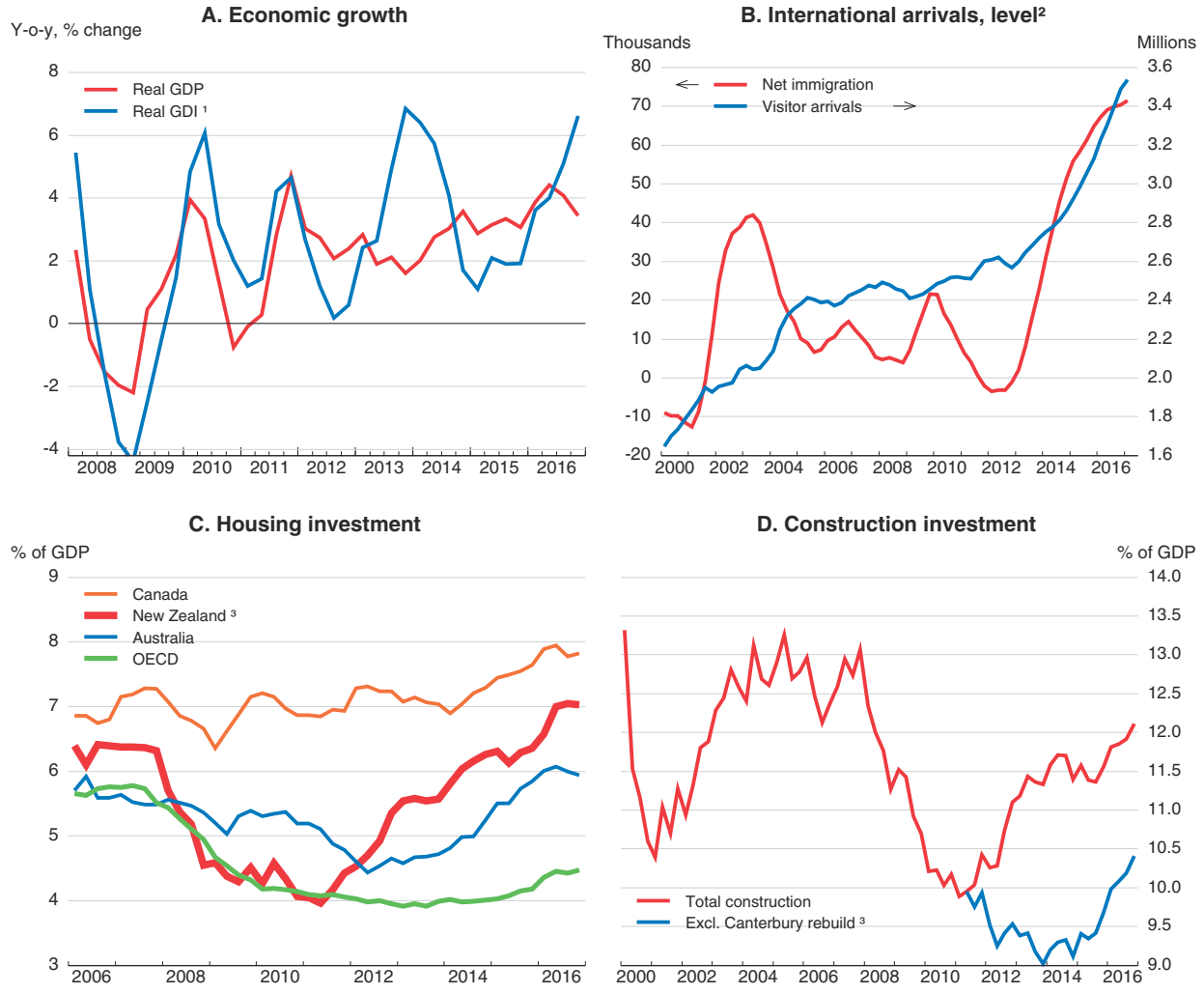
- Continuously upskilling the labour force, facilitating the acquisition of skills in demand in the labour market and, if necessary, addressing any adverse distributional consequences that may result from technical progress would help New Zealanders adjust to labour-market changes.
- Monitoring and managing the effects of natural-resource-based activities on the environment, including by stronger price signals on resource use and pollution through market-based instruments, would help to maintain New Zealand's highly-valued environmental quality.

New Zealand is enjoying a strong, broad-based economic expansion

Economic growth has averaged around 3% over the past three years (Figure 4, Panel A) and is projected to remain strong through 2018 (Table 1). Wage growth has been subdued, however, although this has sustained international competitiveness (Figure 5, Panel A). Until very recently inflation remained below the mid-point of the target range, and inflation expectations have been well anchored (Figure 6, Panels A-C). Several key factors are driving this expansion:

- Net immigration has increased to over 70 000 per year (1.5% of the population) (Figure 4, Panel B). In the year to 30 June 2016, 52 000 people were approved for permanent residence visas: 30 000 under the skilled/business stream, 18 000 under the family stream and 4 000 under the international/humanitarian stream (MBIE, 2016a). China, India, the United Kingdom and the Philippines are the major source countries for residence visas; Australia is also an important source country but Australians do not require a visa to live and work in New Zealand. Net immigration is likely to fall gradually (to 60 000 in 2017 and 51 000 in 2018) as the Australian economy strengthens (encouraging more NZ residents to emigrate and fewer New Zealanders resident in Australia to return), recent policy changes to reduce the number and increase the skill requirements of permanent residents begin to take effect and recent increases in long-term temporary arrivals are followed by an increase in departures when most of these people go home.

Figure 4. **Factors driving the economic expansion**



1. Real GDI equals real GDP adjusted for changes in the terms of trade.
2. Cumulative data for the past four quarters.
3. Excluding RBNZ estimates of the direct impact of the rebuild on construction expenditure.

Source: OECD, Economic Outlook Database; A. Wood et al. (2016), "The Canterbury Rebuild Five Years on from the Christchurch Earthquake", *RBNZ Bulletin*, Vol. 79, No. 3, February; Statistics New Zealand.

StatLink http://dx.doi.org/10.1787/888933497147

- Rising real estate prices (see below) have increased household wealth and consumption. They have also stimulated residential construction activity (Panel C), particularly in Auckland. Following a lull in 2015, activity has surged at double-digit rates in recent quarters. Continued growth will depend on the extent to which approaching capacity limits constrain activity.
- While the 2010-11 Canterbury earthquakes destroyed a considerable amount of public and private capital, the rebuild has supported GDP growth. The rebuild has now peaked (Panel D) and is expected to slow gradually. Expenditure on the November 2016 Kaikōura earthquake rebuild will be much smaller but is expected to reach 1-3% of GDP.
- Tourism has boomed in recent years, with particularly large increases from Asia (especially China).

Table 1. **Macroeconomic indicators and projections**

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

	2013 Current prices (NZD billion)	2014	2015	2016	2017	2018
Gross domestic product (GDP)	**227.7**	**2.8**	**3.1**	**3.9**	**3.1**	**3.1**
Private consumption	132.8	3.1	2.9	4.3	4.1	3.3
Government consumption	42.8	3.3	2.6	2.3	2.7	1.9
Gross fixed capital formation	48.1	8.4	2.1	5.6	5.9	4.9
Housing	12.9	9.9	1.3	9.6	3.8	4.8
Business	22.6	6.1	0.8	6.1	7.4	5.8
Government	12.7	10.7	5.4	0.8	4.3	3.1
Final domestic demand	223.7	4.3	2.6	4.2	4.3	3.4
Stockbuilding[1]	1.8	0.0	-0.5	0.6	0.2	-0.1
Total domestic demand	225.6	4.2	2.2	4.7	4.5	3.3
Exports of goods and services	64.8	3.1	6.8	1.6	0.7	3.6
Imports of goods and services	62.6	7.9	3.6	4.2	6.1	4.5
Net exports[1]	2.2	-1.3	1.0	-0.7	-1.4	-0.2
Other indicators (growth rates, unless specified)						
Potential GDP		2.6	2.8	2.9	2.9	2.8
Output gap[2]		-0.6	-0.4	0.7	0.9	1.2
Employment[3]		3.5	2.3	4.6	3.9	1.9
Working-age population (15-74)		1.7	2.0	2.0	1.8	1.6
Labour force		3.1	2.2	4.3	3.5	1.7
Unemployment rate[4]		5.4	5.4	5.1	4.7	4.5
GDP deflator		2.3	0.2	1.6	2.7	2.1
Consumer price index		1.2	0.3	0.6	2.4	1.8
Core consumer prices		1.4	1.1	1.3	1.7	1.8
Household saving ratio, net[5]		-1.5	-2.2	-0.7	-0.6	-0.6
Terms of trade		5.1	-4.7	3.1	2.0	-0.1
Current account balance[6]		-3.2	-3.3	-2.7	-3.4	-3.4
General government financial balance[6]		0.3	0.0	0.0	0.3	0.8
Underlying general government fiscal balance[2]		0.7	0.1	-0.4	-0.2	0.2
Underlying government primary balance[2]		1.5	0.9	0.3	0.4	0.7
General government gross debt [6, 7]		40.7	40.8	39.7	39.1	38.2
General government net debt[6, 7]		5.3	5.0	4.9	4.4	3.4
Three-month money market rate, average		3.4	3.2	2.3	1.9	2.1
Ten-year government bond yield, average		4.3	3.4	2.8	3.5	4.2

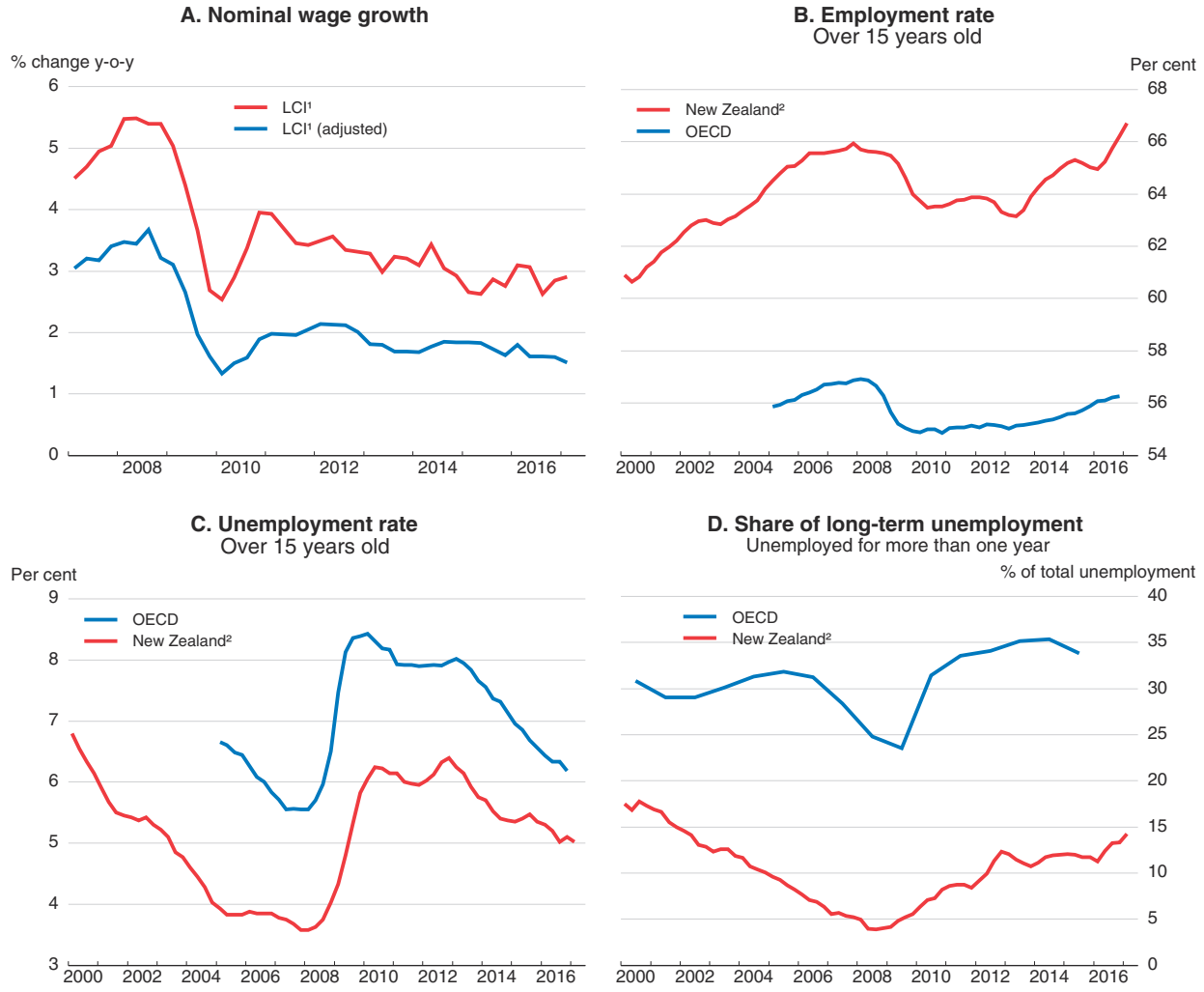
1. Contribution to changes in real GDP.
2. As a percentage of potential GDP.
3. Employment growth in 2016 affected by a change in methodology for Statistics New Zealand's Household Labour Force Survey that increased the number of people identified as being employed.
4. As a percentage of the labour force.
5. As a percentage of household disposable income.
6. As a percentage of GDP.
7. NA basis excluding unfunded liabilities of government-employee pension funds.

Source: OECD (2017), OECD Economic Outlook 101 Database.

- The terms of trade have improved since late 2015 (partly due to a 35% rebound in dairy prices) and are high by historical comparison. This has boosted incomes and should support faster demand growth once farmers have reduced their debt to more sustainable levels.
- Monetary policy has been very supportive (see below).

Employment and the labour force are growing strongly and the employment rate is higher than in most OECD countries (Figure 5, Panel B). The unemployment rate has fallen

Figure 5. **Labour market developments**



1. Labour Cost Index of private-sector wages. The adjusted LCI excludes increases in wages attributable to productivity improvements.
2. Four-quarter moving average series.

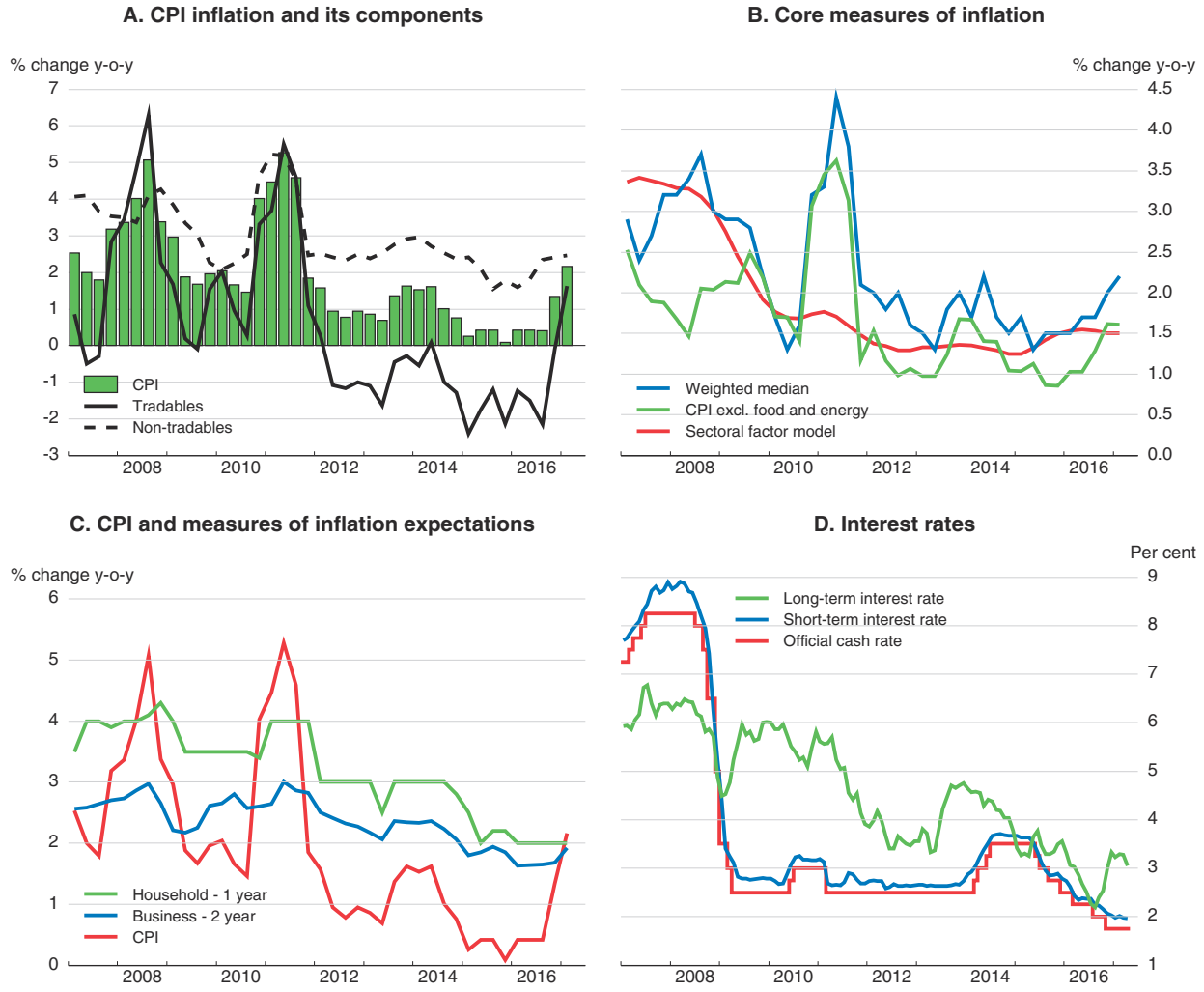
Source: Statistics New Zealand, Work Income and Spending; OECD, Labour Force Statistics Database.

StatLink http://dx.doi.org/10.1787/888933497152

to around 5%, which is still higher than it was before the global financial crisis (Panel C), and varies regionally from 2.8% to 8.0%. While the share of long-term unemployment (more than one year) is low by international comparison, it increased following the crisis and has not yet begun to fall back to pre-crisis levels (Panel D). In the 1990s, when unemployment last was high, the longer-term share started to decline two to three years after the unemployment rate began to fall and reached its low point only three to four years after the unemployment rate bottomed out. The introduction of job-search requirements for certain categories of long-term welfare beneficiaries (see Chapter 2) may have delayed the fall in the longer-term unemployment share. Labour underutilisation, which includes the under-employed and people available to start work but not actively seeking work as well as the unemployed, also remains higher than pre-crisis levels.

The terms of trade have risen back to the peak reached in late 2013, reflecting a partial recovery in commodity prices, notably for dairy products (Figure 7, Panels A and B), and a

Figure 6. **Expected and actual inflation and interest rates**

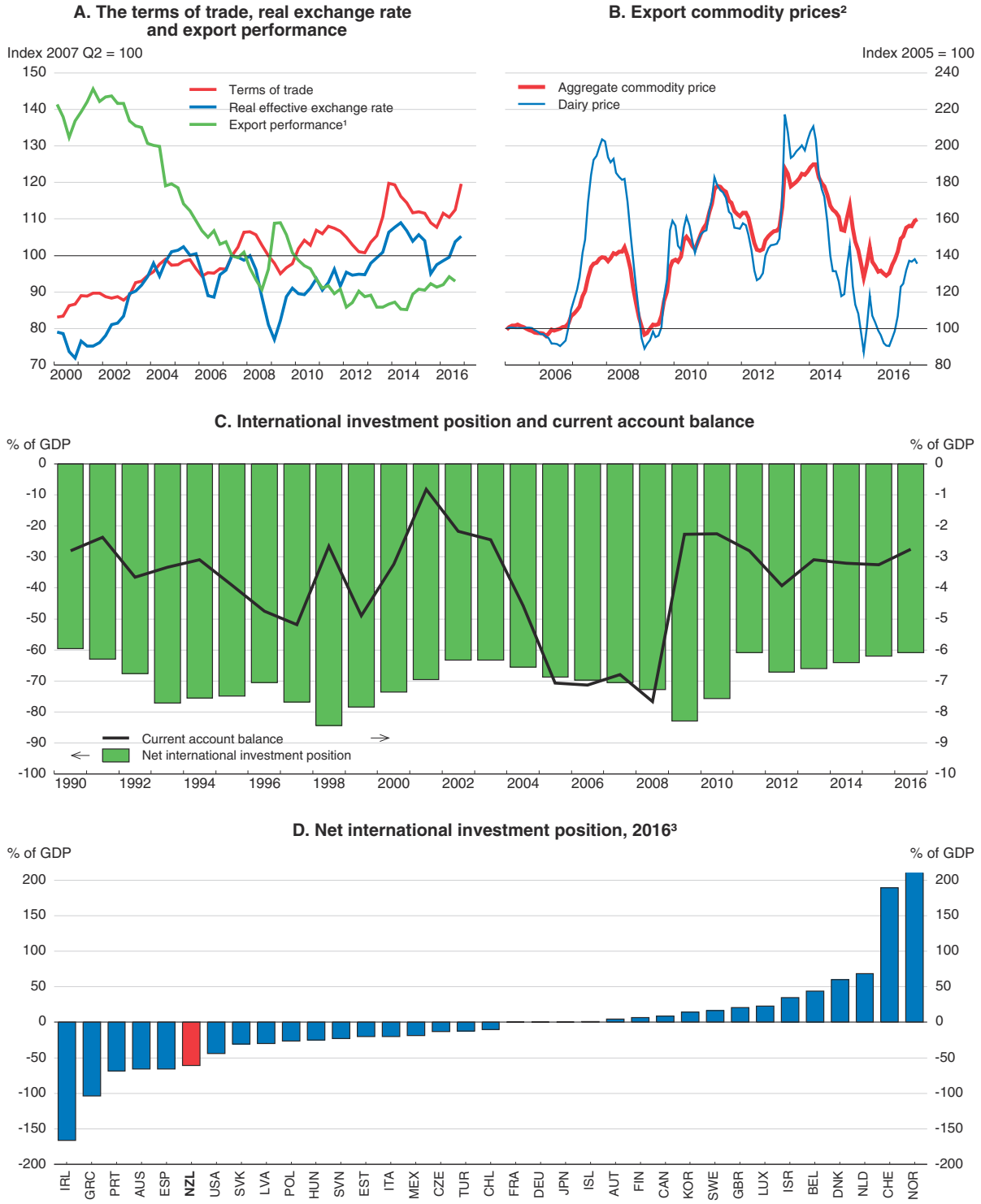


Source: Statistics New Zealand; Reserve Bank of New Zealand; OECD, Economic Outlook Database.

StatLink http://dx.doi.org/10.1787/888933497164

decline in oil prices. The real exchange rate has strengthened but remains below the peak reached in 2014. Even so, the currency may be slightly overvalued, partly owing to New Zealand's more advanced stage in the business cycle – and hence need for earlier policy rate increases – than many other advanced countries. In contrast to the last period of strong economic growth (leading up to the recession), the current account deficit has fallen to less than 3% of GDP, instead of increasing (Panel C), and it is projected to remain below 3 ½ per cent through 2018. This performance mainly reflects declining debt-service costs. The projected current account implies that net international liabilities will stay around the current level of 60% of GDP, which is high by international comparison (Panel D). New Zealand has not suffered major difficulties during the last two global financial crises, despite these net liabilities having been at least as large in relation to GDP, because of its good public policy settings, including the floating exchange rate and low government debt, and the absence of currency mismatches on banks and other agents' balance sheets.

Figure 7. **External sector indicators**



1. Export performance is measured by the evolution of the ratio of exports of goods and services to export market (defined as the trade-weighted average of trading partners' imports) volumes.
2. USD series.
3. 2015 for Chile and Italy.

Source: OECD, Economic Outlook Database; ANZ Bank; Statistics New Zealand; IMF, Balance of Payments Statistics database.

StatLink http://dx.doi.org/10.1787/888933497175

Growth is projected to ease to around 3% in 2017-18, as slower net immigration curtails both consumption and residential construction, and the wind-down in the Canterbury earthquake rebuild curbs construction expenditure, more than offsetting the boost from the Kaikōura earthquake rebuild and the recently announced increases in infrastructure spending. Solid export growth should continue, driven by strong tourism demand from Asia and increases in dairy exports. The unemployment rate is expected to edge down to 4½ per cent by the end of 2018 and wage growth to rise moderately. Consumer price inflation is likely to rise sustainably to 2% by the end of 2018 as the effects of oil price falls pass and capacity constraints bite.

The biggest downside risk to these projections is a disorderly housing market correction, described along with other extreme but inherently unquantifiable potential shocks in Table 2. Global inflation and interest rates could also be lower than assumed, which would delay the return of inflation to the mid-point of the target band and prolong exceptionally low interest rates in New Zealand, adding to house price tensions. The main upside risks are that net immigration does not drop to the assumed extent, sustaining robust growth in consumption and construction spending, and that dairy price rises continue, strengthening exports and disposable incomes. A key external risk concerns global trade, which could be stronger than assumed, boosting growth, or weaker, depressing activity.

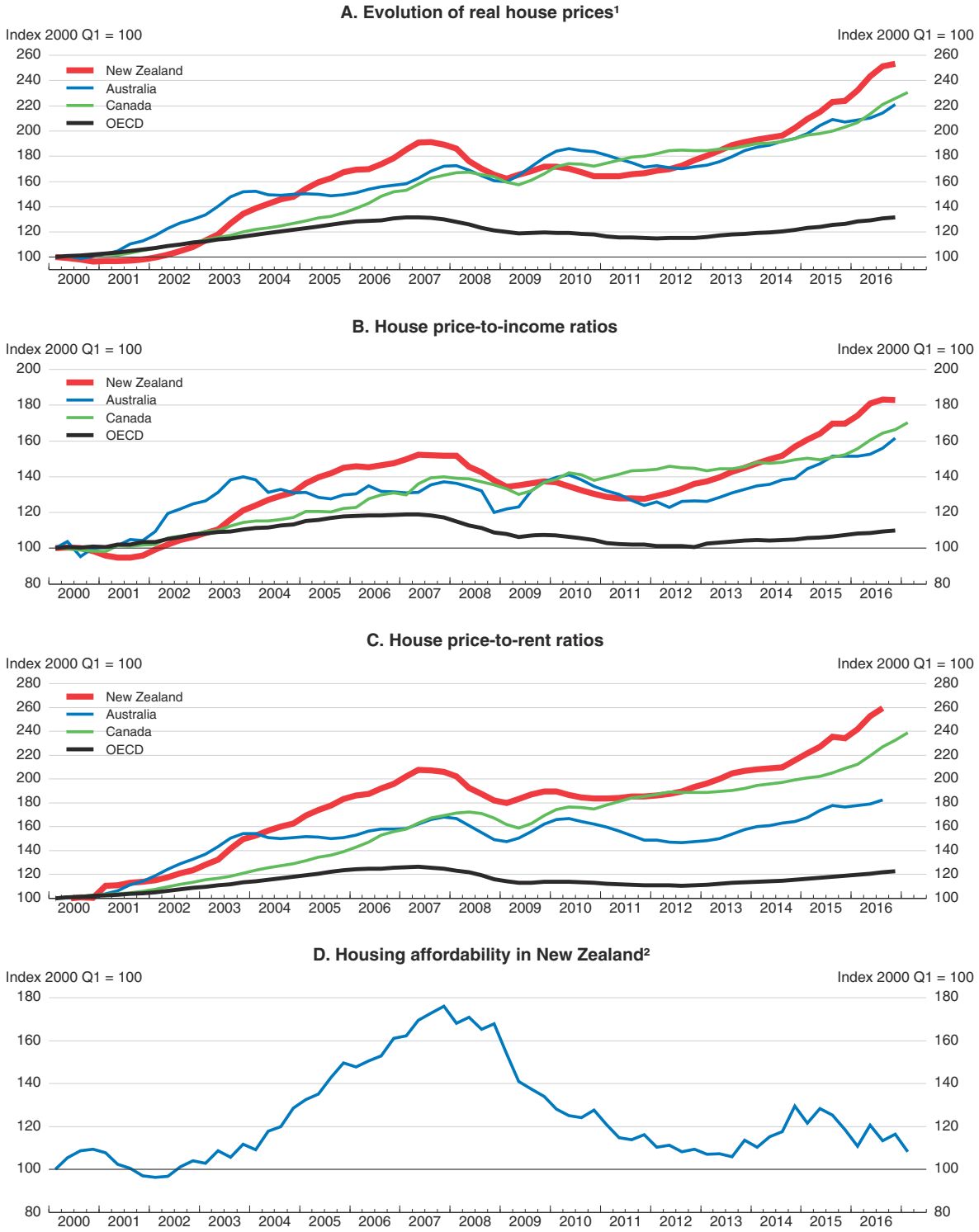
Table 2. **Possible extreme shocks affecting the New Zealand economy**

Shock	Possible impact
Disorderly housing market correction	House prices are high in relation to fundamentals, especially in Auckland, and household debt relative to disposable income has reached levels that are lofty by both historical and international comparisons (Figure 8; Box 1). The median house price is now six times median household income, up from three times in the early 1990s (Demographia, 2017). A large fall would depress household consumption and housing investment.
Rising trade restrictions	Trade tensions have been rising, and if protectionism continues to spread, the effects on countries like New Zealand, without large domestic markets, would be particularly harmful.
Financial-sector crisis in China	Such a crisis would reduce global trade and growth. Demand for New Zealand's exports would be hit both directly by reduced Chinese demand and indirectly, through lower Chinese demand for exports from New Zealand's main trading partners, notably Australia.
Natural disasters	The probability of large aftershock earthquakes remains elevated in regions affected by the 2016 Kaikōura and 2010-11 Canterbury earthquakes. Natural disasters can cause significant loss of life, disruption of economic activity and high public and private costs of reconstruction.

Ensuring price and financial stability

The Reserve Bank of New Zealand (RBNZ) reversed course in June 2015, initiating a series of cuts in official interest rates from 3.5% to 1.75% in November 2016 to push the inflation rate up to the middle of the 1-3% target range over the medium term (Figure 6, Panel D). The RBNZ was concerned that if inflation were to remain well below the mid-point of the target range for an extended period, inflation expectations could decline, making an eventual return to the target more difficult. For the time being, medium-term inflation expectations remain well anchored at around 2%. The RBNZ expects inflation to increase sustainably to around 2% by early 2019 and to begin to increase the official cash rate in the second half of 2019. On the basis of its projections, current monetary policy settings are appropriate, although such low interest rates do have the downside of fuelling increases in house prices and household debt, as in many other countries. The OECD projects a somewhat earlier sustainable increase in inflation to around 2% (late 2018) and beginning of the monetary policy tightening cycle (late 2018), as do most other forecasters.

Figure 8. **House prices**



1. Nominal house prices deflated by the private consumption deflator.
2. The affordability index defined by the Massey University Real Estate Analysis Unit takes the ratio of the weighted mortgage interest rate as a percentage of median selling price to the average wage. The lower the index, the more affordable the housing.

Source: OECD, Housing Prices Database; Massey University Real Estate Analysis Unit, *Home Affordability Report*, various quarterly reports, *www.massey.ac.nz/massey/learning/colleges/college-business/school-of-economics-and-finance/research/mureau.cfm*.

StatLink http://dx.doi.org/10.1787/888933497185

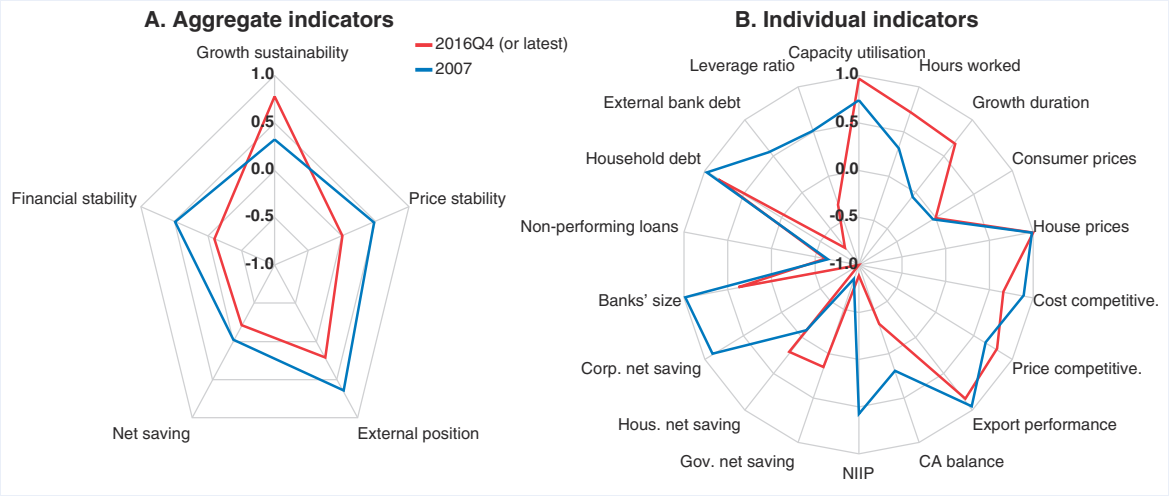
Box 1. **Macro-financial vulnerabilities**

Potential macro-financial vulnerabilities are mapped in Figure 9 in terms of deviations of indicators from their long-term averages, denoted by zero, with the largest deviations (those closest to +1) representing the greatest potential vulnerability. Selected indicators are derived from recent OECD work on vulnerability indicators (Röhn et al., 2015) and on the linkages between finance and economic growth (Cournède and Denk, 2015).

Macro-financial vulnerabilities are generally lower than at the end of the last expansion in 2007, with high house prices and associated high levels of household debt remaining the major sources. The external position remains a risk, with relatively weak cost and price competitiveness and export performance, but all have improved since 2007, as has the current account balance and net international investment position. Financial stability has shown the greatest improvement, as tightened regulation has reduced external bank debt and leverage. The worsening in the indicator of growth sustainability is due to strong capacity utilisation combined with a relatively long period of expansion (23 quarters) since the last downturn.

Figure 9. **Evolution of macro-financial vulnerabilities since 2007**

Deviations of indicators from their real long-term average (0)[1]



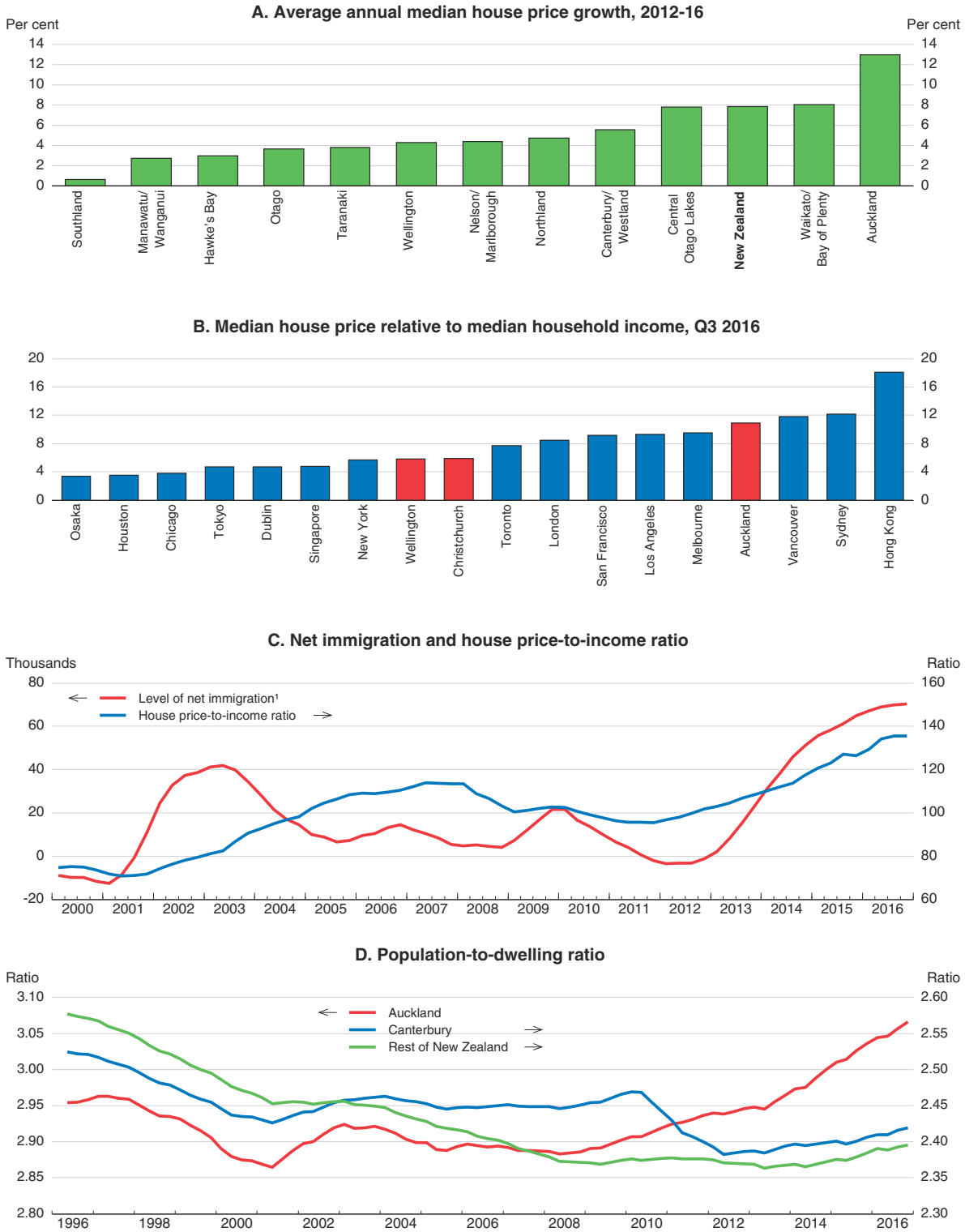
1. With the highest deviations representing the greatest potential vulnerability (+1) and the lowest deviations representing the smallest potential vulnerability (-1). Each aggregate macro-financial vulnerability indicator is calculated by aggregating (simple average) normalised individual indicators. Growth sustainability includes: capacity utilisation rate in the manufacturing sector, total hours worked as a proportion of the working-age population (hours worked), and an indicator combining the length and strength of expansion from the previous trough (growth duration). Price stability includes: an indicator combining the absolute value of the deviation of core inflation from target and the gap between total and core inflation (consumer prices), the average of the house prices-to-rent ratio and the house prices-to-income ratio (house prices). External position includes: the average of unit labour cost-based real effective exchange rate, and consumer price-based real effective exchange rate (cost competitiveness), relative prices of exported goods and services (price competitiveness), export performance, current account balance and net international investment position as a percentage of GDP. Net saving includes: government, household and corporate net saving, all expressed as a percentage of GDP. Financial stability includes: banks' size as a percentage of GDP, non-performing loans as a percentage of gross lending, household debt as a percentage of disposable income, registered banks' external bank debt as a percentage of bank total liabilities, and capital and reserves as a proportion of total liabilities (leverage ratio).

Source: OECD calculations based on Thomson Reuters; OECD, Economic Outlook Database; Reserve Bank of New Zealand; Statistics New Zealand.

StatLink http://dx.doi.org/10.1787/888933497191

House prices have risen sharply in real terms and relative to income and rents, especially since 2012, and are now well above long-term averages (Figure 8, Panels A-C). However, earlier declines in mortgage interest rates offset much of the associated pressures on affordability at the national level (Panel D), although not in Auckland (Massey University,

Figure 10. **House prices and population pressure**



1. Cumulative data for the past four quarters.

Source: Real Estate Institute of New Zealand; Demographia (2017), *13th Annual Demographia International Housing Affordability Survey: 2017*; Statistics New Zealand; OECD, Economic Outlook Database; Reserve Bank of New Zealand (2015), *Financial Stability Report*, May, Figure 4.3 updated.

StatLink http://dx.doi.org/10.1787/888933497204

2016). Price increases have been particularly large in Auckland (Figure 10, Panel A), far outstripping median household income growth. The house price-to-income ratio in Auckland is now comparable to or higher than in many much larger foreign cities (Panel B). A major factor boosting house prices in Auckland has been high net immigration, especially since 2012 (Panel C), in a context of weak housing-supply responsiveness. Approximately half of all immigrants settle in Auckland, above its (one-third) share in the population, and new housing supply has not kept pace with demand in the city (Panel D).

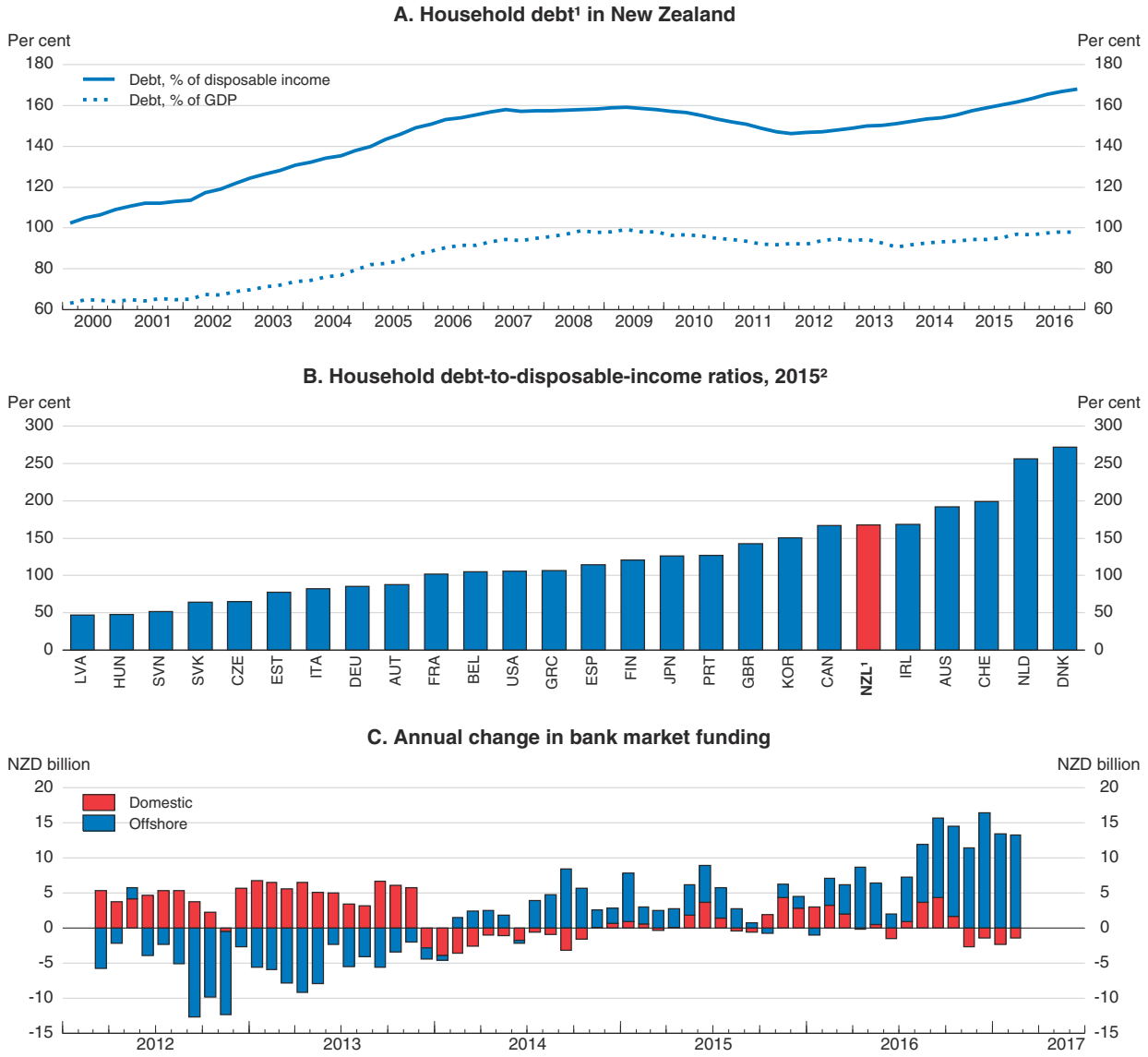
The supply response has been constrained by restrictive and complex land-use regulations, infrastructure shortages and insufficient growth in construction-sector capacity (see below; Chapter 1). Strong demand growth has fed into expectations of further price increases, which in turn has pushed up demand and prices further. This cycle may be spreading to other parts of New Zealand. Prices outside Auckland have also picked up sharply of late, even in the apparent absence of especially high population growth or housing shortages. As discussed in the 2015 *Survey* (OECD, 2015a), the high cost of housing is particularly harmful for low-income households. Affordability has been aggravated by a shift in new housing supply from lower-cost to high-end housing since the early 1990s. Housing costs averaged 54% of income for the bottom fifth of households by income in 2015, up from less than 30% in 1990 (Perry, 2016).

After declining in the aftermath of the crisis, household debt as a share of disposable income resumed an upward trend in 2012 and is now slightly higher than in 2007 (Figure 11, Panel A). Debt is also high by international comparison (Panel B). Moreover, households are highly exposed to interest rate risk – almost 70% of outstanding mortgages by value are scheduled to be re-priced within the next two years. Total bank lending and housing credit have accelerated from 3% per annum over 2011-13 to 7% per annum over 2014-16 (RBNZ, 2016c). The financial stability risks arising from increased household debt and house prices are magnified by recent growth in offshore bank funding, which has boosted banks' exposure to global liquidity shocks (Panel C). Offshore bank funding has risen as non-bank capital inflows have declined, reflecting the fall-off in earthquake-related insurance flows. The other key financial stability risk is dairy sector indebtedness, which accelerated during 2015 but the rate of increase has slowed following recent price increases (RBNZ, 2016b).

The RBNZ has sought to limit financial stability risks by imposing restrictions on loan-to-value ratios since 2013, as recommended in past *Surveys* (Table 3). In October 2015 tightened loan-to-value restrictions were introduced for loans to purchase property in the Auckland area, on the grounds that Auckland house prices exceeded levels that could be explained by fundamental factors such as housing shortages, high immigration and low interest rates. While more detailed analysis is needed, the effectiveness of region-specific restrictions appears to have been undermined because they prompted some investors to shift their purchases outside Auckland. House price increases in the rest of New Zealand soon exceeded those in Auckland, with significantly higher price- and investor activity increases just outside Auckland's boundaries (RBNZ, 2016a). In October 2016, regional variation in loan-to-value restrictions was removed, as tighter Auckland restrictions were extended to the rest of the country, along with further tightening for investors.

The RBNZ has highlighted rapid loan growth at high ratios of debt to income (DTI) and requested the addition of DTI limits to its *Memorandum of Understanding* on prudential policy with the government (RBNZ, 2016b), although it does not intend to impose them unless they are needed. Before making a decision on whether to give it this power, the

Figure 11. **Household debt and bank market funding**



1. Including debt on rental properties.
2. 2013 for Korea; 2016 for New Zealand, Portugal, Sweden and United Kingdom.

Source: OECD, National Accounts – Financial Dashboard Database; Reserve Bank of New Zealand (2016), *Financial Stability Report*, November, Figure 3.12 updated and Statistics on Households.

StatLink http://dx.doi.org/10.1787/888933497217

Table 3. **Past OECD recommendations on price and financial stability**

Recommendations in previous *Surveys*	Action taken since previous *Survey* (June 2015)
While recognising the current strength of the financial system, contain emerging systemic stability risks with tighter prudential policy settings, including the deployment of new macro-prudential policy instruments. Consider implementing bank leverage ratios, permanent deposit insurance and higher capital requirements for too-big-to-fail banks.	Tightened restrictions on high loan-to-value mortgages for loans to purchase property in the Auckland area from October 2015 were extended to the rest of the country from October 2016, along with further tightening for investors. Following these changes, no more than 10% of lending to owner occupiers can be at a loan-to-value ratio above 80% and no more than 5% of lending to investors can be above a 60% ratio. The Reserve Bank has requested that debt-to-income limits be added to its prudential tool kit.

government has requested that it undertake a full cost–benefit analysis including public consultation. Even if the power is attributed to the Bank, it would have to inform the Treasury and consult with registered banks if it wished to make use of this tool.

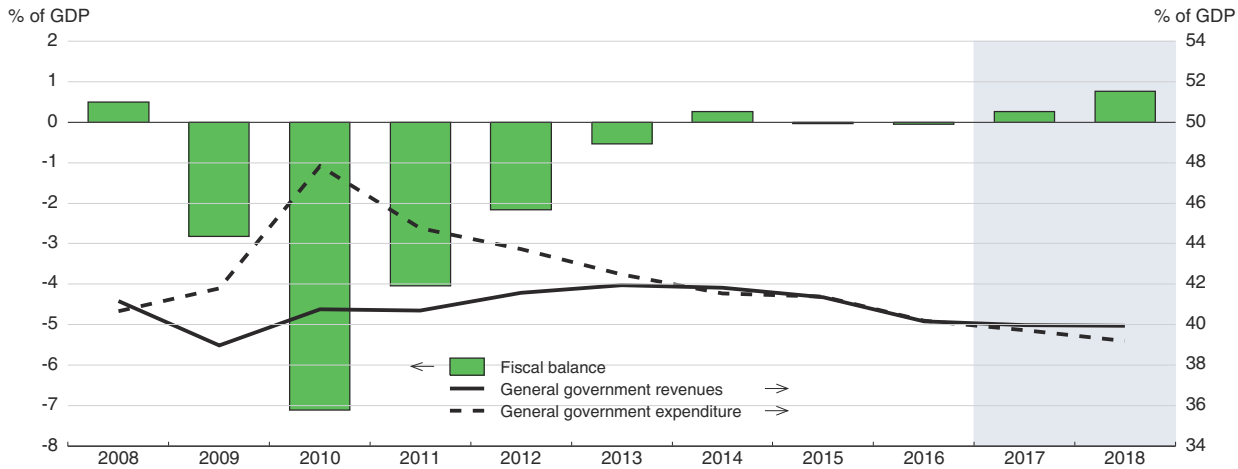
DTI controls complement loan-to-value restrictions by limiting further debt as house prices rise and allowing more precise and effective targeting of policy. Both have been shown to reduce housing credit growth and seem to be more effective than other macro-prudential tools already available to the Bank, such as counter-cyclical capital buffers (Kuttner and Shim, 2013; Cerutti et al., 2015). Nevertheless, the effects of adding DTI limits should be studied, as the use of multiple instruments makes calibration harder and may inadvertently result in over-regulation (Gadanecz and Jayaram, 2016). Distributional implications also need to be considered, as DTI restrictions place the tightest credit constraints on the poor. Subject to DTI limits meeting good regulatory process requirements, including design issues, and paying attention to benefits exceeding costs, they should be promptly added to the Reserve Bank's macro-prudential instruments. In any case, analysis should not be so drawn out that it would delay the implementation of DTI limits, were they to be needed to reinforce financial stability. Indeed, it should occur in parallel with required system development that the banks will have to carry out for their implementation.

Adjusting fiscal policy to enhance growth and prepare for future shocks and population ageing

Considerable progress has been made in lowering the general government budget deficit from a post-recession high of 7.1% of GDP in 2010 to near balance since 2014 (Figure 12). This reduction was achieved mostly by cutting expenditure as a share of GDP back to around the levels prevailing before 2010. An important factor in the rise and subsequent fall in spending was the Canterbury earthquake, which caused an increase in expenditure (net of reinsurance receipts) of 4.4% of GDP in FY 2010-11 (fiscal years end 30 June); such spending fell to only 0.3% of GDP in FY 2015-16. The government's preferred fiscal measure is the total Crown operating balance before gains and losses, which includes operating activities of state-owned enterprises and the Reserve Bank but excludes local government, rather than the more typical international definition of general government. The NZ measure returned to surplus in FY 2014-15 from a peak deficit of 9.2% of GDP (4.6% excluding earthquake expenses) in FY 2010-11 and remained in surplus in FY 2015-16 (Table 4). General government net debt fell to only 5% of GDP in 2015 (Table 1).

After remaining broadly unchanged in FY 2016-17, despite costs related to the Kaikōura earthquake (NZD 1 billion, 0.4% of GDP), the total Crown operating balance (before gains and losses) is officially projected to increase progressively from a surplus of 0.6% of GDP in FY 2016-17 to 2.2% of GDP in FY 2020-21. The Treasury estimates that the fiscal policy stance (fiscal impulse) will be expansionary in both FY 2017-18 and FY 2018-19 and contractionary in each of the subsequent two years. The pause in consolidation in the earlier years of the projection period mainly reflects measures in the May 2017 budget, including adjustments to personal income tax brackets to offset the effects of individuals moving into higher tax brackets in recent years as their incomes have grown (fiscal drag), especially for earners around the middle of the income distribution, and increases in transfers to low-income households and infrastructure spending. The projected consolidation reflects a decline in the expenditure-to-GDP ratio. Based on information available prior to the 2017 budget, the OECD projected a strengthening in the general government position from balance in 2016 to a surplus of 0.8% of GDP in 2018 (Figure 12), with three-quarters of this increase being

Figure 12. **Fiscal indicators**



Source: OECD, Economic Outlook 101 Database.

StatLink http://dx.doi.org/10.1787/888933497221

structural (as indicated by the change in the cyclically-adjusted budget balance). Updating for the 2017 budget would eliminate the increase in the structural budget balance, leaving a modest cyclical increase in the budget balance to a small surplus.

As a small economy highly exposed to global shocks and natural disasters, it is crucial for New Zealand to continue to have low levels of government net debt. To this end the government's fiscal strategy is to reduce net core Crown debt to 10-15% of GDP by 2025. It should be possible to finance the various spending measures recommended in this *Survey* – increased outlays on infrastructure and business R&D subsidies, which net of proposed additional revenues (road user charges, development contributions and targeted rates) amount to less than 0.5% of GDP – without materially compromising this fiscal strategy. Additional fiscal room could be used to fund further tax cuts. A cut in the corporate tax rate has the potential to boost productivity, but a holistic tax review would be worthwhile to consider other changes (see below).

There is currently no effective mechanism for independent assessment of opposition parties' policy proposals. The Treasury has operational independence in forecasting and policy analysis, and New Zealand has highly regarded strict fiscal accounting and transparency requirements (Ter-Minassian, 2014). However, the Treasury does not currently cost or assess opposition parties' policy proposals. Consideration should be given to strengthening New Zealand's institutional framework in this regard, possibly by allocating that responsibility to an existing agency, such as the Treasury. Another option, which might enhance the perception of independence of the evaluations, would be for a new fiscal council to provide such cost estimates, as is done by the Parliamentary Budget Office in Australia and the Central Planning Bureau in the Netherlands. As of May 2017, 26 OECD countries had some form of independent fiscal institution.

Assuming unchanged policies and the current demographic outlook, the Treasury (2016) projects that the primary balance would fall from a surplus of 0.5% of GDP in 2015 to a deficit of 6.3% of GDP in 2060, due in part to increased old-age pension outlays. The government announced in March 2017 that it will raise the pension eligibility age by two years to 67 over the years 2037-40, thereby shielding the current population aged 45 and over from this

Table 4. **Fiscal consolidation is set to continue**

Per cent of GDP (except where noted)

Year to June	Actual 2015-16	Projections				
		2016-17	2017-18	2018-19	2019-20	2020-21
Core Crown revenue	**30.1**	**30.0**	**29.7**	**29.5**	**29.7**	**29.8**
Core Crown expenditure	**29.2**	**28.8**	**28.6**	**28.1**	**27.7**	**27.5**
of which: Social assistance	9.6	9.5	9.4	9.3	9.1	9.0
Social assist. related to NZ Super	4.8	4.9	4.9	4.8	4.9	4.9
Capital spending	1.8	1.8	2.1	2.1	1.9	2.4
Core Crown balance[1, 2]	**0.9**	**1.2**	**1.2**	**1.4**	**2.0**	**2.3**
Total Crown balance[1, 2]	**0.7**	**0.6**	**1.0**	**1.4**	**2.0**	**2.2**
Cyclically-adjusted balance[3]	1.3	1.4	1.3	1.2	1.8	2.2
Fiscal impulse (core Crown + entities)[4]	**-0.3**	**0.0**	**0.4**	**0.5**	**-1.0**	**-0.6**
Net core Crown debt[5]	24.4	23.2	22.8	22.1	20.6	19.3
Gross core Crown debt	34.3	33.0	29.8	28.4	26.9	24.3
General government balance	**0.0**	**0.4**	**0.3**	**0.5**	**1.4**	**1.8**
equal to: central government net lending[6]	0.0	0.5	0.3	0.5	1.5	1.9
+ local government net lending[7]	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Memorandum items (Treasury projections)						
Real GDP growth (production based)	2.7	3.1	3.5	3.8	2.9	2.4
Nominal GDP growth (expenditure based)	4.2	6.2	4.8	5.4	5.0	4.2
CPI (annual per cent change)	0.4	1.8	1.6	2.1	2.2	2.1
Ten-year government bond (per cent)	2.7	3.1	3.6	4.0	4.2	4.3

1. The core Crown includes government departments, offices of parliament, the New Zealand Superannuation Fund and the Reserve Bank of New Zealand. The total Crown consists of the core Crown plus Crown entities (such as the Accident Compensation Commission, the Commerce Commission and Callaghan Innovation) and State-owned enterprises
2. Based on operating balance before gains and losses.
3. Core Crown balance adjusted for the cyclical position of the economy.
4. Excluding Earthquake Commission and Southern Response payments and receipts related to the Canterbury and Kaikōura earthquakes.
5. Excludes assets of the New Zealand Superannuation Fund, which were 12.2% of GDP in 2015.
6. Based on National Accounts estimates from Statistics New Zealand (for the year ended March 2016) and Government Financial Statistics projections from the 2017 budget (for 2016-17 to 2020-21).
7. Estimates based on a continuation of the 2015-16 deficit as per the latest available Government Financial Statistics and National Accounts data for local government.

Source: Treasury (2017), *Budget Economic and Fiscal Update*; OECD calculations based on Statistics New Zealand (2016), *Government Finance Statistics (General Government): Year Ended June 2016*, Statistics New Zealand (2016), National Acounts (Income and Expenditure): Year Ended March 2016 and Treasury (2017) *Budget Economic and Fiscal Update*.

change. This is a very gradual adjustment, especially as life expectancy at 65 is projected to rise from 22 years in 2015 to 25 years in 2040 (Statistics New Zealand, 2016). Starting sooner than 2037 and stretching the adjustment over a longer period (while finishing no later than in 2040) would better contain costs and would distribute the burden of adjustment more evenly across cohorts. In any case, to depoliticise future pension eligibility decisions, the pension age should be indexed to life expectancy (as some other OECD countries have done).

The biggest projected long-term public spending pressure is in health care, which is expected to jump from 6.2% of GDP in 2015 to 9.7% of GDP in 2060 owing to both population ageing and the expectation of expensive new treatments. Cost increases would be attenuated by implementing health-care recommendations made in past *Surveys* (Table 5). Preventive health initiatives could deliver long-term fiscal savings while increasing inclusiveness, as the prevalence of key health risks including obesity, physical inactivity and smoking is much higher among Māori, Pasifika and people living in socioeconomically deprived areas (Ministry of Health, 2016).

Table 5. **Past OECD recommendations on policies to prepare for future shocks and population ageing**

Recommendations in previous *Surveys*	Action taken since previous *Survey* (June 2015)
Implement fiscal consolidation measures to reduce net core Crown debt as planned, while continuing efforts to improve well-being of the most vulnerable members of society. Allow the automatic stabilisers to operate fully.	Ongoing. Net debt is falling as a percentage of GDP. A child material hardship package was implemented on 1 April 2016 that included a lift in core benefit rates for families with children. The 2016 budget included additional funding for its social investment programme, including the establishment of a new Ministry for Vulnerable Children. The 2017 budget included additional funding for family incomes through changes to tax thresholds, family tax credits and accommodation supplements.
Target the Working for Families programme more tightly on the working poor by lowering upper income thresholds and increasing abatement rates.	Upper income thresholds for Working for Families Tax Credits were lowered for FY 2016-17: the upper threshold for parents with one child fell from an annual pre-tax income of NZD 110 530 to NZD 84 314. The abatement rate for Working for Families tax credits was increased by 1.25 percentage points to 22.5%. The 2017 budget included measures to increase payments for families with young children and lift the abatement rate for Working for families Tax Credits from 22.5% to 25% and reduce the abatement threshold from NZD 36 350 a year to NZD 35 000 a year. This means that assistance is more targeted to lower income families.
Raise the pension eligibility age from 65 to 67.	The government announced in March 2017 that it will raise the New Zealand Superannuation eligibility age by six months each year from 2037 to reach 67 by 2040.
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.	No action taken.
Adopt a comprehensive approach to reducing obesity, covering personal behaviour, factors that influence physical activity and nutritional practices, and improved obesity management through primary care.	The government launched an obesity strategy in 2015 with voluntary measures based around education and exercise. There is scope to strengthen cross government governance and accountability and consider the range of regulatory options other countries are exploring.
Reduce further the costs (including transport and childcare) of access to primary health care for the poor.	The government introduced, from 1 July 2015, free GP visits for under 13s, and in 2016 commissioned a review of primary care funding. Its recommendations have not yet been implemented.

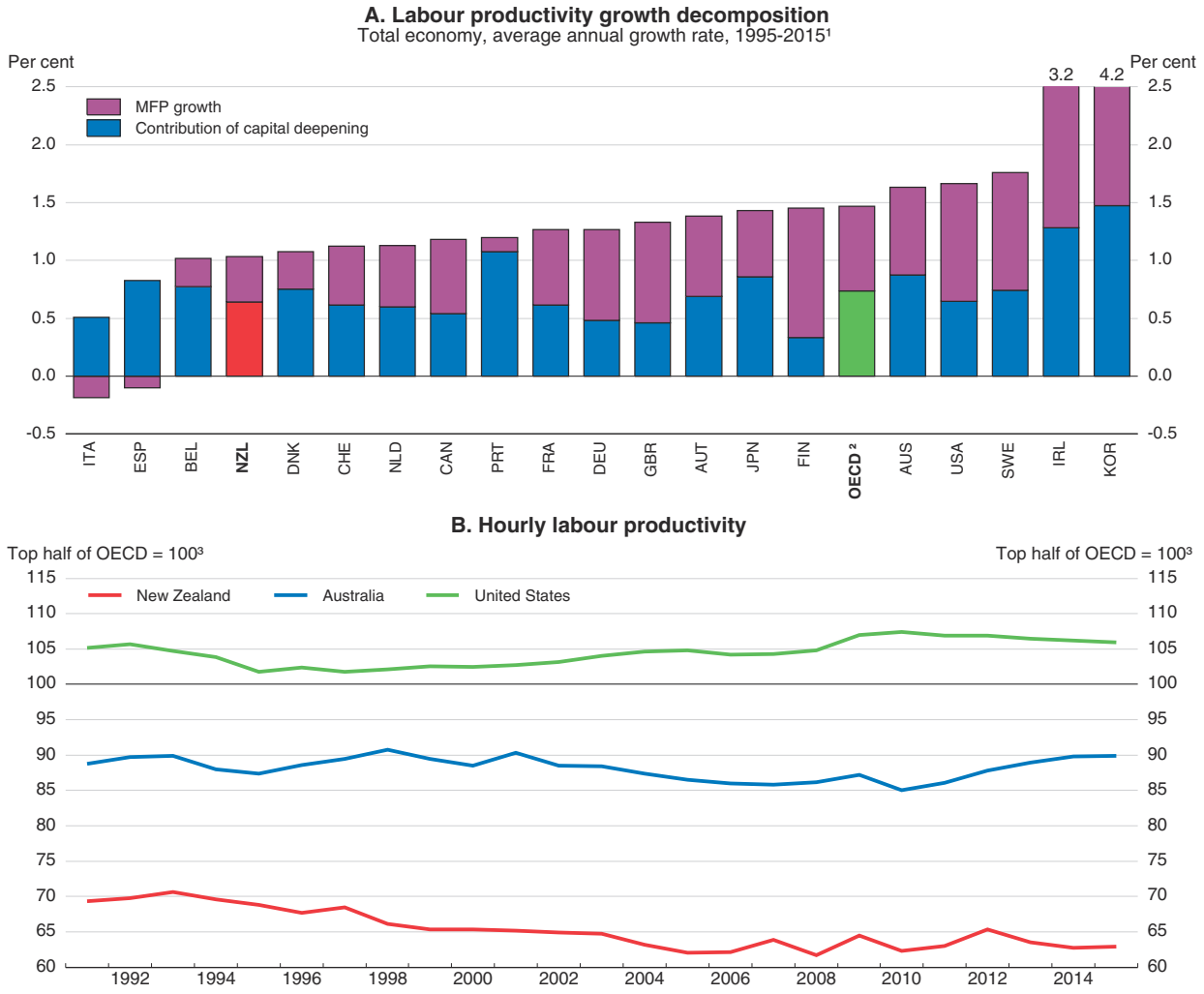
Improving productivity in New Zealand's economy

New Zealand's productivity is low relative to top OECD performers and growth has lagged behind that in most other OECD countries over the past two decades (Figure 13), despite generally productivity-friendly policies (de Serres et al., 2014). Disappointing labour productivity outcomes are partly attributable to low capital intensity, resulting from a high labour force growth rate and persistently weak investment: non-residential capital formation per person in the labour force is less than 75% of the OECD average, after removing the Canterbury earthquake rebuild (Figure 14). Labour productivity growth in the traded sector outperformed that in the non-traded sector by about 50% between 1996 and 2015.

Several key factors contribute to New Zealand's poor productivity performance:

- *Lack of international connection and scale*: An economy's ability to benefit from innovation at the global frontier rises with international connectedness (Saia et al., 2015). New Zealand's lack of scale and geographical remoteness constrain labour productivity benefits from agglomeration and international connections (McCann, 2009).
- *Weak competitive pressures*: High price-cost margins and the survival of laggard firms with poor productivity and management practices suggest that competition is not as strong in New Zealand as in some other advanced countries (NZPC, 2014; MBIE, 2016b).

Figure 13. **Labour productivity**



1. 1996-2015 for Austria; 1995-2014 for Australia, Ireland, Japan, Portugal and Spain.
2. Average of the 20 countries for which data are available.
3. Population-weighted average for the top 17 OECD countries for labour productivity, calculated using 2010 purchasing power parity exchange rates.

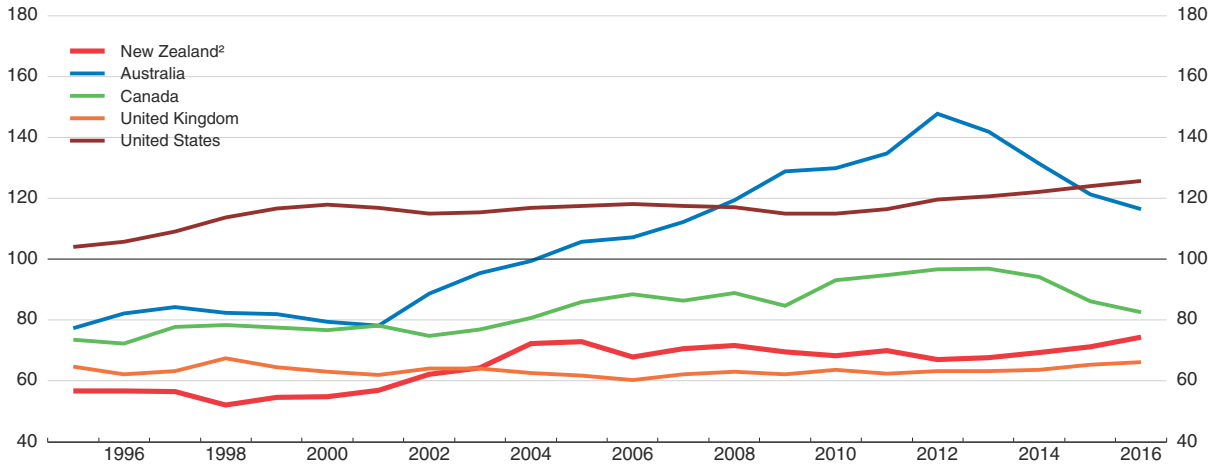
Source: OECD (2017), Productivity Database; OECD (2017), *Economic Policy Reforms: Going for Growth 2017*.

StatLink http://dx.doi.org/10.1787/888933497234

- *Low rates of capital investment* (Figure 14): A higher cost of capital than in most other advanced economies contributes to low capital investment. As national saving has persistently fallen short of investment, New Zealand has accumulated substantial foreign liabilities, and international investors may require a premium to invest there (Rose, 2009; McDermott 2013). Also, owing in part to its small size, New Zealand has thin venture capital, stock and bond markets. Low rates of capital investment depress wages, with negative consequences for income distribution and inclusiveness.
- *Low R&D activity:* New Zealand's R&D expenditure, especially by the business sector, is low (Figure 15).

Figure 14. **Gross fixed non-residential capital formation**

Per person in the labour force, OECD = 100[1]



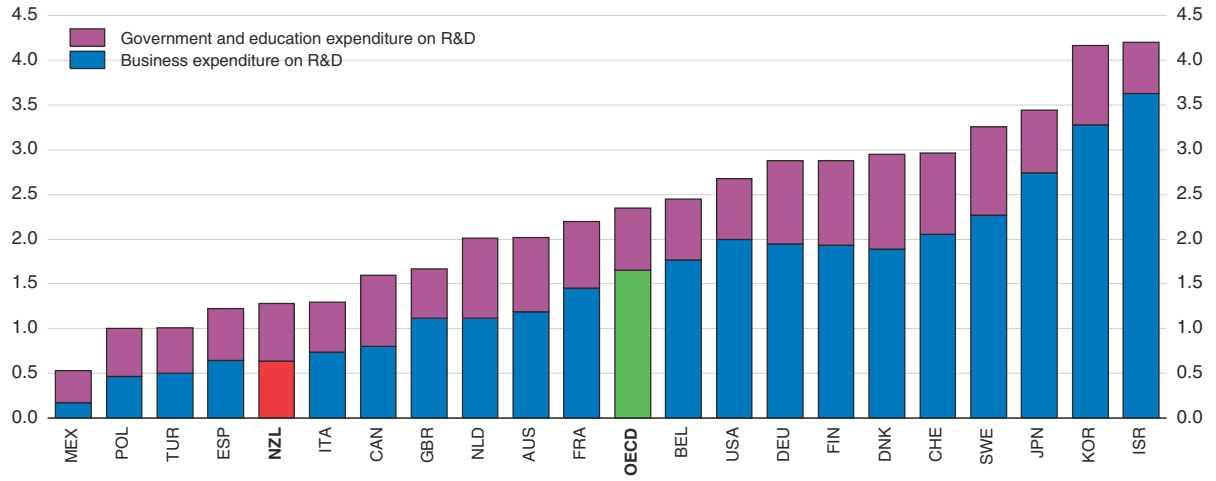
1. Data for gross non-residential capital formation are in current prices and were converted into a common currency using 2010 purchasing power parity exchange rates. The labour force includes only people aged 15-64. Data for the OECD exclude Chile, the Czech Republic, Estonia, Greece, Hungary, Iceland, Israel, Latvia, Luxembourg, Mexico, Norway, the Slovak Republic, Slovenia and Turkey.
2. Excluding investment related to the Canterbury earthquake rebuild.

Source: OECD, Economic Outlook and Labour Force Statistics Databases; A. Wood et al. (2016), "The Canterbury Rebuild Five Years on from the Christchurch Earthquake", *RBNZ Bulletin*, Vol. 79, No. 3, February.

StatLink http://dx.doi.org/10.1787/888933497246

Figure 15. **Expenditure on research and development**

As a percentage of GDP, 2015 or latest year available



Source: Statistics New Zealand; OECD, Main Science and Technology Indicators Database, *http://oe.cd/msti*.

StatLink http://dx.doi.org/10.1787/888933497252

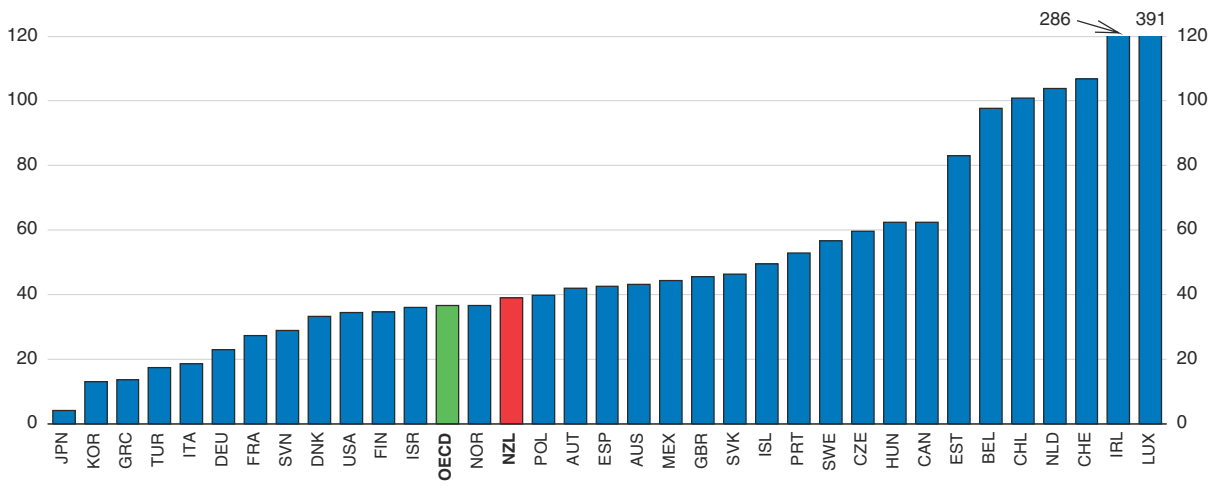
Increasing international connections by reducing barriers to foreign direct investment

Foreign direct investment boosts recipient countries' productivity by providing capital to fund capital formation, opening up access to global supply chains and markets and promoting local competition. These benefits are particularly important for small countries such as New Zealand that lack a large domestic market. Compared to portfolio investment, direct investment is more likely to be associated with a lasting relationship and thus to lead to technological, skills and managerial quality transfers, and less likely to lead to financial crises (Caldera Sanchez and Gori, 2016).

New Zealand's inward direct investment stocks are substantially lower than in a number of other small, high-income OECD countries (Figure 16). It retains a comprehensive foreign investment screening process, something that has not substantially changed in several decades and does not exist in many other countries. Moreover, there are further barriers in some industries, in particular in fisheries and telecommunications. While few investment proposals are blocked, the screening process is poorly targeted: it applies to foreign investment in all businesses valued at more than NZD 100 million and to "sensitive land", defined to include all non-urban land over five hectares as well as smaller sites that adjoin certain types of land, such as local parks and reserves. Screening imposes a higher threshold for approval than required to address community concerns (Treasury, 2009). For potential investors, it creates delays, significant compliance costs and uncertainty, which is heightened by ministerial discretion as well as the inability to get a non-binding preliminary opinion on whether an investment will be blocked. Fortunately, compliance costs were reduced in 2016 for some transactions, but further steps could be taken in this direction. Through restricting foreign entry, screening is one of the key horizontal policy measures increasing New Zealand's Services Trade Restrictiveness Index (OECD, 2017e).

Figure 16. **Inward direct investment stock**

As a percentage of GDP, 2016 or latest available data



Source: OECD, Foreign Direct Investment Database.

StatLink http://dx.doi.org/10.1787/888933497262

In line with OECD guidelines on foreign direct investment and national security concerns (OECD, 2009), screening should be progressively narrowed. This could be done by incrementally removing screening requirements on specific sectors that do not raise national security issues (such as construction and retail trade) and where foreign direct investment offers the greatest potential benefits to New Zealand. Such a staged approach would provide an opportunity to demonstrate tangible benefits from reducing restrictions, as was important in building the case for foreign direct investment in Korea (Nicolas et al., 2013). Establishing a public register of foreign direct investment (informed by mandatory notification) could also help to alleviate community concerns, as would emphasising that the NZ government retains sovereign control over activities taking place on NZ land, irrespective of ownership.

Exploiting benefits from agglomeration by reforming urban planning and infrastructure funding

Agglomeration economies generated by cities and industrial clusters are an important source of productivity growth (Glaeser, 2010). New Zealand's small population limits such economies. Even so, the urban planning system and a lack of land transport and water infrastructure have been barriers to agglomeration by preventing increases in housing supply from meeting demand, boosting housing costs and inhibiting people from moving into economically successful, highly productive urban areas. Land prices inside Auckland's urban boundary are nearly 10 times higher than outside, while a suite of complex and restrictive land-use rules (including maximum building heights, minimum lot sizes and parking requirements) has made development more difficult and expensive (OECD, 2017c), although many of these practices have been reduced or removed through the Auckland Unitary Plan (as described below). Rapid population growth due to high immigration is placing additional pressures on infrastructure. The inability of water supply infrastructure to keep pace with demand has restricted developers' ability to deliver new housing in a timely manner (NZPC, 2017a), and transport congestion is likely to worsen (Auckland Transport Alignment Project, 2016).

The recent Auckland Unitary Plan will allow greater densification and some expansion of urban development limits. It represents a major step forward in spatial planning, integrating land use, housing, transport, infrastructure and other urban planning issues. Nevertheless, permitted housing density follows a U-shape, with a fall in density in areas close to the city centre but higher density further out, which contrasts with the more usual linear decline in density as distance from the centre increases. This form is partly the result of insufficient infrastructure in areas close to the city centre. Large investments are being made to rectify this problem, which should permit the Plan to be revisited in the future to permit greater densification, provided that opposition from vested interests can be overcome.

While infrastructure investments have been stepped up in Auckland, they still appear to be lagging behind the requirements of such a rapidly growing population. A major problem is that the Auckland Council, like others in New Zealand, has weak incentives to invest in amenities to facilitate growth, as local ratepayers bear much of their cost, but the fiscal benefits flow mainly to central government. To mitigate this problem a number of avenues for diversifying revenue sources should be considered, as discussed in the 2015 *Survey* (Table 6). These include: making greater use of tolls to fund local and national roads and of Public-Private Partnerships where that could increase efficiency (see Chapter 1); introducing volumetric charges for water outside the few councils, such as Auckland, that already have them; ensuring that housing development contributions (one-off levies imposed by local authorities on developers to finance parts of the capital costs associated with new development) reflect costs; and increasing the Council's debt-servicing capacity so that it could issue more debt to finance infrastructure. Options for increasing this capacity include sharing in a revenue base linked to local economic activity, such as GST, and using targeted rates to tax the windfall gains that accrue to local landowners from the provision of new amenities. Property owners should lose underground property rights that unnecessarily add to the costs of infrastructure provision, as with Auckland's underground rail line.

Table 6. **Past OECD recommendations on improving productivity**

Recommendations in previous *Surveys*	Action taken since previous *Survey* (June 2015)
Improve the house price supply response: • Adopt spatial planning for all urban areas • Reform the Resource Management Act to better incorporate urban development needs. • Reduce the scope for vested interests to thwart rezoning and development that would be in the wider public interest.	The Auckland Unitary Plan largely became operative in November 2016. The report of the Productivity Commission inquiry into urban planning was released in March 2017. The report relates closely to spatial planning, Resource Management Act reform and balancing wider against vested interests.
Limit the tax deductibility of losses from rental property investments by allowing them to be offset only against future rental income.	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.	Capital gains on investment properties bought and sold within two years have been subject to income tax since 2015.
Consider diversifying revenue sources for infrastructure funding. Implement infrastructure demand management strategies to reduce urban road congestion, notably congestion charging.	The Auckland Transport Alignment Project between central and local government has looked at options for variable network pricing on Auckland roads. Central and local government submitted a report in September 2016. The Government and the Auckland Council are developing a work programme to look at options for congestion pricing.
Expand the use of *ex post* evaluations of Commerce Commission decisions to assess performance.	*Ex post* evaluations are undertaken on an *ad hoc* basis.
To address equity financing gaps, shift the allocation of the NZ Venture Investment Fund to provide greater support for early-expansion-stage firms.	No action taken.
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.

Leveraging the productivity potential of regional and Māori economies

Regions are important in understanding New Zealand's productivity performance. Some regions have relatively lower GDP per capita and poor productivity performance (OECD, 2016b). Regional economic development based on partnership between central government agencies and local stakeholders can enhance productivity in different types of regions by better integrating and adapting public investments and service provision to local conditions. The NZ government has recently initiated a series of regional economic surveys, followed by action plans led by local governments. This approach is consistent with the OECD's regional development policy framework, which emphasises the importance of partnership across levels of government (OECD, 2016b). Regional policy should continue to focus on effectively meeting the specific needs of all regions, rather than redistribution and subsidies for lagging regions, which can impede productivity growth. A key driver of several regional economies in New Zealand is Māori economic development. Māori represent 15% of the NZ population and, on average, are younger, have lower incomes and poorer social and health outcomes than non-Māori. A new Action Plan under New Zealand's strategy for boosting Māori economic performance – the Crown-Māori Economic Growth Partnership – will be released this year with the objective of growing a more productive, innovative and internationally connected Māori economic sector. It will be important that quantifiable targets be established for government actions in partnership with Māori and that this initiative be integrated with wider regional development efforts such as the Regional Growth Programme.

Enhancing competition and firm dynamics

Boosting competition offers potential productivity improvements through resource reallocation to the most productive firms, greater diffusion of existing technologies to

laggards and increased incentives for innovation. It can also offer distributional benefits through placing downward pressure on prices, which benefits consumers over generally wealthier shareholders. As noted above, there are indications that weak competition is an issue in New Zealand. While there has been a strong rate of job creation by new firms – which contributes to a relatively young population of small businesses – analysis suggests that there are long-run impediments in the process of productivity-enhancing re-allocation of labour and capital (Conway, 2016).

Lowering trade barriers would boost competition and increase international connections. While New Zealand has few trade restrictions, there would be benefits from cutting remaining tariffs, improving trade facilitation measures, removing trade barriers in telecoms and, for services more generally, giving stronger consideration to recognising foreign licenses to practise when those licences are based on equivalent or better standards than their NZ counterparts.

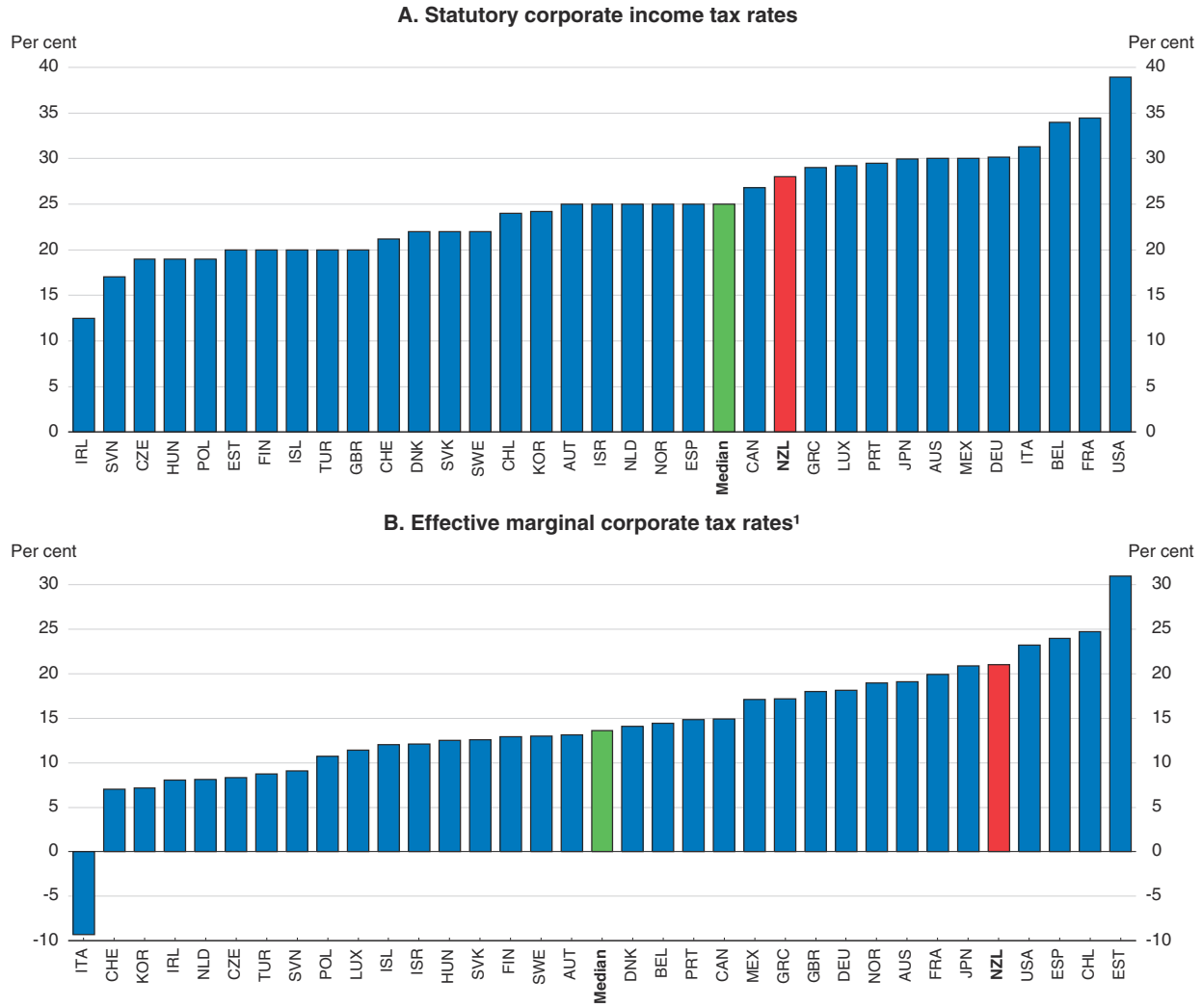
Allowing the Commerce Commission to undertake market studies is currently under consideration and could help markets work better, especially when obstacles and distortions to competition are not caused by competition law violations. In addition, the legislative prohibition against misuse of market power should be reviewed to consider whether the current requirement to prove the intent or purpose of behaviour is working and examine whether a test focused instead on the effects of business conduct, as in most other OECD countries, would be more beneficial.

New Zealand scores close to the OECD average on the OECD's indicator of the efficiency of insolvency regimes, leaving some room for improvement. Improving the efficiency of New Zealand's insolvency regime would strengthen productivity by facilitating reallocation of resources to the most productive firms and restructuring rather than liquidating viable businesses. It takes much longer to resolve an insolvency case in New Zealand than in leading countries such as Japan, Ireland, Canada, Belgium and Finland (World Bank, 2016). New Zealand's regime may impede continued trading of viable firms after commencement of insolvency proceedings, because it does not give priority to new financing ahead of pre-existing unsecured creditors, as is international best practice. Consideration should also be given to introducing separate insolvency regimes for SMEs and large firms. Facilitating the exit of non-viable firms can be expected to reduce productivity disparities across firms, which is associated with less labour income inequality (OECD, 2016c).

Increasing capital investment through tax reform

The authorities could increase the attractiveness of investing in New Zealand by cutting the corporate tax rate, which at 28% exceeds the OECD median of 25% (Figure 17, Panel A). The effective marginal corporate tax rate, which is more relevant for investment decisions, is considerably less competitive (Panel B). In contrast to most other countries, the effective tax rate is not much lower than the nominal rate in New Zealand owing to its relatively broad corporate income tax base. As having a broad tax base reduces the efficiency cost of taxation, the focus of measures to reduce the effective corporate tax rate should be on lowering the nominal rate. High effective corporate tax rates increase the user cost of capital and thus reduce aggregate investment, foreign direct investment and entrepreneurial activity (Djankov et al., 2010), with substantial negative implications for economic growth (Johansson, 2016; Bartolini et al., 2017). While distance from major markets might insulate New Zealand to some extent, it is difficult to see how it can resist the global trend to lower corporate tax rates without losing out on foreign investment. Any cut in the corporate tax

Figure 17. **Corporate income tax rates, 2016**



1. The effective marginal corporate tax rate is the percentage increase in the cost of capital of a marginal investment – that is, an investment that pays just enough to make the investment worthwhile – as a result of the corporate income tax rate and tax base.

Source: OECD, Tax Database; Oxford University Centre for Business Taxation, CBT tax database.

StatLink http://dx.doi.org/10.1787/888933497276

rate would need to be assessed in the context of a holistic review of the tax system, including personal taxes and the option of expanding the number of tax bases to include land (which is immobile and therefore non-distortionary; Brook, 2014), capital gains and negative environmental externalities (see below). There are trade-offs between cuts to different taxes, and one downside of a corporate tax cut is that some of the benefits accrue to foreign investors. Yet, benefits for foreigners are the price to be paid for attracting foreign capital.

Increasing national saving could also contribute to an expansion in investment and indeed is necessary if investment is not to be financed through a wider current account deficit. The NZ government has a strong record on saving, but not the private sector. Removing regulatory and infrastructure barriers to the expansion of housing supply would reduce capital gains on property, obliging households to save more out of current income to meet their consumption objectives in retirement. The 2011 *Survey* advanced a number of

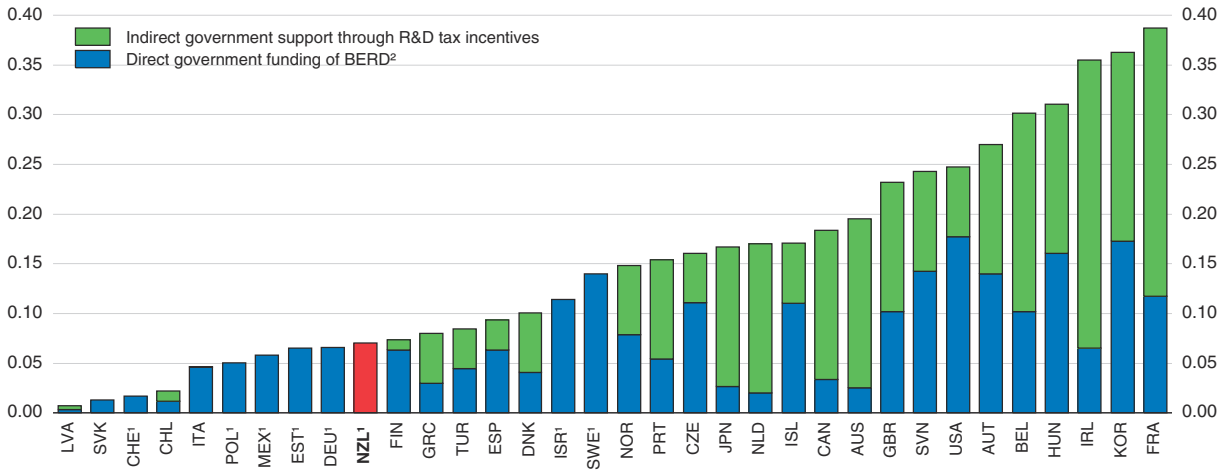
policy options to address low private saving, including extending automatic enrolment in the national retirement savings scheme (Kiwisaver) to all employees and considering an increase in the default contribution rate, as well as decreasing taxation of returns on non-housing saving vehicles (OECD, 2011). Reducing the tax rate on saving would require other revenue-raising changes as mentioned above.

Increasing innovation through support for R&D and industry linkages

Innovation, including through R&D, can boost firm productivity, but there can also be spill-over benefits beyond individual firms, which, along with difficulties finding external finance, provide a rationale for fiscal support for R&D (OECD, 2016d). New Zealand's support for R&D is provided predominantly through grants administered by Callaghan Innovation. Government support for business R&D in New Zealand is unusual among OECD countries in terms of both its low quantum and the absence of R&D tax incentives that provide an enhanced (i.e. greater than 100%) allowance for eligible expenses (Figure 18). There is also a low level of collaboration between firms and higher education and research institutions, in particular by small firms, which account for a large share of New Zealand's output and stand to gain the most from this type of collaboration (Figure 19).

Figure 18. **Direct and indirect funding of business R&D by governments**

As a percentage of GDP, 2014 or latest available data



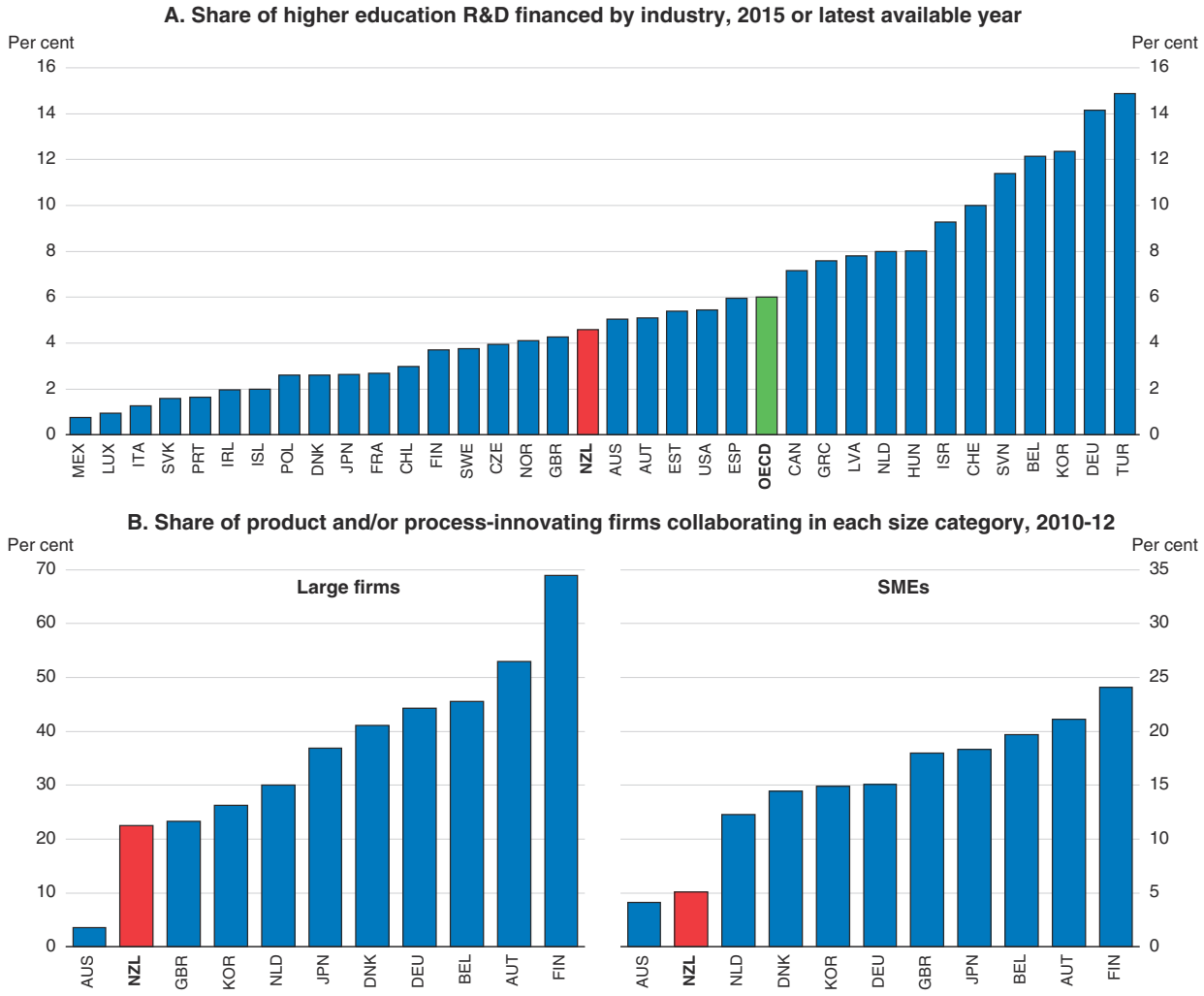
1. Estonia, Germany, Mexico, New Zealand and Switzerland did not provide any indirect government support through R&D tax incentives. For Israel, the R&D component of incentives cannot be identified separately at present. No data on the cost of expenditure-based R&D tax incentive support are currently available for Poland and Sweden. Data on direct government support for New Zealand are for the year to March 2016.
2. Business enterprise expenditure on R&D.

Source: OECD (2017), R&D Tax Incentive Indicators, *http://oe.cd/rdtax* and Main Science and Technology Indicators, *http://oe.cd/msti;* Statistics New Zealand.

StatLink *http://dx.doi.org/10.1787/888933497282*

The NZ government should increase its support for innovation by increasing R&D grants or re-introducing an R&D tax credit. R&D grants are capped at NZD 25 million per year, a limit that may discourage firm growth. Removing it could increase R&D, especially by larger firms, delivering greater spill-over benefits. Long-term support for successful collaboration between research institutions and industry should also be maintained or increased, and financial incentives for research institutions to develop industry linkages should be strengthened.

Figure 19. **Firms collaborating on innovation with higher education or research institutions**



Source: Statistics New Zealand; OECD, *Main Science and Technology Indicators Database*; OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015*, Figure 3.3.1.

StatLink http://dx.doi.org/10.1787/888933497296

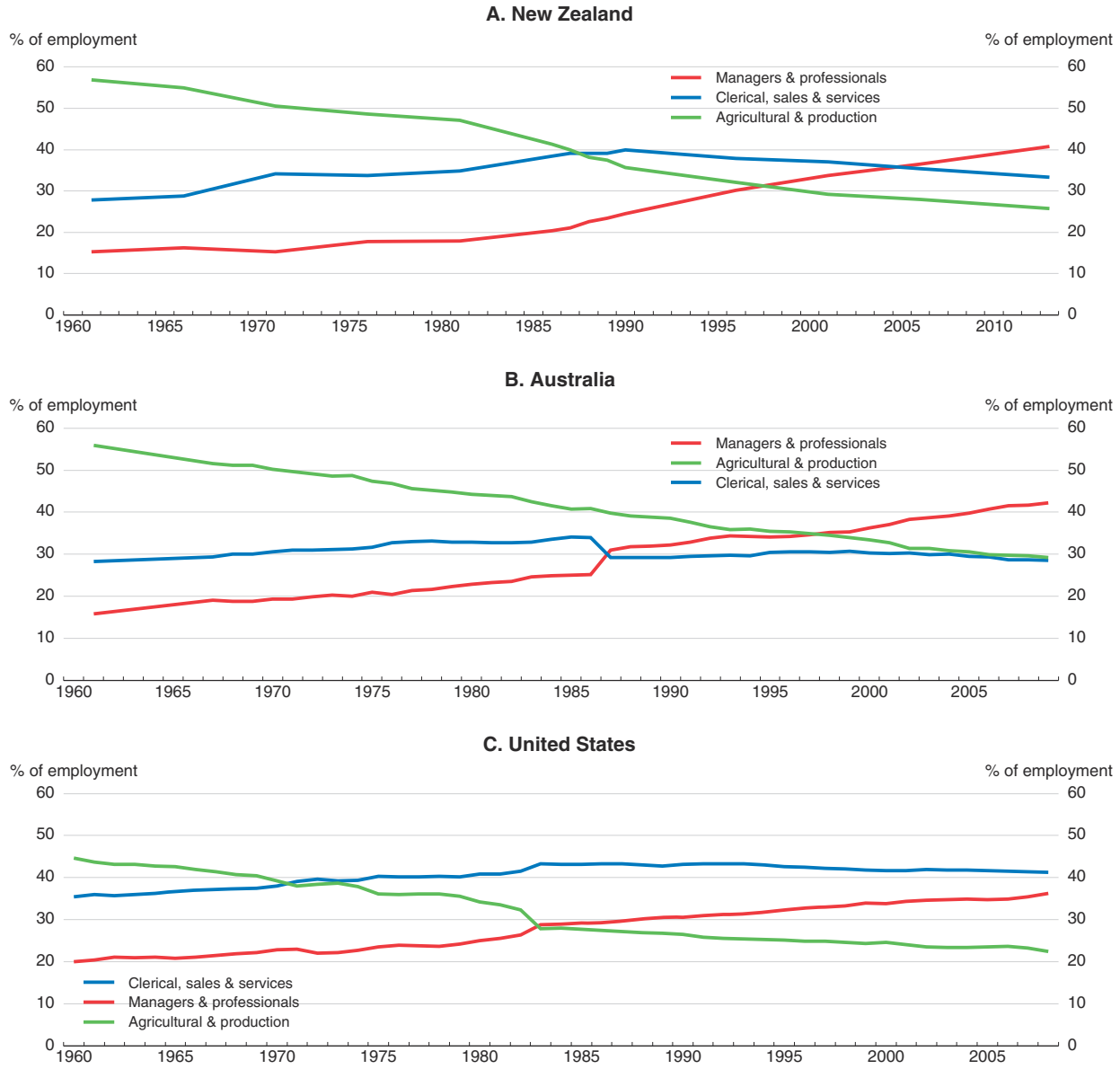
Adapting to the changing labour market

Technical progress continues to favour high-skilled workers

Technical change has long been increasing the productivity of, and hence the demand for, more highly skilled workers relative to others. This has led to a rising share of workers employed in high-skilled occupations, such as professionals and managers, and a declining proportion in low-skilled occupations, such as production and related workers (Figure 20, Panel A). Similar patterns hold in other countries too, albeit less pronounced in some than in New Zealand (Panels B and C).

Since the 1980s digitalisation has been the dominant form of technical change. It has automated many repetitive tasks, a process referred to as routine-replacing technical change. This has most affected middle-skilled jobs. By contrast, high-skilled jobs have many abstract tasks, and many low-skilled jobs, such as personal carers, require motor skills, judgement and/or social interaction (Autor et al., 2003). Routine-replacing technical change

Figure 20. **Long-run broad occupational employment shares**



Source: M. Handel (2012), "Trends in Job Skill Demands in OECD Countries", *OECD Social, Employment and Migration Working Papers*, No. 143; Statistics New Zealand, *2013 Census QuickStats about work and unpaid activities*, Table 11.

StatLink http://dx.doi.org/10.1787/888933497301

is hypothesised to lie behind the rise in employment shares of high- and low-skilled occupations in Europe and the United States in recent decades and falling shares of middle-skilled occupations, a phenomenon known as polarisation or "hollowing out" (Autor, 2015; Goos et al., 2014). New Zealand's high-skilled occupation employment shares rose markedly over 1991-2011, whether classified on the basis of earnings or average years of education, but fell for middle-skilled and low-skilled occupations, especially the former (Table 7).

Bessen (2016) finds that in the United States computerisation increases the productivity of workers who use computers more intensively than others, the more so the more highly skilled they are. Over time occupations that use computers intensively substitute for

Table 7. **Levels and changes in occupational employment shares in New Zealand, 1991-2011**

	Average employment share in 1991	Percentage point change in employment share, 1991-2011
Occupations[1]		
High paid	19.5	7.3
Middle paid	50.2	-5.5
Low paid	30.3	-2.5
High education	35.4	9.5
Middle education	48.6	-7.1
Low education	16.0	-2.5

1. Occupations are defined at the two-digit level of the classification system in use up until 2011. High-paid (low-paid) occupations have median earnings one standard deviation above (below) the all-occupation average, while middle-paid occupations have median earnings within one standard deviation of the all-occupation average.
High-education occupations typically require tertiary education. They include teaching professional, other professionals, life science professionals, science professionals, life science associate professors, public administration, science associate professors, other associate professors and corporate managers.
Middle-education occupations typically call for upper secondary attainment. They include office clerks, customer service, building trades, metal and machinery trades, precision trades, agriculture and fisheries personal services, sale persons and other trades.
Low education occupations have limited educational requirements. These occupations include industrial plant operators, building and related occupations, machine operators, elementary occupations and drivers.

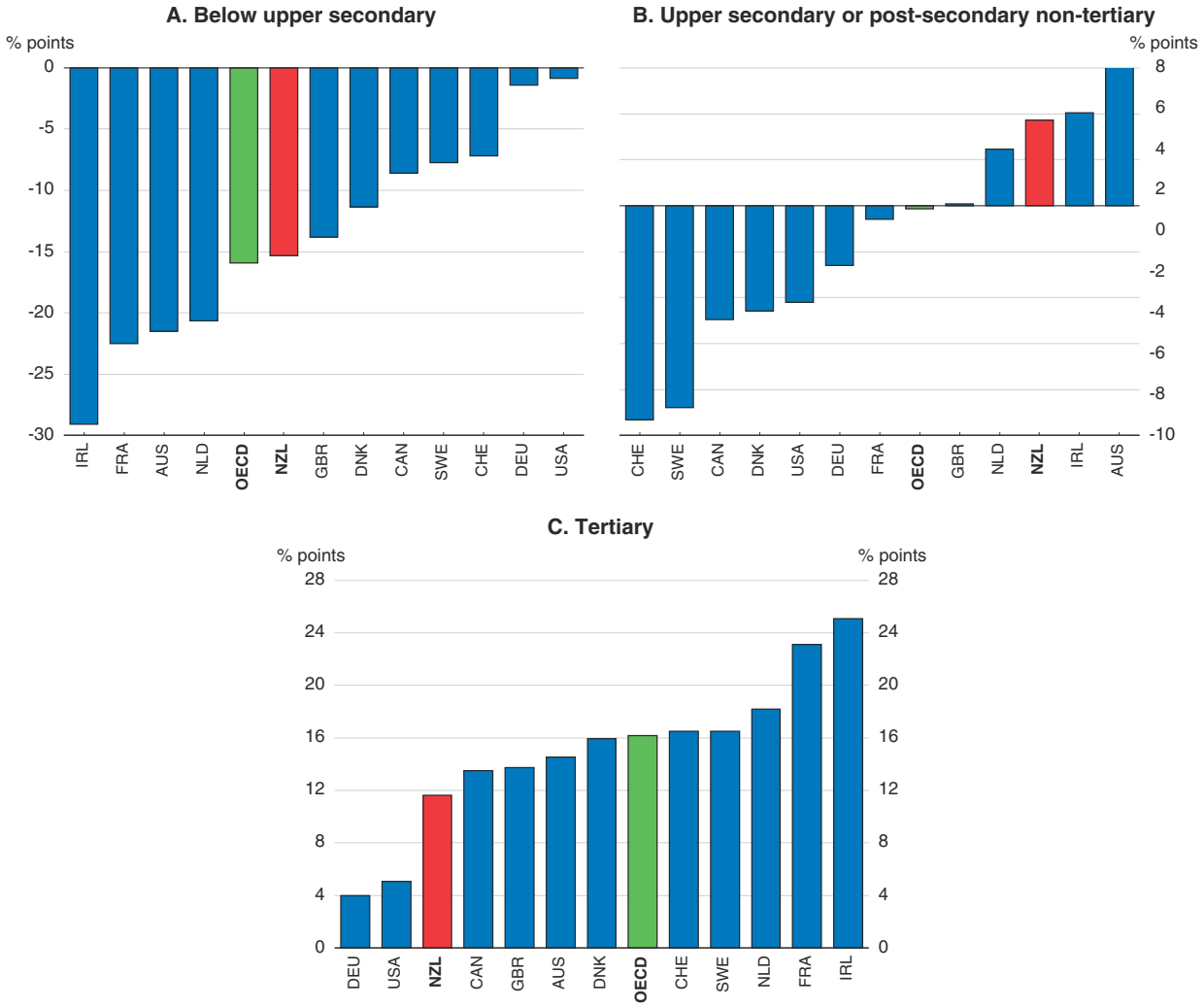
Source: Statistics New Zealand, *Household Labour Force Survey*.

others in employment. Rising computer use is associated with growth in well-paid jobs and shrinkage in others. To shift to these well-paid occupations workers need to learn new complementary skills, which are costly or difficult to acquire, so only some workers do so. This leads to greater wage inequality within occupations.

Stronger demand for high-skilled workers in New Zealand has been met by workforce upskilling. The proportion of the population with less than upper secondary education attainment is lower for 25-34 year-olds than for 55-64 year-olds, and a much higher share of 25-34 year-olds have tertiary education than 55-64 year-olds (Figures 21 and 22); however, increases in attainment have been greater in most other countries, and attainment levels are higher abroad for the younger age group than in New Zealand. International migration has made a significant contribution to this upskilling. Immigration net of emigration has contributed a much larger share of the population with higher educational attainment than the falling share with lower levels of attainment (Table 8). In April 2017 the government announced a series of changes, including adding remuneration thresholds for the Skilled Migrant Category (residence), which should result in higher-skilled immigrants. While data on permanent and long-term migration continue to show a preponderance of net immigration in generally higher-skilled occupations, it should be borne in mind that these data do not capture short-term migration flows, which mostly entail low-skilled work, and that migrants may undertake less skilled work in New Zealand than in their home country.

Unfortunately, it is difficult to judge whether increases in the supply of skills have been well calibrated to growth in demand for skills in New Zealand over the long term owing to a lack of data on earnings by level of education attainment. Over the period 2005-16, for which data are available, earnings premiums point to relative demand for workers with short-cycle tertiary qualifications or post-secondary non-tertiary qualifications running ahead of supply (Table 9). The timing of these gains suggests that the Canterbury rebuild was an important factor. The decline in the share of the population with such qualifications also contributed to the shortage (Table 10). Earnings premiums for higher tertiary qualifications display no clear

Figure 21. **Educational attainment gap between young and old,[1] 2015**



1. The young are defined as the 25-34 year-olds age group and the old as the 55-64 year-olds age group.
Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Table A1.3.

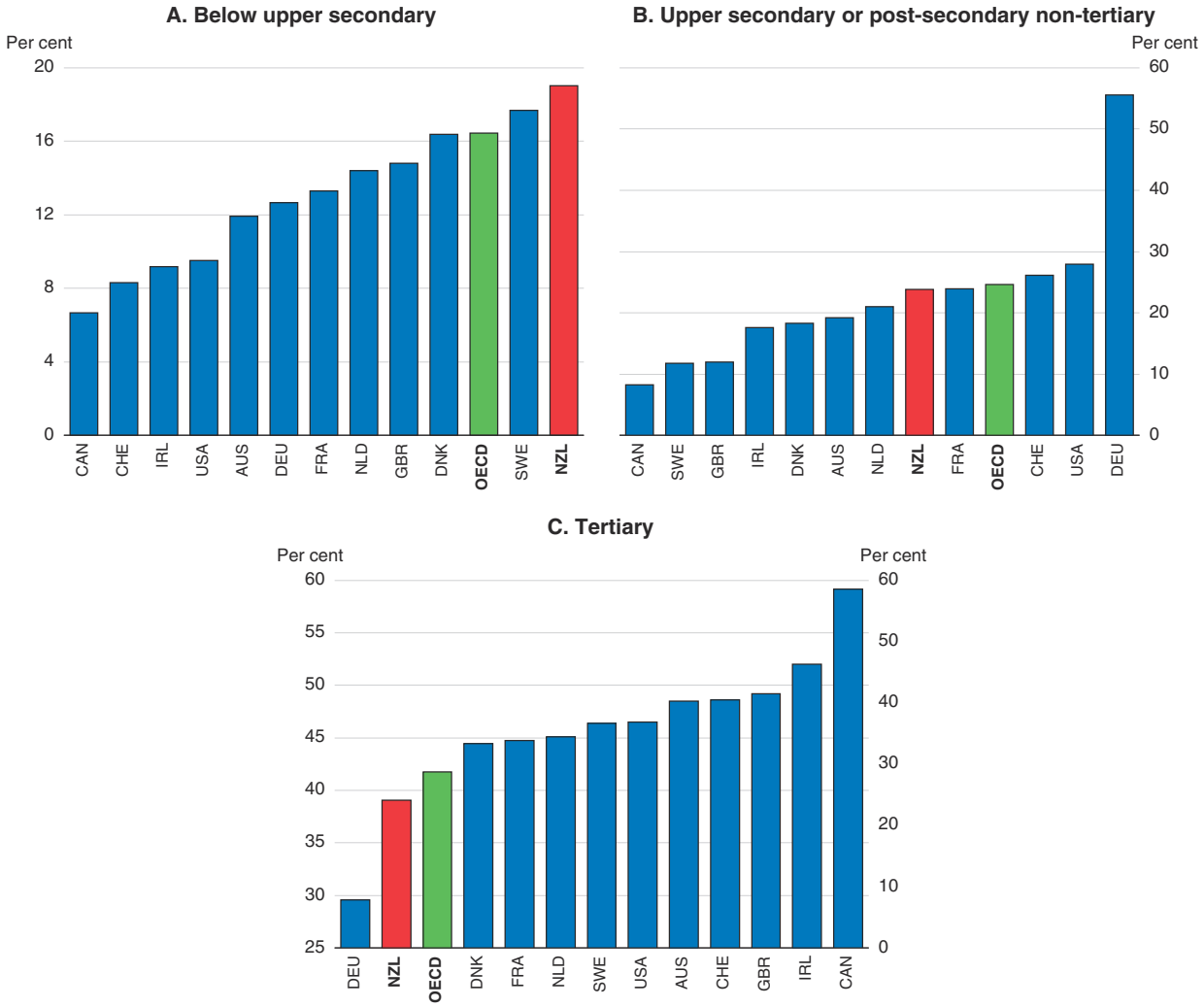
StatLink http://dx.doi.org/10.1787/888933497312

trend, suggesting that relative demand broadly increased in line with relative supply. Short-cycle tertiary earnings premiums are higher than in Australia and the United States while premiums for people with bachelor's or higher qualifications are higher than in Australia but much lower than in the United States (OECD, 2016e).

The Manpower Group survey of employers indicates that skills shortages in New Zealand are greater than in most other countries (Figure 23, Panel A). These shortages increased markedly following the Canterbury earthquakes but have been declining since 2014 (Panel B). NZ firms report that the hardest jobs to fill are for skilled tradespersons and engineers (Panel C). Wage rises in the construction sector, where many of them work, have outpaced those in other sectors in recent years. All of these factors are partly related to post-earthquake reconstruction and increases in the housing and construction industries.

The diffusion of digital technologies is expected to continue to favour high-skilled workers over their low-skilled counterparts. Using the data from the PIAAC study on tasks

Figure 22. **Level of educational attainment of the young,[1] 2015**



1. The young are defined as the 25-34 year-olds.
Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Table A1.3.

StatLink http://dx.doi.org/10.1787/888933497324

that workers report using, Arntz et al. (2016) estimate that 35% of NZ jobs are at risk of automation (meaning that more than 50% of tasks could be automated) over the next 10-20 years, with 9% at high risk (more than 70% of tasks are automatable) (Figure 24). These proportions are near the OECD average. As in other countries, low-skilled and low-income workers are much more likely to have their jobs automated than high-skilled, high-income workers (Figure 25).

Workers will need to upgrade their skills in fields in demand

NZ workers have strong information-processing skills, especially in literacy and problem solving in a technologically rich environment (Figures 26 and 27), putting them in good stead to adapt to change, such as workplace reorganisation to use digital technologies more productively. While skills for older workers are lower than for younger workers, the drop off with age is smaller than in most other countries, with the result that older

Table 8. **Impact of net migration on the skills of the population**

	Immigration	Emigration	Net migration
Education level[1]		Stocks (thousands), 2010	
High education	332.6	174.7	157.9
Low-middle education	551.6	340.5	211.1
Total	884.2	515.2	369.0
		% of population aged 15 and over, 2010	
High education	55.3	29.1	26.3
Low-middle education	23.0	14.2	8.8
Total	29.5	17.2	12.3
Occupation[2]		% share, 2011-16	
Professionals	37.4	33.9	52.2
Managers	9.8	10.1	8.9
Clerical and administrative workers	6.9	7.2	5.6
Technicians and trade workers	17.4	16.2	22.4
Community and personal service workers	13.7	14.0	12.4
Sales workers	6.1	7.9	- 1.6
Labourers	5.6	6.5	1.8
Machinery operators and drivers	3.0	4.1	- 1.8
Total of above occupations (thousands)	243.1	196.3	46.8

1. Low education refers to lower secondary education; medium education corresponds to upper secondary education and post-secondary non-tertiary education; and high education refers to tertiary education.
2. Occupations of permanent and long-term migrants ranked by decreasing years of education.

Source: Statistics New Zealand; OECD (2015), *Connecting with Emigrants – A Global Profile of Diasporas 2015*.

Table 9. **Earnings premiums for NZ workers**[1] **by level of educational attainment**

Upper secondary education = 100

	2005	2010	2011	2012	2013	2014	2015	2016
Below upper secondary education	82	83	82	82	92	94	93	91
Post-secondary non-tertiary education	102	107	107	99	113	113	118	115
Tertiary education	124	129	122	121	136	146	145	140
Short-cycle tertiary education	105	104	101	102	114	127	128	124
Bachelor's or equivalent education	141	143	134	132	133	145	139	133
Master's, Doctoral or equivalent education	..	..	..	..	174	176	177	166

1. Earnings of full-time, full-year workers aged 25-64.

Source: OECD (2016), "Education and earnings", *Education at a Glance* (database); Statistics New Zealand.

Table 10. **Educational attainment by highest level of qualification**

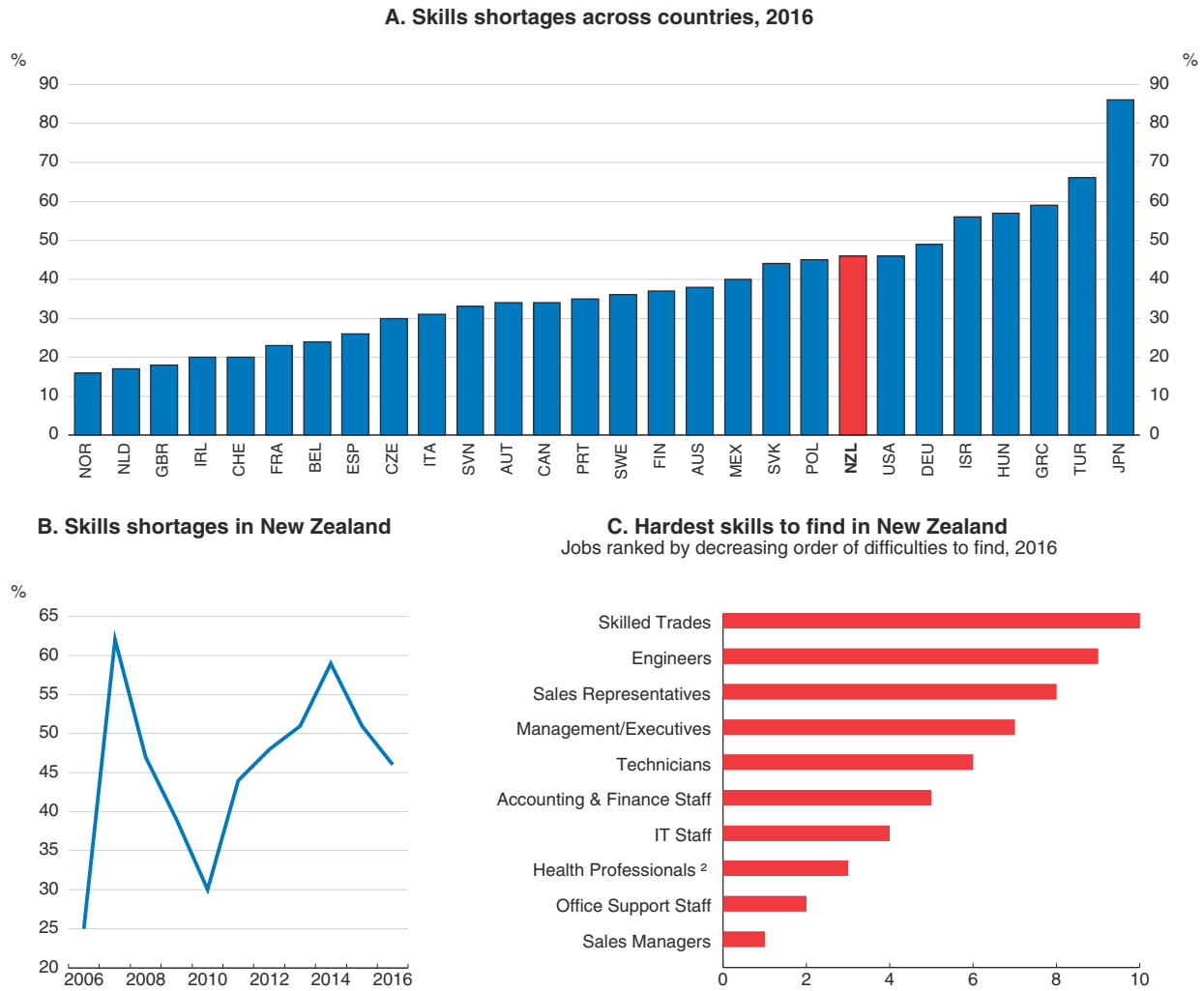
Population aged 15 years and over, per cent of all qualifications

	2005	2010	2011	2012	2013	2014	2015
No qualifications or not stated	26.3	25.6	24.5	24.2	24.4	22.7	22.2
School qualification	25.0	23.6	24.5	23.9	25.8	26.0	25.7
Tertiary diplomas/certificates	34.2	33.1	33.6	33.7	29.8	29.7	30.7
Bachelors degree or higher	14.5	17.7	17.4	18.3	20.0	21.5	21.4

Source: Ministry of Education, *Education Counts*.

Figure 23. **Firms facing skills shortages**[1]

As a percentage of all firms with ten or more employees



1. Survey based. Firms are classified as facing a skills shortage if they report having difficulties filling jobs.
2. Doctors and other non-nursing.

Source: ManpowerGroup, *Talent Shortage Survey*, various years.

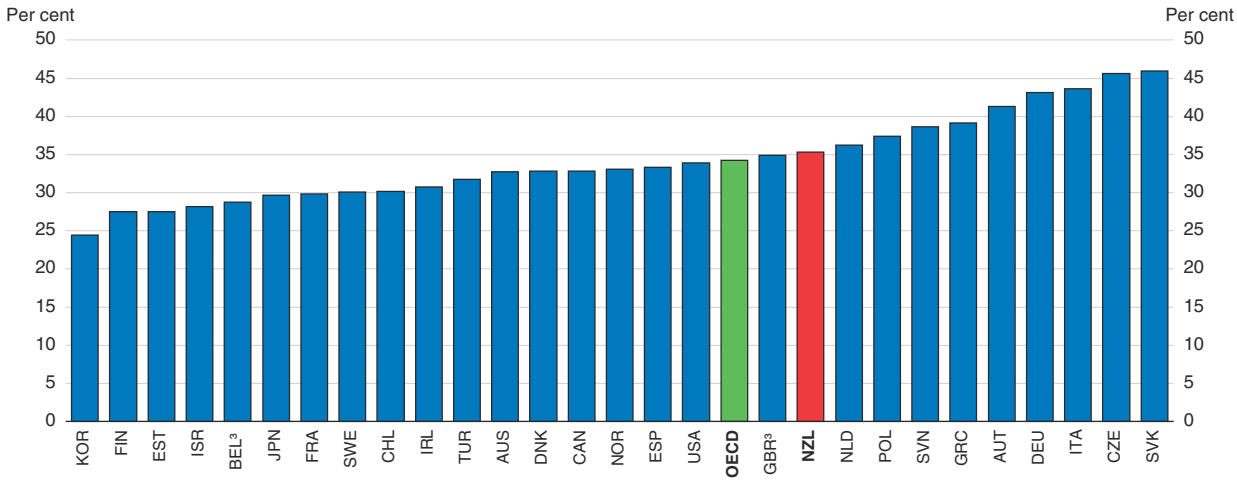
StatLink http://dx.doi.org/10.1787/888933497331

workers' skills in New Zealand are amongst the highest in the countries that participated in the PIAAC study (OECD, 2016f; see Chapter 2). Hanushek et al. (2016) find that returns to information-processing skills are higher when there is more economic change. They estimate that a one standard deviation increase in numeracy skills is associated with 19% higher earnings in New Zealand, slightly below the pooled estimate for the 32 countries in the PIAAC study.

Even so, young people will need to continue their education to higher levels than in the past and in fields that are in demand to adapt to changes in the labour market induced by technical change. For more young people to be able to succeed in post-secondary education, achievement by the secondary level will need to improve – performance at the secondary level is a strong predictor of success at the tertiary level (OECD, 2016e). The OECD PISA study shows that while achievement stabilised between 2012 and 2015 at levels

Figure 24. **Risk of job automation**

Jobs at risk of automation,[1] 2012 and 2015[2]



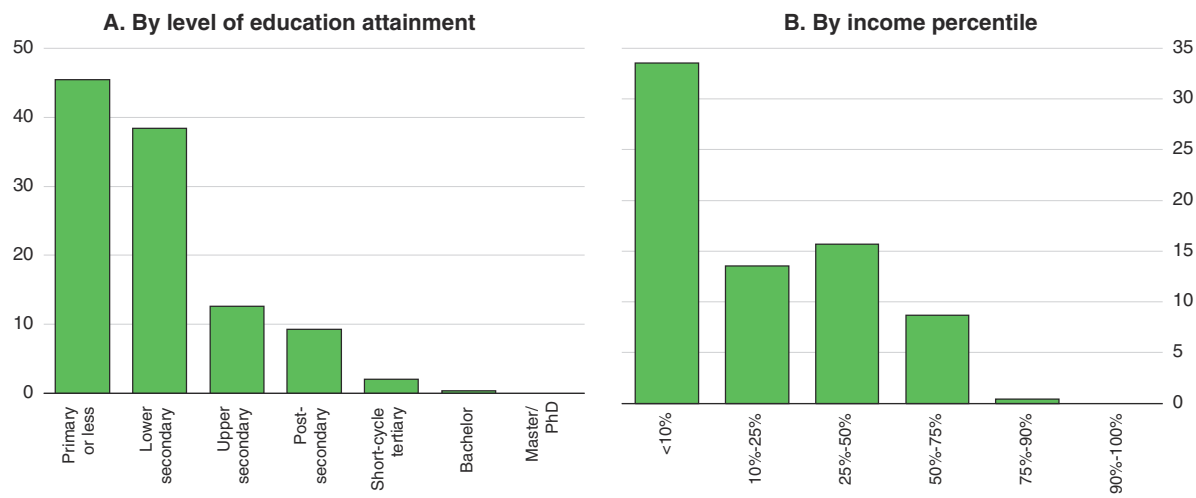
1. Jobs are at risk of being automated if at least 50% of their tasks are automatable.
2. Data correspond to 2012 for countries participating in the first round of the Survey of Adult Skills: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden, United States and United Kingdom. Data correspond to 2015 for countries participating in the second round of the Survey of Adult Skills: Chile, Greece, Israel, New Zealand, Slovenia and Turkey.
3. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2012, 2015); M. Arntz et al. (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, *http://dx.doi.org/10.1787/5jlz9h56dvq7-en*.

StatLink http://dx.doi.org/10.1787/888933497340

Figure 25. **Share of NZ workers with high automation potential by education attainment and income level**

Share of workers in jobs at high risk of automation,[1] 2015



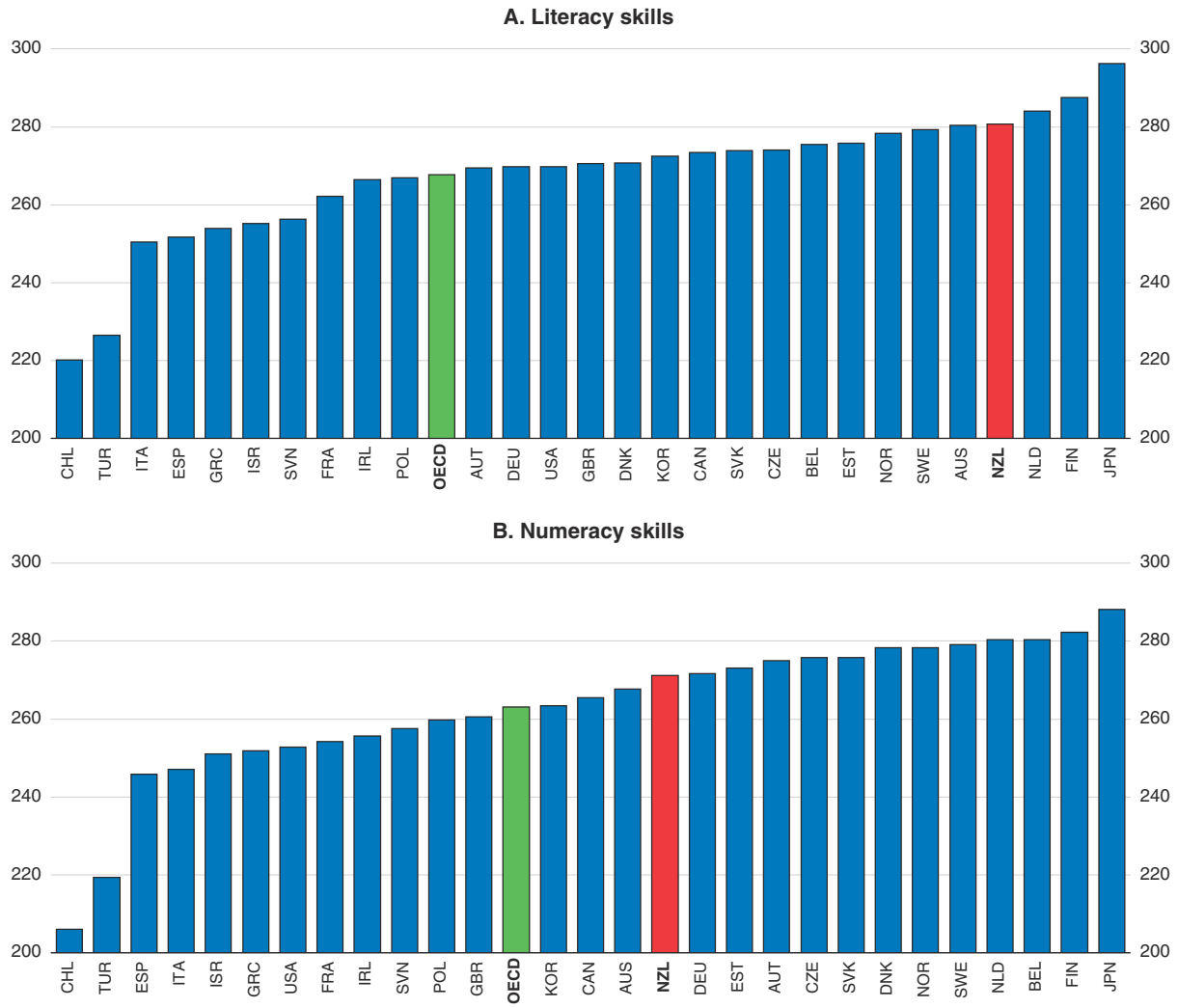
1. Workers are at high risk of automation if at least 70% of their tasks are automatable.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2015); M. Arntz et al. (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, *http://dx.doi.org/10.1787/5jlz9h56dvq7-en*.

StatLink http://dx.doi.org/10.1787/888933497358

Figure 26. **Information-processing skills**

2012 or 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 24. Data indicated as Belgium correspond to Flanders; the United Kingdom is an average of England and Northern Ireland.

Source: OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

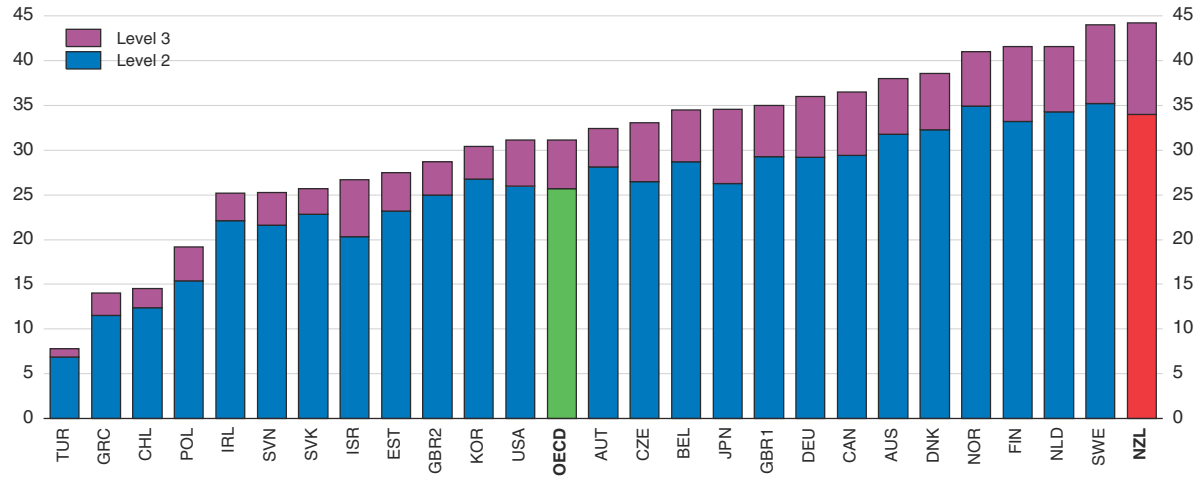
StatLink http://dx.doi.org/10.1787/888933497364

above the OECD average, it had declined markedly since the earlier years (Figure 28), and in the TIMSS study mathematics achievement is below average (Mullis et al., 2016). The decline reflects an increased share of low performers and a reduced share of high performers (Figure 29). It is not clear why these changes have occurred. Possible explanatory factors include significant changes in the curriculum and qualifications framework, changes in teacher training and development and other factors affecting teaching and learning, such as increases in the use of ability grouping.

Māori and Pasifika achievement remains below that of the rest of the population (Figures 28 and 30), and the influence of socio-economic background on outcomes remains higher than in many countries (Figure 31). A cornerstone of successive NZ governments' strategies for accelerating the progress of Māori and Pasifika students and of those from low socio-economic backgrounds is to ensure that all pre-school children have access to

Figure 27. **Proficiency in problem solving in technology-rich environments among adults**

Percentage of 16-65 year-olds scoring at each proficiency level, 2012 or 2015[1]

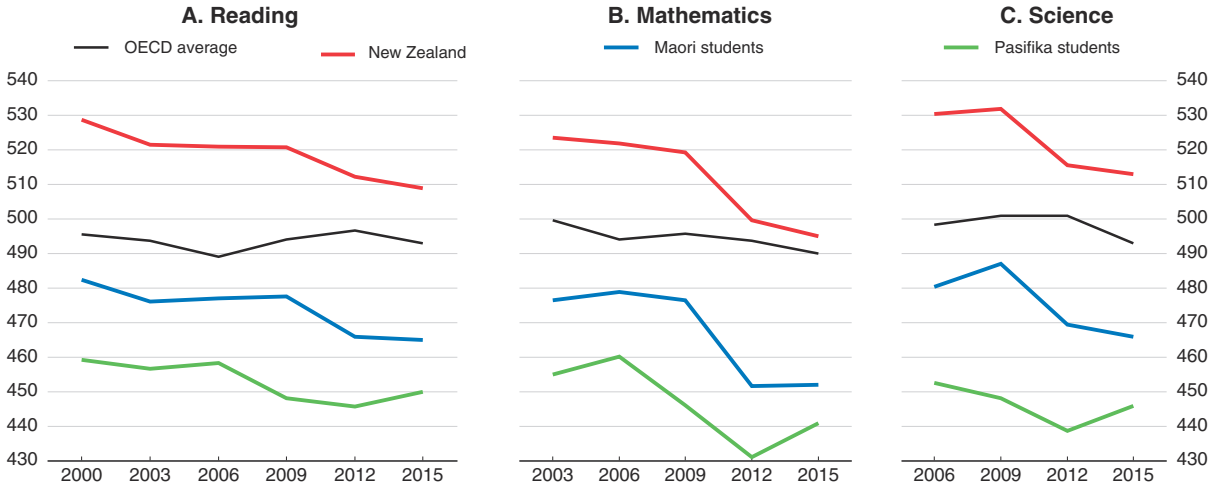


1. For the exact year of reference of the data, see footnote 2 in Figure 24. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, Table A2.6; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497372

Figure 28. **New Zealand's average PISA scores have fallen**



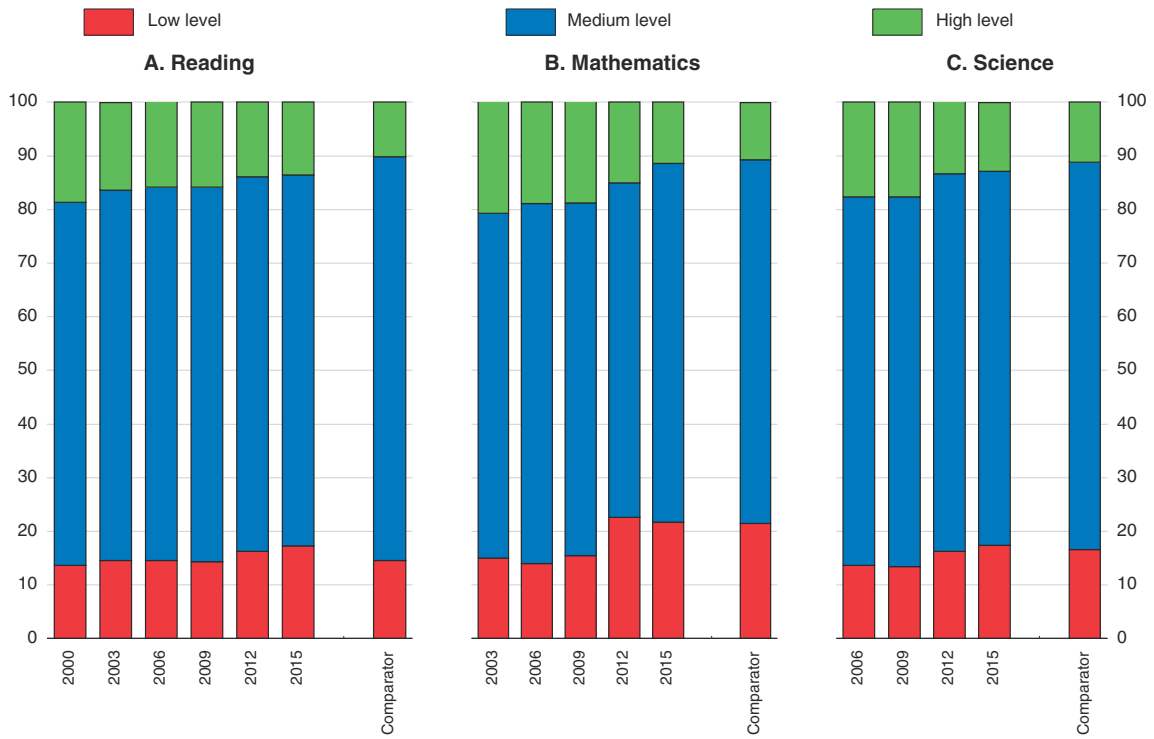
Source: OECD, *PISA Results*, various years; S. May, J. Flockton and S. Kirkham (2016), *PISA 2015 – New Zealand Summary Report*, Ministry of Education.

StatLink http://dx.doi.org/10.1787/888933497384

high-quality early childhood education. Progress has been made in reducing non-participation rates for Pasifika and Māori children, from 24% and 17%, respectively, in 2000 to 9% and 6% in 2016. As discussed in the last *Survey*, the government needs to monitor outcomes for disadvantaged children and, if necessary, move to ensure that increased participation is delivering improved educational outcomes for them (Table 11). There have also been improvements in the rates of students, including Māori and Pasifika, obtaining National Certificate of Educational Achievement (NCEA) Level 2 or above qualifications (NCEA Level 2 qualifications are considered to be the minimum necessary to give people reasonable opportunities in terms of further education and employment).

Figure 29. **Percentage of students at each proficiency level**[1]

Trends in New Zealand over time and 2015 comparison with the average of countries with similar performance[2]

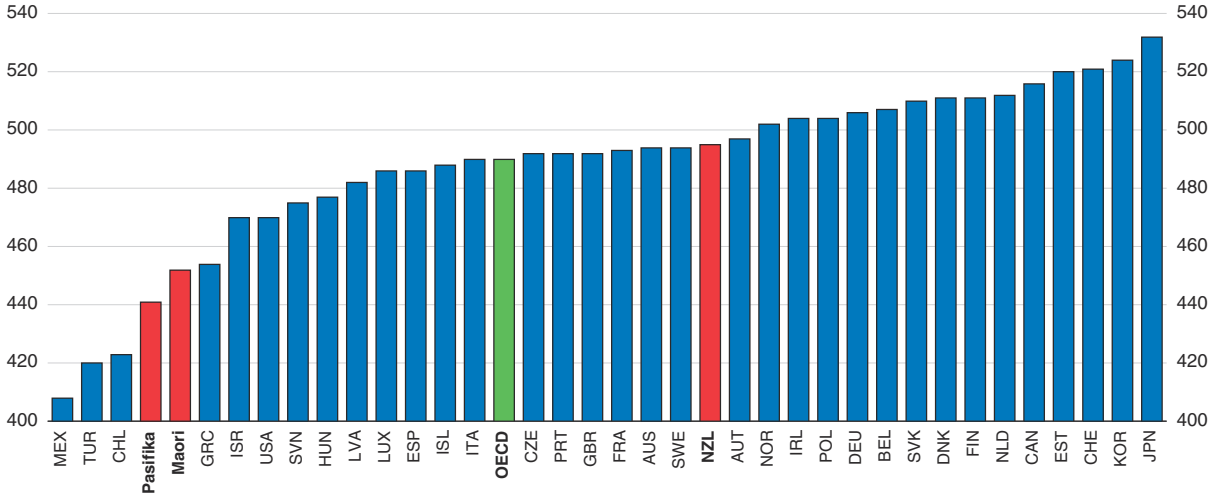


1. Low level is defined as the combination of below level 1/1b, level 1b/1a/1; medium level as the sum of level 2, level 3 and level 4; and high level as level 5 plus level 6.
2. Countries for which scores are not significantly different from New Zealand's are: for reading, Germany, Japan, Korea, Macao (China), Netherlands, Norway, Poland and Slovenia; for mathematics, Australia, Austria, Czech Republic, France, Portugal, Russian Federation, Sweden, United Kingdom and Viet Nam; and for science, Australia, Germany, Korea, Netherlands, Slovenia, United Kingdom and Beijing-Shanghai-Jiangsu-Guangdong (China).

Source: OECD, *PISA Results*, various years.

StatLink http://dx.doi.org/10.1787/888933497395

Figure 30. **PISA performance in mathematics, 2015**

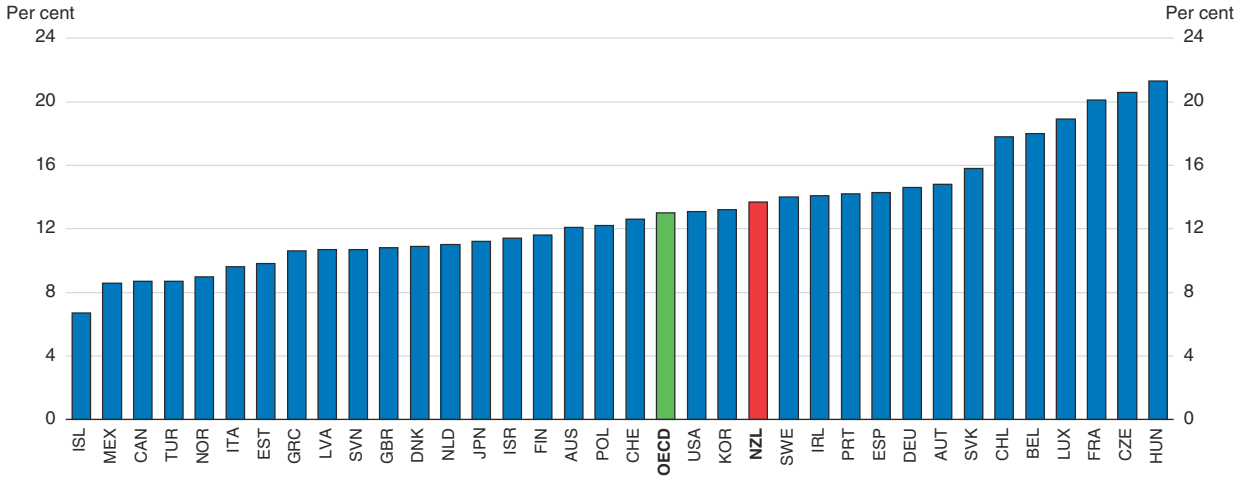


Source: OECD (2016), *PISA 2015 Results: Excellence and Equity in Education*, Annex B1, Chapter 5; S. May, J. Flockton and S. Kirkham (2016), *PISA 2015 – New Zealand Summary Report*, Ministry of Education.

StatLink http://dx.doi.org/10.1787/888933497403

Figure 31. **Influence of socio-economic background on PISA scores in mathematics**

Variation in student performance explained by socio-economic background,[1] 2015



1. PISA index of economic, social and cultural status.

Source: OECD (2016), *PISA 2015 Results: Excellence and Equity in Education*, Vol. I, Table I.6.3c.

StatLink http://dx.doi.org/10.1787/888933497411

Table 11. **Past OECD recommendations on adapting to the changing labour market**

Recommendations in previous *Surveys*	Action taken since previous *Survey* (June 2015)
Meet the 98% participation target for early childhood education. Ensure that the education provided is of high quality, includes programmes to enhance the involvement of parents and focuses more on the outcomes of children from disadvantaged backgrounds.	The 2016 target will largely be achieved: the early childhood education participation rate was 96.7% for the 12 months to September 2016. The number of children not attending early childhood education is now fewer than 800 short of the 98% target. The national early childhood curriculum, Te Whāriki, has been updated to better reflect developments in educational thinking and practice. The Ministry of Education is engaging with the families of the hardest-to-reach children, with a specific focus on raising participation in early childhood education for Māori, Pasifika and low socio-economic communities, particularly for three and four year-old children.
Boost financial support to recruit and retain effective teachers and school leaders for schools with high concentrations of children at risk of under-achievement.	An additional NZD 359 million is being invested over four years (from 2014/15, and an on-going NZD 155 million per year) to establish Communities of Learning | Kāhui Ako, a Teacher-Led Innovation Fund, and a Principal Recruitment Allowance. Communities of Learning | Kāhui Ako are intended to bring schools and other education providers together to: identify shared achievement challenges; draw on new teaching and leadership roles to lift teaching effectiveness in response to these challenges; and build more coherent student pathways through the education system. Leadership and teaching roles within Communities of Learning receive an additional allowance. The Principal Recruitment Allowance provides for an allowance to support the recruitment of highly effective principals to the most high-need schools.
Continue to make education more job relevant by: i) provision of better information to students about labour market outcomes to enable them to make study choices via high-quality and relevant professional careers counselling at secondary and tertiary levels; and ii) increasing transparency and accountability in the system about programme quality and outcomes (completion rates; employment outcomes).	There has been a greater focus on better information provision to assist learners with their study choices. MBIE's "Occupation Outlook" internet site and mobile app provides information about market prospects in different fields. Provider-level employment outcomes are being published. The government is proposing to transfer Careers New Zealand's functions into the Tertiary Education Commission to improve the provision of careers information.
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 government has raised the number of student places in engineering in tertiary institutions and increased the tuition subsidy.
Consider boosting practical training components within engineering degrees through support for tertiary education institutions located near engineering clusters.	The Engineering e2e (education to employment) programme was established to achieve the official target of an additional 500 engineering graduates annually. It brings together engineering employers and institutes of technology and polytechnics, supported by the Tertiary Education Commission.

Raising teaching effectiveness is the most important lever for enhancing learning (OECD, 2015b; Schleicher, 2016). A range of initiatives is underway to improve teaching quality, including the creation of communities of learning in 2014. These are intended to enhance collaboration and improve teaching and leadership expertise in New Zealand's highly devolved school system. These communities of learning should help to ease achievement problems by enhancing primary school teachers' pedagogical capabilities and confidence in mathematics teaching.

To lift outcomes in the long term, a systemic approach is necessary to improve the effectiveness of mathematics teaching in primary and intermediate schools. Key elements of such an approach include: raising initial teacher education quality and entry standards (current minimum entry standards for teaching programmes are relatively low); supporting professional learning and development that lifts the capability of the current workforce to teach mathematics; and supporting school leaders to lead a collaborative, data- and evidence-informed teaching culture that emphasises all aspects of the mathematics curriculum.

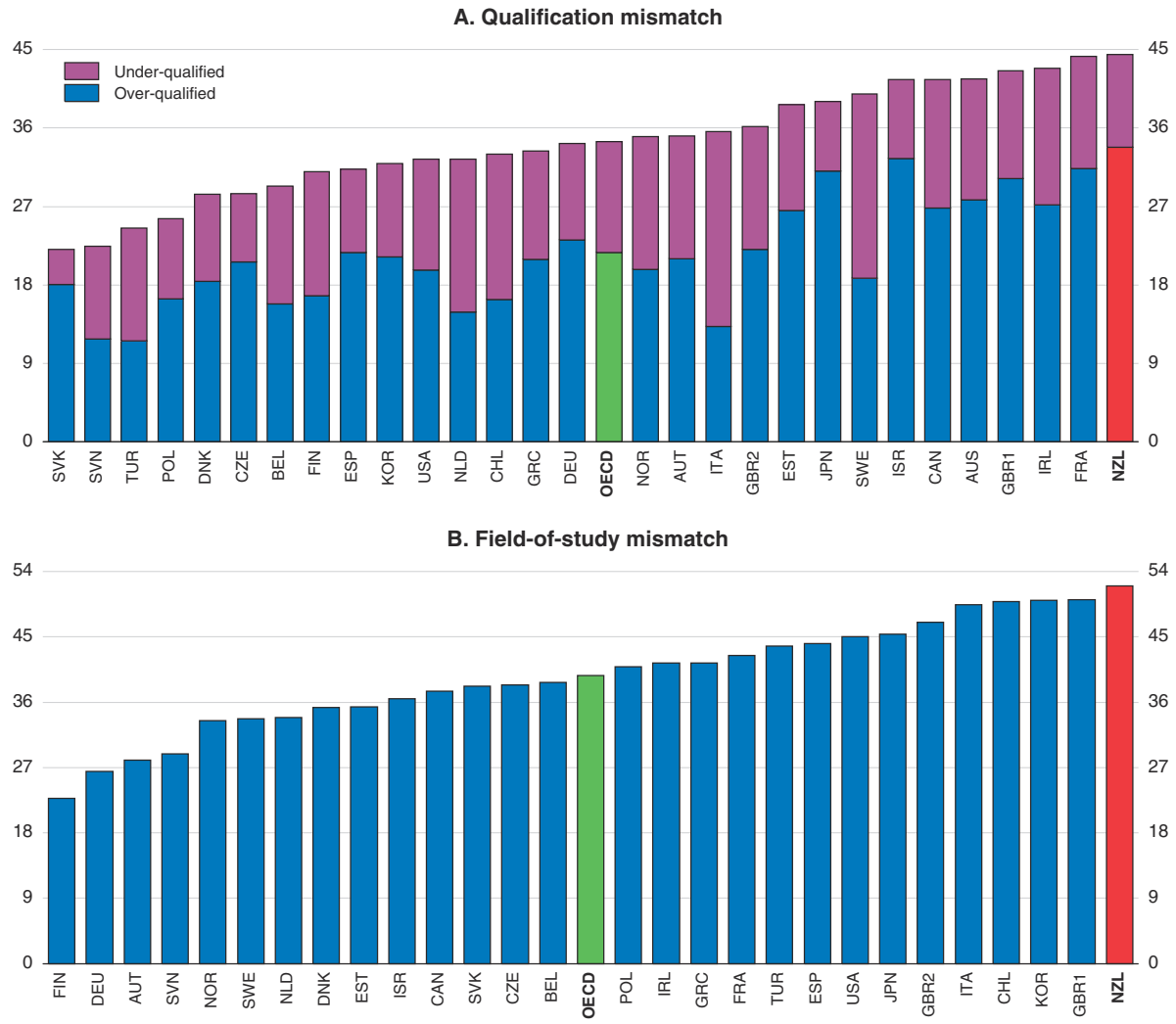
Options should also be explored to ensure that every pathway through the schooling system enables students to gain at least the minimum skill level needed to support further study and labour market participation in higher-skilled occupations. One of the unintended consequences of a highly devolved education system may be that it is less likely to consistently deliver a core set of skills to each student. In this respect, options should be investigated to reduce over-reliance on same ability grouping (i.e. the streaming of students for all classes, some subjects, or different forms of a subject) and variability in students' levels of exposure to the mathematics curriculum. This could include reviewing minimum numeracy requirements for school qualifications and the minimum education required by all school leavers as well as examining options for schools to access guidance and professional learning and development on the effective use of mixed ability grouping strategies.

Adapting to technical change entails not just acquiring higher levels of education and skills, but obtaining those that are in demand in the labour market. New Zealand appears to have some problems in this regard. As noted above, skills shortages are relatively widespread. Moreover, qualifications and field-of-study mismatches, which occur when workers have qualifications that are greater or less than required for their jobs or in a different field, are more common than for any other participant in the PIAAC study (Figure 32). As in other countries, most qualifications mismatch is over-qualification. According to econometric evidence presented in OECD (2016f), workers employed in small firms or part time are more likely to be overqualified than workers in large firms or employed full time, with the effect being particularly strong for small-firm employment. Given the preponderance of employment in small firms in New Zealand, small-firm employment appears to be the major factor accounting for its relatively high rate of over-qualification, followed by part-time work, which is also more prevalent in New Zealand than in most other countries. OECD (2016f) also found that part-time employees are more likely to be field-of-study mismatched in New Zealand than full-time employees, but that small-firm employment is not a significant explanatory factor of field mismatch.

Most overqualified workers are also field-of-study mismatched. Sometimes, workers who are field-of-study mismatched hold qualifications in fields where the labour market is relatively oversupplied, obliging them to settle for a job outside their field of study that requires a lower qualification than they hold (Montt, 2015). In New Zealand, such mismatch could also be attributable to the low level of specialisation in a small labour market.

Figure 32. **Qualifications and field-of-study mismatch**[1]

Percentage of mismatched workers, by type of mismatch, 2012 and 2015[2]



1. Qualifications mismatch occurs when a worker has a higher or lower level of qualification than is required for his/her job. Field-of-study mismatch occurs when a worker has a qualification in a different field than required for his/her job.
2. For the exact year of reference of the data, see footnote 2 in Figure 24. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, Figure 5.7; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497420

Overqualified workers in New Zealand earn 14% less than their well-matched counterparts with the same qualifications and skills proficiency, the same hourly earnings penalty as the average for OECD countries (OECD, 2016f). Once qualification mismatch is taken into account, field-of-study mismatch does not have an additional earnings penalty, in contrast to the OECD average result.

While New Zealand is always likely to have a high incidence of overqualified workers owing to its small size and the preponderance of employment in very small firms, steps could be taken to reduce such mismatch. Given that most over-qualified workers are also field mismatched, reducing field mismatches could help to reduce over-qualification

mismatches. Relative to the OECD average, New Zealand's mismatches are particularly high in "teacher training and education science" and in "humanities, languages and arts" and are especially low in "agriculture and veterinary" (Table 12). This could be a sign that, relative to other countries, too many workers in New Zealand have qualifications in the former two fields and not enough in the latter in relation to labour market demand. The fact that in New Zealand the overall mismatch rate (52.0%), which is a weighted average of field mismatches, is close to the simple average of field mismatches (52.7%), whereas the overall mismatch rate for the OECD average (41.9%) is well below the simple average of field mismatches (48.2%) indicates that the distribution of workers across fields in New Zealand is more weighted towards those with high mismatch rates than in other countries.

Table 12. **Prevalence of field-of-study mismatch by field**

	Field-of-study mismatch by field of study, per cent								
	Overall rate	Teacher training and education science	Humanities, languages and arts	Social sciences, business and law	Science, mathematics and computing	Engineering, manufacturing and construction	Agriculture and veterinary	Health and welfare	Services
New Zealand	**52.0**	**56.3**	**90.7**	**27.3**	**79.5**	**36.2**	**55.8**	**32.8**	**43.9**
England (UK)	50.1	40.6	87.3	27.3	76.7	37.5	83.4	24.7	57.9
Korea	50.1	33.7	72.9	26.3	84.0	44.1	85.9	39.4	22.9
Chile	49.9	40.9	83.6	22.0	73.9	41.7	39.9	43.4	42.7
Italy	49.4	48.2	75.6	18.8	76.9	34.0	82.2	25.1	47.3
Northern Ireland (UK)	47.0	40.5	87.4	20.3	74.5	41.6	90.7	22.3	63.1
Japan	45.3	72.1	85.8	27.0	59.5	38.2	79.6	24.1	32.1
United States	45.0	49.7	73.6	24.5	71.7	33.2	71.4	35.1	46.1
Spain	44.1	40.1	80.7	26.8	71.3	37.6	43.2	30.4	35.1
Turkey	43.8	24.3	76.4	33.6	80.8	41.5	48.8	32.6	40.5
France	42.5	37.6	68.5	25.6	72.9	35.9	64.6	35.0	40.9
Country average	**41.9**	**46.3**	**76.5**	**23.5**	**71.2**	**34.4**	**70.9**	**30.5**	**38.6**
Greece	41.4	36.1	75.0	16.8	68.6	44.4	78.1	37.8	16.6
Ireland	41.4	29.1	76.5	23.1	79.5	31.0	83.1	28.6	34.3
Poland	40.9	38.2	65.6	19.0	79.6	34.4	65.6	24.8	47.0
Flanders (Belgium)	38.7	28.5	76.3	20.8	68.1	32.1	90.2	31.1	25.1
Czech Republic	38.3	35.9	77.9	22.5	69.7	32.2	77.4	39.4	52.2
Slovak Republic	38.2	26.9	80.1	21.0	66.0	28.3	84.1	22.8	36.3
Canada	37.5	30.0	77.1	19.2	62.6	26.0	57.3	32.2	41.3
Israel	36.5	34.9	69.2	23.6	46.0	35.7	55.9	30.2	60.0
Estonia	35.3	30.9	61.5	23.7	47.5	32.4	75.8	23.5	40.7
Denmark	35.2	40.0	71.7	19.9	51.0	29.0	63.7	19.8	41.8
Netherlands	33.9	30.0	72.7	17.4	59.1	39.2	69.4	32.6	37.1
Sweden	33.7	27.7	71.1	30.8	54.7	30.6	64.9	23.8	27.2
Norway	33.5	21.6	71.0	19.6	66.1	35.2	91.9	21.7	27.4
Slovenia	28.8	19.2	44.3	20.0	51.6	29.6	63.9	16.3	32.8
Austria	28.0	25.9	60.8	21.8	49.3	28.6	76.5	14.7	25.6
Germany	26.4	31.9	55.6	17.4	51.6	29.2	54.5	23.2	18.0
Finland	22.8	31.2	52.7	16.7	41.5	21.1	55.0	14.7	18.1

Source: OECD calculations based on the Survey of Adult Skills, PIAAC (2012 and 2015).

Field mismatches could be lower if more NZ students sought qualifications in less crowded fields, where job prospects are better. The government has recently created several Internet sites (e.g. Compare Study Options) to help students become better informed about

labour market prospects in different fields of study, although this information would be more accessible if the sites were consolidated (NZPC, 2017b). These services need to be complemented by better careers education and guidance in schools that enables students to develop the skills and knowledge necessary to make good choices about their study options and careers pathways (NZPC, 2017b). Following a comprehensive review, the government is proposing to transfer Careers New Zealand's functions into the Tertiary Education Commission to exploit its ability to work with tertiary providers and employers so that they can provide better careers information to schools regarding the skills needs of the labour market. In this context, the authorities are also exploring how to make it easier to share careers resources and expertise across schools and Communities of Learning.

It may also be worth reviewing New Zealand's career-focused education, as is happening in many other countries, to ensure that it is in tune with the changing labour-market demands resulting from digitalisation. In the United States, for example, the manufacturing sector requires many more workers who know how to use robotics equipment and can navigate across a variety of technologies than are in the education pipeline (Giffi et al., 2015). To help to bridge these skills gaps, career-focused education is being developed. An example is the six-year high school-community college programme founded by IBM in 2011 in which 300 partner companies work with 60 local schools to shape curricula that will educate students up to a two-year associate's degree. More generally, having the skills to work with new technologies is likely to be critical to access good jobs. Increasingly, students will need to graduate with a mix of soft skills, such as problem solving and communication, and basic technical skills such as technology and mathematics.

People need to acquire new skills throughout their working lives to meet evolving labour market needs. New Zealand has the highest adult participation rate (aged 25-64) in formal and non-formal education among the countries that participated in the PIAAC study, reflecting high participation in both the formal and non-formal components (OECD, 2016e). Moreover, the gap between the high participation rates of those with high education attainment, information-processing skills and frequency of skill use and those with the opposite characteristics is smaller than in most other countries. Factors that contribute to high participation in formal education include open access to tertiary education for those aged over 20, highly subsidised courses, student support (loans and income-tested allowances) and low income tax rates, which boost after-tax returns on education investments.

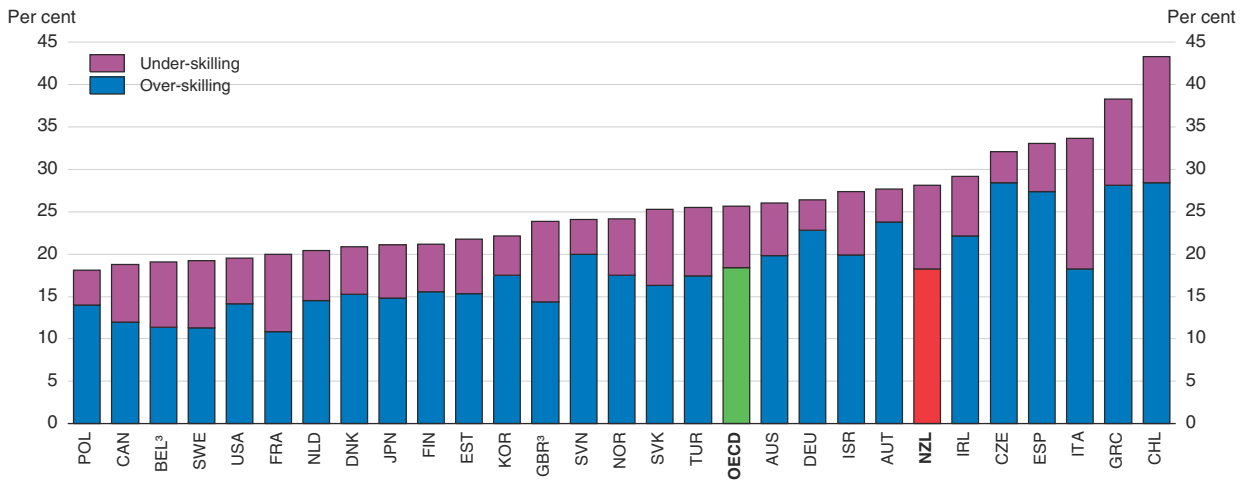
However, the provision of training is uneven across different professions, with those in lower skilled jobs less likely to receive learning and development opportunities. Employers (particularly of lower-skilled workers) may underinvest in training that builds transferable skills for fear that their employees leave before training investments have been amortised. This problem is likely to be more so in small firms, which have smaller internal labour markets, are more credit constrained and less well-managed than larger companies. If such training investments enhance workers' labour-market prospects, the government will benefit through lower social benefit costs and higher tax revenues. In these circumstances, there may be a role for government subsidies or regulatory interventions to increase such investments towards the socially optimal level. This will be all the more so if faster rates of technical change result in more people having to upgrade skills to remain in employment. Among best practices for such incentives, OECD (2017a) recommends that they should minimise administrative burdens, focus on the least skilled and SMEs (to minimise deadweight losses), be flexible, result in certified learning outcomes and be regularly monitored and evaluated.

Reducing skills mismatches could increase productivity and wages

Literacy skills mismatches in New Zealand also exceed the OECD average (Figure 33). This reflects higher levels of under-skilling. Adalet McGowan and Andrews (2017), find, for example, that reducing literacy skills mismatch in New Zealand to the best practice level could raise labour productivity by 7% (Figure 34). Most NZ public policies affecting skills mismatch that were examined by Adalet McGowan and Andrews are near best practice, but housing is a notable exception (Figure 35). The biggest problem is that housing supply does not react much to shortages (Andrews et al., 2011), which has had a clear impact on house prices in recent years, making it more difficult for workers to move to a better matched job where they would be more productive. If responsiveness were increased to best practice levels (found on average in the United States), NZ labour productivity could rise by 2¼ per cent as a result of reduced mismatches (Figure 35). As discussed above, these problems mainly reflect restrictive land-use policies and inadequate infrastructure provision.

Figure 33. **Percentage of workers with literacy skills mismatch**[1]

2012 and 2015[2]



1. The figure shows the percentage of workers who are either over- or under- skilled, for a sample of 11 market industries: manufacturing; electricity, gas, steam and air conditioning supply; water supply; construction; wholesale and retail trade; transportation and storage; accommodation and food service activities; information and communication; real estate activities; professional, scientific and technical activities, and administrative and support service activities. In order to abstract from differences in industrial structures across countries, the 1-digit industry level mismatch indicators are aggregated using a common set of weights based on industry employment shares for the United States. Skills mismatch occurs when a worker's skills are higher than the 90th percentile or lower than the 10th percentile of workers with self-reported well-matched skills.
2. For the exact year of reference, see footnote 2 in Figure 24.
3. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

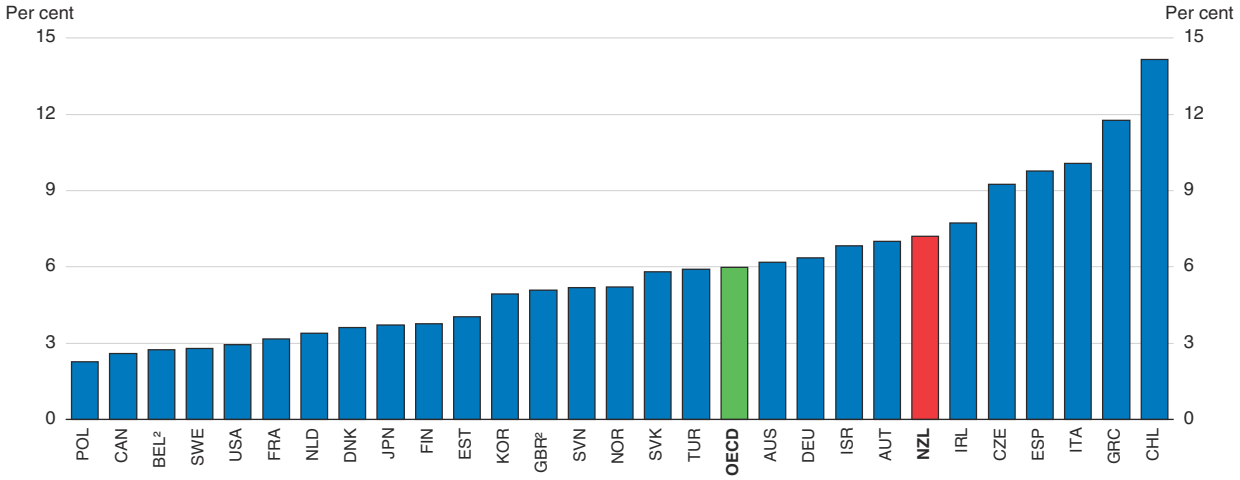
StatLink *http://dx.doi.org/10.1787/888933497430*

Greater support for displaced workers could reduce lay-off costs they face

More rapid technological change also increases the risk of workers being displaced, although there is no strong evidence of such effects in New Zealand having become greater than in the past. In New Zealand, the stock of displaced workers (i.e., those who report being displaced due to structural and technical change) is about 1.1% of the total workforce, which is comparable to the scale in other OECD countries but higher than the pre-global financial crisis level (OECD, 2017b). However, the re-employment rate after two years is high (84%),

Figure 34. **Counterfactual productivity gains from reducing skills mismatch**[1]

Simulated gains to allocative efficiency from lowering skills mismatch to the best practice



1. The chart shows the difference between the actual allocative efficiency and a counterfactual allocative efficiency based on lowering the skills mismatch in each country to the best practice. 1-digit industry level mismatch indicators are aggregated using a common set of weights based on the industry employment shares for the United States. The estimated coefficient of impact of mismatch on productivity is based on a sample of 19 countries for which both firm level productivity and mismatch data are available. The estimated gains to allocative efficiency for the other countries should be interpreted with caution to the extent that they are not included in the econometric analysis due to insufficient productivity data.
2. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

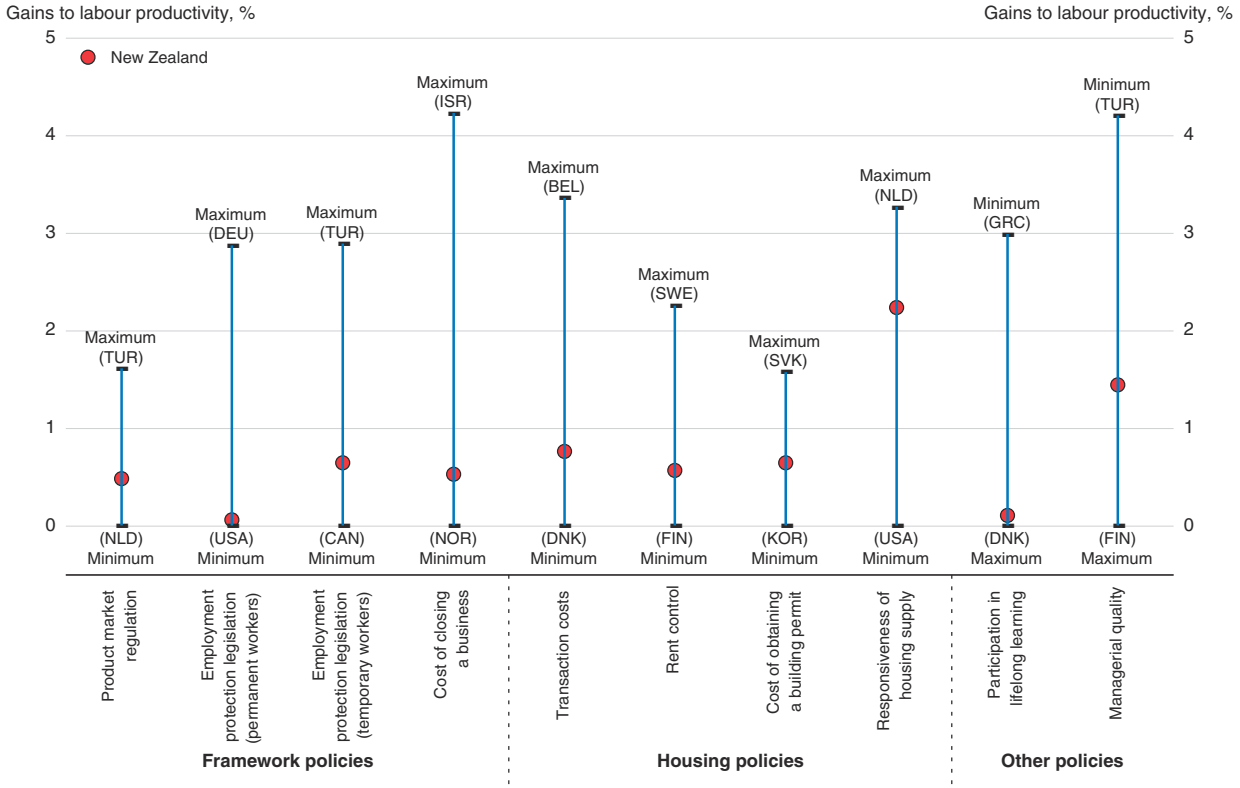
Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497444

on a par with rates in the Nordic countries and higher than in many other OECD countries – concomitantly, only 0.18% of the workforce are displaced workers who have not been re-employed after two years.

Although small in proportion to the overall workforce, the effects of displacement may be significant for some households. Displaced workers and their families in New Zealand bear the bulk of costs of being laid off. Notice periods are short by international comparison, reducing costs for employers but giving displaced workers little time to find a new job while still employed. Only around one half of displaced workers in New Zealand receive redundancy pay, with an average payment equal to 34 weeks of wages (Dixon and Maré, 2013; OECD 2017b). This level and coverage of redundancy pay are comparable to those in other OECD countries but may lead to inequalities between workers as arrangements tend to be less favourable for low-skilled workers than for high-skilled workers. The biggest difference in comparison with most other countries is that there is no public unemployment insurance. Instead, New Zealand has a means-tested unemployment benefit, which few (30%) displaced workers receive because most have household incomes that are too high (usually because they have a working partner). For those who do qualify for the benefit, net replacement rates initially tend to be below the OECD average but are higher after long periods of unemployment, when the unemployed in most other countries are no longer eligible for insurance benefits and instead receive lower (means-tested) social assistance benefits; for example, for a single-earner couple with two children previously earning the average wage the net replacement rate in New Zealand is 58% compared with an OECD average that is initially 69% but falls to 55% for the long-term unemployed (OECD Tax-Benefit model). Moreover, the authorities generally do not assist displaced workers to find a new job unless

Figure 35. **Estimated gains to labour productivity from adopting best-practice policies to reduce skills mismatch**[1]



1. The red circle is the probability to have mismatch evaluated at the level of the policy in New Zealand and individual characteristics, which include age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector. The distance between the minimum/maximum and the red circle is the change in the probability of skills mismatch associated with the respective policy change. Estimates are based on logit regressions of probability of mismatch controlling for age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector and OLS regressions of labour productivity on skills mismatch.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497450

they are eligible for social welfare benefits. With the exception of redundancy pay arrangements, which are comparable to those in other countries, all of these factors contribute to displaced workers incurring larger earnings losses when re-employed than in most other countries (OECD, 2017b). These factors may also contribute to the poor job matching observed in the labour market despite flexible labour market regulations, which improve matching.

A solution to reduce the burden on displaced workers would be to introduce public unemployment insurance, as in all other OECD countries except Australia and Mexico (excluding Mexico city, which has unemployment insurance), and expand the coverage of active labour market policies to those qualifying for unemployment insurance benefits to help this group to transition quickly to good (well-matched) new jobs. In most cases, this would just entail expanding the coverage of public employment services, such as enforcing job-search obligations, counselling and providing labour exchanges. In some cases, where individuals have greater difficulty finding a new job, it might entail active labour market programmes, such as training schemes or short-term employment subsidies. Such

arrangements would help displaced workers search for better job matches than currently, both by giving them the wherewithal to prolong search to find a better job and providing them with services that facilitate job search and, where necessary, enhance their skills and employability, thereby reducing their earnings losses in re-employment. They would also preserve the advantages of flexible labour market regulations. As in other countries, unemployment insurance entitlements (to income-related benefits) would only be for a limited period for people with the necessary contributions record, after which time the unemployed would fall back on the current means-tested benefit. Careful study would be required before embarking on such a reform to ensure that its design enhances social well-being. Ideally, unemployment insurance should be experience rated, so that it does not subsidise employers and industries with high lay-off rates at the expense of others.

If a public unemployment insurance scheme cannot be introduced in New Zealand, the next best solution to ease the financial burden on displaced workers and help them to transition to better jobs would be to introduce a minimum statutory notice period and mandatory notification of redundancies, as recommended in OECD (2017b). These reforms would reduce the loss of earnings for displaced workers and give them more time to search for a job while still in work, when they can benefit more from their professional network and avoid the stigma sometimes associated with unemployment. Work and Income, New Zealand's public employment service, would also have more time to organise support. At the same time, Work and Income's objectives could be expanded to include helping displaced workers not eligible for welfare benefits transition to a new job; under the current investment approach, Work and Income has no incentive to help such workers find a new job as this does not reduce benefit expenditures. The major drawback of mandatory notice periods is that they could reduce labour market turnover, which would adversely affect skill matching in the labour market. Careful study would be required before embarking on such a reform to ensure that it delivers more benefits than costs. Improving careers advice and training guidance for adult workers, which is limited, and recognition of skills acquired on the job would also improve job-to-job transitions.

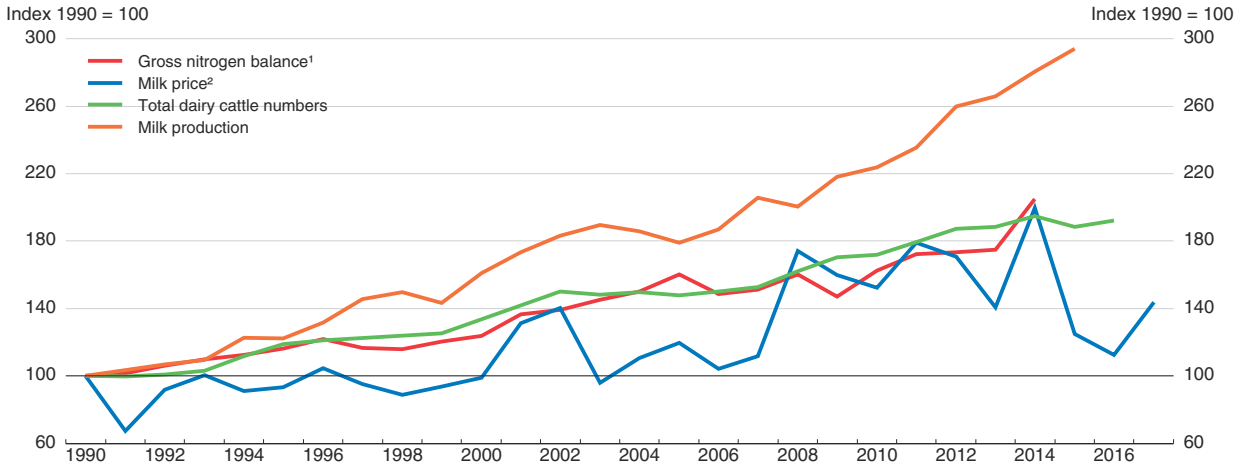
Making growth more environmentally sustainable

Economic and population growth has led to environmental degradation and will continue to do so in the absence of policy development that systematically integrates environmental objectives and strong policy measures to protect the environment. Expansion of primary production, in particular dairy farming, has increased freshwater contamination, greenhouse gas emissions and threats to biodiversity. Initiatives that drive large increases in production, such as the goal to double real primary industry exports between 2012 and 2025 and government grants and concessional financing for irrigation projects, are potentially in conflict with the need to maintain and improve the quality of the environment. To decouple growth in primary production from natural resource depletion, it will be important to ensure environmental limits are clear, to make producers pay for the environmental damage they cause and for New Zealand to continue to lead international research efforts to find solutions that mitigate greenhouse gas emissions and water pollution from agriculture. Currently nearly 10% of government research spending targets environmental research, the highest share in the OECD (OECD, 2017c). High rates of population growth are also placing pressure on the environment, particularly in urban areas where additional sewerage and storm-water infrastructure is needed to reduce overflows of untreated water into watercourses and harbours.

Addressing water quality and quantity challenges

As discussed in past *Surveys*, New Zealand faces increasing water-quality challenges from diffuse sources of pollution. The biggest problems relate to nutrients, pathogens and sediments (OECD, 2017c). The Resource Management Act has not been effective at dealing with diffuse-source pollution: the increase in the nitrogen balance per hectare was the worst in the OECD over the two decades to 2014 (OECD, 2017d) primarily due to expansion of intensive dairy farming (Figure 36). While New Zealand has an abundance of fresh water overall, water scarcity is an increasing concern in key agricultural areas. Water is not always consumed, or available, in its highest value use (economic, social and environmental) primarily due to over-allocation in some regions, a "first-in, first-served" approach to issuing resource consents for water abstractions and preferences for renewal of existing water resource consents.

Figure 36. **Growth of nitrogen balances and milk production in New Zealand**



1. Kg of nitrogen per hectare of total agricultural land. The gross nitrogen balance calculates the difference between the nitrogen inputs entering a farming system (i.e. mainly livestock manure and fertilisers) and the nitrogen outputs leaving the system (i.e. the uptake of nitrogen for crop and pasture production).
2. Producer price at farm gate. Data refer to the year ending in May. From 2015, the OECD series is extended based on the Fonterra farm-gate milk price.

Source: OECD/Eurostat Agri-Environmental Indicators Database; OECD Aglink Database, *www.agri-outlook.org*; Statistics New Zealand; UK-Milk Development Council – LTO NEDERLAND.

StatLink http://dx.doi.org/10.1787/888933497460

The National Policy Statement on Freshwater Management is an important instrument to address water-quality and -quantity challenges. It requires that overall freshwater quality within a region be maintained or improved, existing over-allocation phased out and further over-allocation avoided. The Clean Water Package 2017 builds on the National Policy Statement by proposing a target that 90% of rivers and lakes be swimmable by 2040, stock be excluded from waterways by 2030 and the creation of NZD 100 million freshwater improvement fund. Regional councils are likely to need additional support to manage water within ambitious quality and quantity limits and to implement effective collaborative governance (OECD, 2017c). As recommended in past *Surveys* (Table 13) and the recent *OECD Environmental Performance Review of New Zealand* (OECD, 2017c), the use of economic instruments such as pricing and permit trading should be expanded (subject to resolving iwi/Māori rights), as that is the most efficient way to ensure that scarce resources are allocated

Table 13. **Past OECD recommendations on making growth more environmentally sustainable**

Recommendations in previous *Surveys*	Action taken since previous *Survey* (June 2015)
Improve the measurement of water abstraction and quality via evolving national guidelines. Continue to encourage the development of market-based mechanisms where possible to manage the supply and quality of fresh water. Allow water consents to be tradable.	The National Policy Statement on Freshwater Management directs all regional councils to set objectives for, limits on, and introduce methods to achieve desired water quality and quantity outcomes in all water bodies by 2025 or 2030 at the latest. Under the Policy Statement, Councils are required to identify methods to encourage efficient use of water. The introduction of new national water metering regulations also ensured the measurement and reporting of significant water consumption.
Improve horizontal and vertical co-ordination of sustainable development policy. Central government should set national environmental standards and provide national policy statements and technical training for local authorities.	Collaboration across government agencies has improved through the work of the Natural Resources Sector but there remains a lack of institutional coordination on aquaculture, fisheries, marine biodiversity and urban development.
Strengthen price signals within the Emissions Trading Scheme by phasing out transitional arrangements that halve the number of emission permits (and hence their price) needed by emitters and allow free allocations to emissions-intensive, trade-exposed activities.	The one-for-two arrangement is being gradually phased out.
Develop a strategy to cut agricultural emissions of greenhouse gases efficiently through a combination of pricing, regulation and R&D.	The third review of the Emissions Trading Scheme, launched in 2015, did not consider bringing biological emissions back within the scheme. In September 2016 the government announced the establishment of the Biological Emissions Reference Group to study the matter. The government has commissioned a study from the Productivity Commission on how New Zealand can maximise the opportunities and minimise the costs and risks of transitioning to a lower carbon economy. The report is due by June 2018.

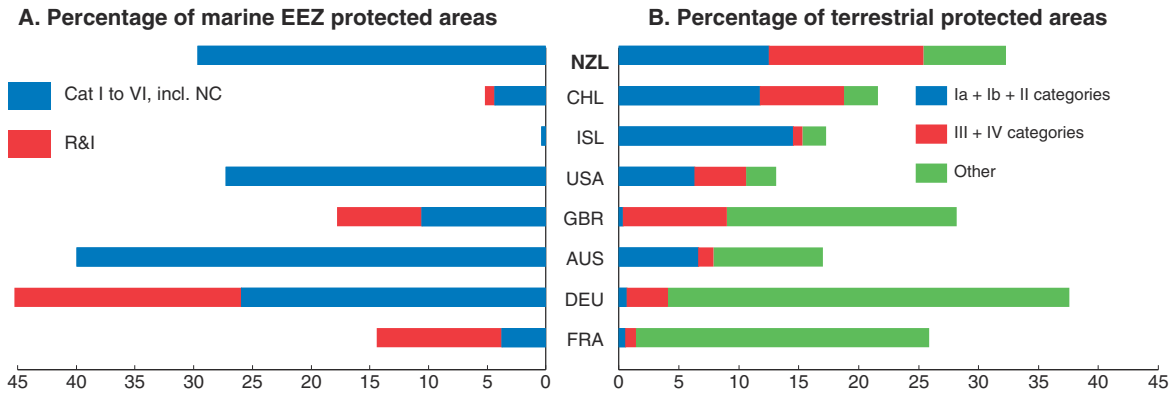
to their highest value use. Economic instruments are commonly used internationally to relieve water shortages, but can also address water quality issues through pollution charges or by capping discharges of pollutants in a catchment (i.e. watershed) and allowing trade in discharge permits, as in the Lake Taupo Nitrogen Market. Different catchments are likely to need to take different approaches in the use of economic instruments to address water issues, depending on their size and other characteristics.

Addressing threats to biodiversity

New Zealand has a unique wealth of biodiversity, with one of the world's highest rates of endemic flora and fauna species. It also has one of the world's largest shares of threatened species, accounting for about a quarter of native mammals, a third of birds, fish and reptiles, and 60% of amphibians (OECD, 2016c). Almost three-quarters of its native freshwater fish species are classified as at risk or threatened with extinction (Goodman et al., 2014). The main threats to biodiversity are biological invasion (predators, weeds, pests and diseases), reduced habitat and pollution. Deteriorating water quality is a particular threat to freshwater biodiversity, with reduced invertebrate-species richness concentrated in farming regions where there have been increases in nitrogen pollution (Larned et al., 2016).

New Zealand is a global leader in species-recovery programmes and pest-control methods such as the Predator Free New Zealand 2050 initiative; efforts for species recovery have increased significantly since 2000. Terrestrial protected areas covered almost one-third of New Zealand's land area in 2016, and it has the highest share of strictly managed terrestrial protected areas in the OECD (Figure 37). The network of marine areas under some form of protection has expanded over the last decade to cover about 30% of New Zealand's marine area. However, many ecosystem types are represented in the marine protected area only to a limited extent (Brown, 2015). Subject to analysis of economic, social and

Figure 37. **Marine and terrestrial protected areas, selected OECD countries**[1]



1. Countries are ranked by terrestrial area protected in IUCN categories Ia to IV, where Ia = strict nature reserve; Ib = wilderness area; II = national park; III = natural monument or feature; IV = habitat/species management area. The item "other" covers category V (protected landscape/seascape), VI (protected area with sustainable use of natural resources), NC (no IUCN category) and R&I (area additionally protected under regional or international designations).

Source: OECD (2016), "Indicators on Terrestrial and Marine Protected Areas: Methodology and First Results", Working Party on Environmental Information, ENV/EPOC/WPEI(2016)2.

StatLink http://dx.doi.org/10.1787/888933497477

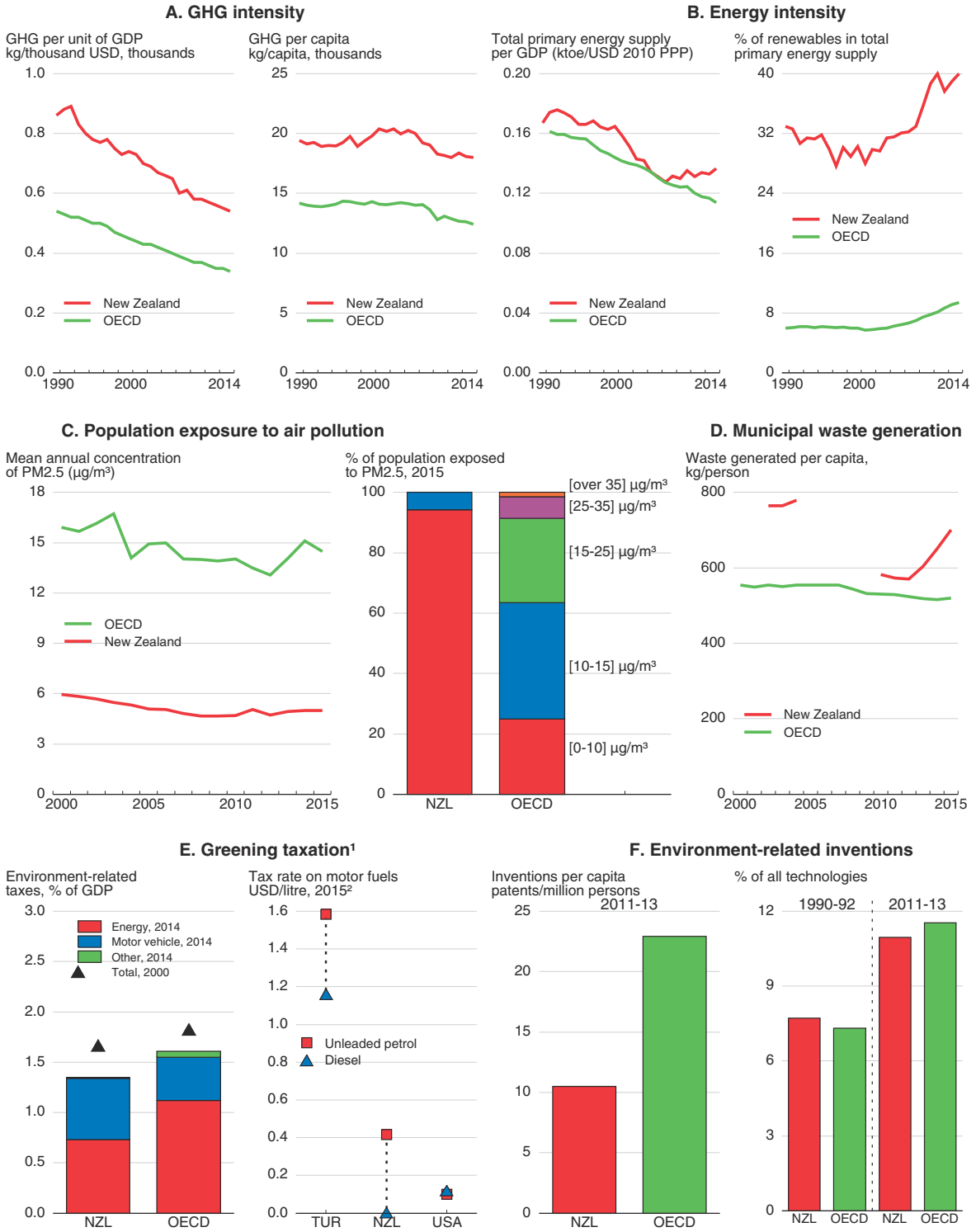
environmental tradeoffs, the network of marine areas should be expanded to represent more ecosystem types, and water-quality issues need to be addressed (as discussed above) to address threats to freshwater biodiversity. Developing a National Policy Statement on biodiversity, which is underway, is now a priority (OECD, 2017c).

Reducing greenhouse gas emissions

Greenhouse gas emissions continue to rise, with agriculture, road transport and industry being the main sources. While emissions have grown more slowly than the economy and the GDP, New Zealand's gross greenhouse gas emissions per capita and per unit of GDP remain among the five highest in the OECD (Figure 38, Panel A). New Zealand pledged to reduce its greenhouse gas emissions by 30% below the 2005 level by 2030 (equivalent to 11% below 1990 levels) at the 2015 Paris climate conference and ratified the Paris Agreement in October 2016. Reducing emissions is challenging, because half are from agriculture, where there are few inexpensive abatement options, and 80% of electricity generation is already from renewable sources.

The New Zealand Emissions Trading Scheme, which is the cornerstone of the country's climate change mitigation policy, has not been very effective because carbon prices have been very low and coverage limited (Leining and Kerr, 2016). Despite rising emission allowance prices since mid-2015, the carbon price component of energy prices remains negligible, well below a conservative estimate of the social cost of carbon (EUR 30 tCO_2) and too low to influence behaviour (OECD, 2016g; Royal Society of New Zealand, 2016). Biological emissions from agriculture have been indefinitely excluded. The Emissions Trading Scheme should be reformed to ensure a carbon price consistent with New Zealand's intended transition to a low-carbon economy, and a date for the inclusion of biological emissions from farming should be announced or alternative pricing and regulatory measures taken to enforce emissions reductions (OECD, 2017c). These measures should be complemented by the introduction of fuel efficiency and emissions standards for imported vehicles to terminate the importation of old, fuel-inefficient vehicles. Better urban planning, including

Figure 38. **Environmental indicators**



1. Includes taxes at both central and lower levels of government.
2. 2014 for the United States.

Source: OECD (2017), OECD Environment Statistics Database (Green Growth Indicators: Exposure to Air Pollution, Patents: Technology Development, Municipal Waste); OECD National Accounts Database; IEA (2017), IEA World Energy Statistics and Balances database; IEA Energy Prices and Taxes database.

StatLink http://dx.doi.org/10.1787/888933497485

by coping more systematically with increases in energy consumption from urban expansion, and a shift in the share of land transport subsidies from roads (currently 90%) towards public transport and infrastructure for cycling and walking would also help.

Another way of ensuring appropriate incentives to protect against environmental degradation is to green the tax system (i.e., tax polluting activities more). New Zealand has room for improvement in this domain: environment-related taxes have fallen more since 2000 as a share of GDP than in the rest of the OECD (Panel E), though this excludes the Emissions Trading System, which functions like a tax. For example, the lack of a tax on the use of diesel in urban areas beyond the cost of road use implies distorted incentives to avoid emitting fine particles and nitrogen oxides (NO_x), causing local air pollution.

Bibliography

Adalet McGowan, M. and D. Andrews (2017), "Skill Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers*, OECD Publishing, Paris (forthcoming).

Andrews, D., A. Caldera Sánchez and A. Johansson (2011), "Housing Markets and Structural Policies in OECD Countries", *OECD Economics Department Working Papers*, No. 836, OECD Publishing, Paris.

Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris.

Auckland Transport Alignment Project (2016), *Auckland Transport Alignment Project: Supporting Information*, *www.transport.govt.nz/assets/Uploads/Land/Documents/ATAP-Supporting-Information.pdf*.

Autor, D. (2015), "Why Are There Still So Many Jobs? The History and Future of Workplace Automation", *Journal of Economic Perspectives*, Volume 29, Number 3, Summer 2015, Pages 3-30.

Autor, D., F. Levy and R. Murnane (2003), "The Skill Content of Recent Technological Change: An Empirical Exploration", *Quarterly Journal of Economics,* Vol. 118, No. 4, pp. 1279-1333.

Bartolini, D., O. Akgun, B. Cournède, A. Johansson and J.-M. Fournier (2017), "Tax Policy and Long-Term Economic Growth", *OECD Economics Department Working Papers*, Paris, forthcoming.

Bessen, J. (2016), "How Computer Automation Affects Occupations: Technology, Jobs, and Skills", *Boston University Law and Economics Working Paper*, No. 15-49.

Brook, A. (2014), "Options to Address New Zealand's Saving–Investment Imbalance", *New Zealand Treasury Working Paper*, No. 14/17, Wellington.

Brown, M. (2015), *Vanishing Nature: Facing New Zealand's Biodiversity Crisis*, Environmental Defence Society, Auckland.

Caldera Sanchez, A. and F. Gori (2016), "Can Reforms Promoting Growth Increase Financial Fragility? An Empirical Assessment", *OECD Economics Department Working Papers*, No. 1340, OECD Publishing, Paris.

Cerutti, E., S. Claessens and L. Laeven (2015), "The Use and Effectiveness of Macroprudential Policies: New Evidence" *IMF Working Paper*, WP/15/61, Washington, DC.

Conway, P. (2016), *Achieving New Zealand's Productivity Potential*, *Productivity Commission Research Paper*, No. 2016/1, Wellington.

Cournède, B. and O. Denk (2015), "Finance and Economic Growth in OECD and G20 countries", *OECD Economics Department Working Papers*, No. 1223. OECD Publishing, Paris, *http://dx.doi.org/10.1787/5js04v8z0m38-en*.

de Serres, A., N. Yashiro and H. Boulhol (2014), "An International Perspective on New Zealand's Productivity Paradox", *NZPC Working Paper*, 2014/1.

Demographia (2017), *13th Annual Demographia International Housing Affordability Survey*, Belleville.

Dixon, S. and D. Maré (2013), "The Costs of Involuntary Job Loss: Impacts on Workers' Employment and Earnings", *Motu Working Paper 13-03*.

Djankov, S., T. Ganser, C. McLiesh, R. Ramalho and A. Shleifer (2010), "The Effect of Corporate Taxes on Investment and Entrepreneurship", *American Economic Journal: Macroeconomics*, Vol. 2, No. 3, July, pp. 31-64.

Gadanecz, B. and K. Jayaram (2016), "Macroprudential Policy Frameworks, Instruments and Indicators: A Review" in *Combining Micro and Macro Data for Financial Stability Analysis*, Vol. 41, Bank for International Settlements, *www.bis.org/ifc/publ/ifcb41c_rh.pdf*.

Giffi, C., B. Dollar, B. Gangula and M. Drew Rodriguez (2015), "American Manufacturing Competitiveness and the Looming Skills Gap", *Deloitte Review*, Issue 16, pp. 95-113.

Glaeser, E. (2010), "Introduction", in E. Glaeser (ed.), *Agglomeration Economics*, The University of Chicago Press, *www.nber.org/books/glae08-1*.

Goodman, J., N. Dunn, P. Ravenscroft, R. Allibone, J. Boubee, B. David, M. Griffiths, N. Ling, R. Hitchmough and J. Rolfe (2014), "Conservation Status of New Zealand Freshwater Fish, 2013", *New Zealand Threat Classification Series 7*.

Goos, M., A. Manning and A. Salomans (2014), "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring", *American Economic Review*, Vol. 104, No. 8, pp. 2509-26.

Hanushek, E., G. Schwerdt, S. Wiederhold and L. Woessmann (2016), "Coping with Change: International Differences in the Returns to Skills", *NBER Working Papers,* No. 22657.

Johansson, Å. (2016), "Public Finance, Economic Growth and Inequality: A Survey of the Evidence", *OECD Economics Department Working Papers*, No. 1346, OECD Publishing, Paris, *http://dx.doi.org/10.1787/094bdaa5-en*.

Kuttner, K. and I. Shim (2013), "Can Non-Interest Rate Policies Stabilize Housing Markets? Evidence from a panel of 57 economies", *NBER Working Papers*, No. 19723, Cambridge, Mass., *www.nber.org/papers/w19723*.

Larned, S., T. Snelder, M. Unwin and G. McBride (2016), "Water Quality in New Zealand Rivers: Current State and Trends", *New Zealand Journal of Marine and Freshwater Research*, Vol. 50/3, pp. 389-417.

Leining, C. and S. Kerr (2016), "Lessons Learned from the New Zealand Emissions Trading Scheme", *Motu Working Paper*, No. 16-06, Motu Economic and Public Policy Research, *http://motu-www.motu.org.nz/wpapers/16_06.pdf*.

Massey University (2016), *Home Affordability Report*, September.

MBIE (2016a), *Migration Trends 2015/2016*, 16th Annual Report, Wellington.

MBIE (2016b), *Competition in New Zealand Industries: Measurement and Evidence*, Occasional Paper 16/01, Wellington.

McCann, P. (2009), "Economic Geography, Globalisation and New Zealand's Productivity Paradox", *New Zealand Economic Papers*, Vol. 43, No. 3, pp. 279-314.

McDermott, J. (2013), "Understanding the New Zealand Exchange Rate", speech by the Assistant Governor and Head of Economics at the Reserve Bank of New Zealand to Federated Farmers, Wellington, November.

Ministry of Health (2016), *New Zealand Health Survey: Annual Update of Key Results 2015/16*, Wellington.

Montt, G. (2015), "The Causes and Consequences of Field-of-Study Mismatch: An Analysis using PIAAC", *OECD Social, Employment and Migration Working Papers,* No. 143, OECD Publishing, Paris.

Mullis, I., M. Martin, P. Foy and M. Hooper (2016), "TIMMS 2015 International Results in Mathematics", retrieved from Boston College, TIMMS and PIRLS International Student Center website: TIMSS 2015 and TIMSS Advanced 2015 International Results – TIMSS Reports.

Nicolas, F., S. Thomsen and M. Bang (2013), "Lessons from Investment Policy Reform in Korea", *OECD Working Papers on International Investment*, 2013/02, OECD Publishing, Paris.

NZPC (NZ Productivity Commission) (2014), *Boosting Productivity in the Services Sector*, Inquiry Report, Wellington.

NZPC (2017a), *Better Urban Planning*, Inquiry Report, Wellington.

NZPC (2017b), *New Models of Tertiary Education,* Inquiry Report, September.

OECD (2009), *Guidelines for Recipient Country Investment Policies Relating to National Security*, Recommendation adopted by the OECD Council on 25 May 2009, Investment Division, Paris.

OECD (2011), *OECD Economic Surveys: New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-nzl-2011-en*.

OECD (2015a), *OECD Economic Surveys: New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-nzl-2015-en*.

OECD (2015b), *Education Policy Outlook 2015: Making Reforms Happen*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264225442-en*.

OECD (2016a), *The Productivity–Inclusiveness Nexus*, OECD Publishing, Paris.

OECD (2016b), *OECD Regional Outlook 2016: Productive Regions for Inclusive Societies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264260245-en*.

OECD (2016c), "Promoting Productivity and Equality: A Twin Challenge", *OECD Economic Outlook*, Volume 2016, Issue 1, OECD Publishing, Paris.

OECD (2016d), *OECD Business and Finance Outlook 2016*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264257573-en*.

OECD (2016e), *OECD Education at a Glance, OECD Indicators,* OECD Publishing, Paris.

OECD (2016f), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris.

OECD (2016g), *Effective Carbon Rates: Pricing CO2 through Taxes and Emissions Trading Systems,* OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264260115-en*.

OECD (2017a), *Getting Skills Right: Financial Incentives for Steering Education and Training*, OECD Publishing, Paris, (forthcoming).

OECD (2017b), *Back to Work New Zealand – Improving the Re-Employment Prospects of Displaced Workers*, OECD Publishing, Paris.

OECD (2017c), *Environmental Performance Review: New Zealand*, OECD Publishing, Paris.

OECD (2017d), *Agri-Environmental Indicators: Nutrients*, Database, *http://stats.oecd.org//Index.aspx?DataSetCode=TAD_ENVINDIC_2013*

OECD (2017e), *OECD Services Trade Restrictiveness Index (STRI): New Zealand*, OECD Publishing, Paris.

Perry, B. (2016), *Household Incomes in New Zealand: Trends and Indicators of Inequality and Hardship 1982 to 2015*, Ministry of Social Development, Wellington.

RBNZ (2016a), "Adjustments to Restrictions on High-LVR Residential Mortgage Lending", *Consultation Paper*, Wellington.

RBNZ (2016b), *Financial Stability Report*, November, Wellington.

RBNZ (2016c), *Statistics*, Wellington, *www.rbnz.govt.nz/statistics*

Röhn, O., A. Caldera Sánchez, M. Hermansen and M. Rasmussen (2015), "Economic Resilience: A New Set of Vulnerability Indicators for OECD Countries", *OECD Economics Department Working Papers*, No. 1249, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jrxhgjw54r8-en*.

Rose, D. (2009), "Overseas Indebtedness, Country Risk and Interest Rates", *Policy Quarterly*, Vol. 5, Issue 1, pp. 3-8.

Royal Society of New Zealand (2016), *Transition to a Low-carbon Economy for New Zealand*, Wellington.

Saia, A., D. Andrews and S. Albrizio (2015), "Productivity sSpillovers from the Global Frontier and Public Policy: Industry-Level Evidence", *OECD Economics Department Working Papers,* No. 1238, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5js03hkvxhmr-en*.

Schleicher, A. (ed.) (2016), *Teaching Excellence through Professional Learning and Policy Reform: Lessons from around the World, www.oecd-ilibrary.org/docserver/download/9116041e.pdf?expires=1489745907&id=id&accname=ocid84004878&checksum=59B951F68626D3D87801482D3A68BF72*.

Statistics New Zealand (2016), "How Long Will I Live?", Wellington, *www.stats.govt.nz/browse_for_stats/health/life_expectancy/how-long-will-I-live.aspx*.

Ter-Minassian, T. (2014), *External Review of the Treasury's Fiscal Policy Advice: New Zealand*, Washington, *www.treasury.govt.nz/publications/informationreleases/fiscalpolicyadvice /pdfs/tfpa-2908566.pdf*.

Treasury (2009), *Review of the Overseas Investment Screening Regime*, Policy Document and Regulatory Impact Statement, draft, *www.treasury.govt.nz/publications/informationreleases/overseasinvestment/pdfs/oi-cpa-ris-oir.pdf*.

Treasury (2016), *He Tirohanga Mokopuna: 2016 Statement on the Long-Term Fiscal Position*, Wellington.

World Bank (2016), "Resolving Insolvency", *Doing Business: Measuring Business Regulations*, Washington, *www.doingbusiness.org/data/exploretopics/resolving-insolvency*.

© OECD 2017

ANNEX

Progress in structural reform

This Annex reviews actions taken on recommendations from previous Surveys *that are not covered in tables within the main body of the Assessment and Recommendations. Recommendations that are new in this* Survey *are listed at the end of the relevant chapter.*

Product market competition

Recommendations	Action taken since previous *Survey* (June 2015)
Abolish the government's "Kiwi share" in Telecom, which is used to impose foreign-ownership restrictions, coverage obligations, price caps for certain residential services and a "free local calling" rental option. Make coverage obligations contestable by other telecommunications companies and technologically neutral.	The Kiwi Share was abolished following Telecom's 2011 split into two companies: Spark and Chorus. The government continues to hold a small number of shares in Chorus for similar regulatory reasons to the Kiwi share. Foreign-ownership restrictions remain, as do coverage obligations (under the Telecommunications Service Obligation).
To promote a high-performance ICT infrastructure, clarify the competition policy framework for the broadband market, and adjust regulations to ensure consistent pricing strategies for copper and fibre networks.	The regulatory review referred to in the previous *Survey* is continuing, with several consultation phases completed.
Review air service agreements to ensure capacity limits are not restricting trade growth, especially with Asian countries where limits have been reached.	The government seeks open-skies agreements with no limits on routes and capacity and is not aware of any specific cases where an airline is looking to offer services to New Zealand but is unable to do so owing to restrictions in New Zealand's air service agreements.

Housing markets

Recommendations	Action taken since previous *Survey* (June 2015)
Treat KiwiSaver withdrawals for first-home purchases as interest-bearing loans, or limit them to low-income members.	No action taken.
Raise the supply of social housing for low-income households. Increase targeted housing subsidies for low-income households that are not in social housing.	The Social Housing Reform Programme, which seeks to increase the supply of social housing, was subject to review in 2015, leading to a number of changes in its implementation. The Ministry of Social Development became the lead agency, an investment approach to social housing was adopted, a broader range of financial assistance and support services was introduced, and more flexible funding arrangements were implemented to provide needed social housing faster. The Government announced that it aims to increase the number of social houses from 66 000 in 2017 to 72 000 by mid-2020. Budget 2017 changes include increases to the Accommodation Supplement, which is a partial rent subsidy paid to low-to-middle income people.
Begin regular tenancy re-assessments for all occupants of social housing, accompanied by increased efforts to help tenants achieve financial independence and self-sufficiency.	All current and future tenants can have their eligibility reviewed. The Ministry of Social Development prioritises reviewing eligibility for social housing for tenants paying market rents, or within NZD 50 of market rents, and for larger social housing properties (4+ bedrooms) or social housing properties that are underutilised. There are currently 3 000 reviews undertaken per year.
Evaluate whether state housing tenants requiring more permanent housing provision, such as the elderly and disabled, may benefit from placement in specialised long-term housing facilities better adapted to their needs.	The Social Housing Reform Programme is driving a shift towards a diverse market with a broad range of providers that can provide more targeted services to support better outcomes for particular groups. The government has also funded registered charities that provide supported housing options for older people. Some local authorities are also active in the provision of pensioner housing.
Remove water rate subsidies to tenants paying market rents.	Some social housing tenants are charged for water usage, depending on the region of New Zealand they live in and the social housing provider they are renting from. The decision to charge tenants for their water usage is made by the social housing provider. Housing New Zealand Corporation (the government provider of social housing) currently absorbs the costs of all water charges.

Labour markets

Recommendations	Action taken since previous *Survey* (June 2015)
Draw lessons from the Canterbury Skills and Employment Hub (a labour-market matching scheme), trial it elsewhere, and, with good results, roll it out country-wide.	In April 2016, following lessons learned from the Canterbury Skills and Employment Hub, a front-loaded labour market test – whereby an employer must first engage with the Ministry of Social Development to see whether a suitable or trainable beneficiary client is available to fill the vacancy before engaging with Immigration New Zealand – was rolled out across the country.
More frequently update immigration skills shortage categories to reduce labour market bottlenecks.	Work is underway to review the process for determining skills shortages in the NZ economy. The government will examine how they may be better defined and how that information can be more effectively employed across the economy and skills system, with the aim of incentivising the employment of New Zealanders and informing their skills development, while still ensuring that sectors and regions facing genuine shortages can access the workers they need.

Skills development

Recommendations	Action taken since previous *Survey* (June 2015)
Devolve funding for a greater share of overall school costs, including teacher pay, providing schools with more flexibility to allocate resources and boost performance.	A broad review of education system funding is underway, examining how the funding system can best support student progress and equitable student outcomes. A proposal to devolve greater flexibility to schools to allocate resources was considered but was not adopted after sector engagement.
Carefully promote quality-improving school competition and innovation, curbing any tendency toward school segregation by imposing strong social service obligations in exchange for government support, with objective evaluation of pilot projects in this sphere.	Publicly available information on student achievement and school performance has been improved. The Teacher-Led Innovation Fund provides grants to teachers to develop innovative practices that improve learning outcomes.
Foster teaching quality by improving teacher training and professional development, especially as to diverse student needs, bolstering school leaders' capacity via selective hiring and training, and tying salaries and career paths to performance rather than merely seniority.	A range of initiatives focused on lifting teaching effectiveness has been introduced or is in development. These include changes to initial teacher education and professional learning and development; the reform of the teacher professional body; and Investing in Educational Success, which supports teacher collaboration, expands career pathways for expert teachers and provides additional allowances for principals in high-needs schools.
Continue to strengthen existing measures to help school boards, principals and teachers to use student achievement data to ensure that all students are performing well.	As part of the development of a Community of Learning | Kāhui Ako, members examine their data, identify factors affecting achievement and agree achievement challenges to work on. New leadership and teaching roles within Communities of Learning, and resourcing for collaboration time, provide support for effective data use. Changes to centrally funded professional learning, in place from the start of 2017, include a greater focus on supporting schools in using their data and evidence to identify focus areas and assess impacts.
Collaborate with Australian tax authorities to enforce the same repayment obligations of NZ student debt-holders working there as those who remain at home.	An agreement on an information-sharing arrangement between Australian and NZ authorities for the recovery of student loans came into operation in 2016.

Taxation

Recommendations	Action taken since previous *Survey* (June 2015)
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.
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.

Green growth

Recommendations	Action taken since previous *Survey* (June 2015)
Investigate and promote innovations (e.g. smart metering, pastoral emissions mitigation technology) proven to enhance responsiveness to ETS price signals.	The work programme exploring complementary measures, in addition to the ETS, to promote long-term emissions reductions is proceeding.
Monitor the implementation of the 2014 National Policy Statement for Freshwater Management in regional plans to ensure water quality meets agreed goals. Provide clearer technical guidance for regional councils.	The National Policy Statement for Freshwater Management has been implemented in two regional councils and is progressively being implemented in others. As detailed in the OECD's 2017 Environmental Performance Review, regional councils are likely to need additional support to manage water within ambitious quality and quantity limits and to implement effective collaborative governance.

Inclusiveness

Recommendations	Action taken since previous *Survey* (June 2015)
Complement the recent welfare reform by following people going off benefit, as planned, to ensure satisfactory outcomes. Strengthen the focus of social spending on lifting the long-term outcomes of the disadvantaged, including by improving public-sector coordination.	Research has been undertaken on where people go when they move off benefit, including on people's characteristics and outcomes. Trials are underway to test approaches to improve employment and social outcomes for long-term unemployed people.
Review policy settings to strengthen the incentives for those on low incomes to work more than 20 hours a week, including benefit abatement rates and childcare costs.	From April 2016 a new higher rate (NZD 5 per hour) of childcare assistance was introduced for lower-income families, available for up to 50 hours per week for each child. Families with children aged three, four and five are eligible for a higher rate of assistance for the first 20 hours each week under the 20 Hours Early Childhood Education programme.
Increase welfare benefits for beneficiary households with children, and step-up job-search and activation investments, especially for those in social housing.	Families with children on benefits have received an additional NZD 25 per week since 1 April 2016. The 2017 budget increased Working for Families Family Tax Credit rates and accommodation assistance available to beneficiary households with children.

Thematic chapters

© OECD 2017

Chapter 1

Improving productivity in New Zealand's economy

New Zealand ranks highly on most indicators of well-being, but incomes are below the OECD average due to low labour productivity. Low labour productivity is only partly explained by the industry composition of the NZ economy and is primarily a consequence of sustained low multi-factor productivity growth within industries, as well as weak investment. Economic geography is an important factor in New Zealand's poor productivity performance, as the small size and remoteness of the economy diminish its access to global markets, the scale and efficiency of domestic businesses, the level of competition, and the ability to benefit from innovation at the global frontier. Policy and institutions are generally supportive of productivity growth, but there are a number of areas where there is scope for reforms that would help offset the country's geographical disadvantages and improve the welfare of New Zealanders over the coming decades. This includes promoting international connections, removing barriers to fixed capital investment (including taxation), accessing benefits from agglomeration by improving urban planning and infrastructure provision, enhancing competition and increasing investment in innovation and intangibles.

Productivity growth will be a central determinant of the welfare of New Zealanders over the coming decades. Globally, productivity is expected to be the main driver of incomes, in particular via investment in technology and knowledge-based capital. Economic growth from productivity improvements contributes to welfare through increasing the income that can be earned from each hour worked, providing individuals with the option to work less or consume more goods and services. It also allows societies to honour implicit commitments to the elderly in the form of pensions, to those on low incomes in terms of avoiding poverty and to youth by way of investments in high-quality education.

Productivity growth is particularly important for New Zealand, as this is one dimension where it compares unfavourably with leading OECD countries. As described elsewhere in this Survey, New Zealand has robust institutions, good governance, generally strong policy settings, a stable macroeconomy and a world-class education system that contributes to strong human capital and workforce skills. Rare exceptions to New Zealand's success are household disposable incomes that are below the OECD average, and work/life balance, where an above-average share (14%) of New Zealanders works very long hours (OECD, 2016a), although on average employees in New Zealand work similar hours to their OECD counterparts. Despite high labour utilisation, reflecting high participation and low unemployment, GDP per capita is below the OECD average due to low productivity.

This chapter seeks to synthesise and build on the literature explaining New Zealand's poor productivity performance – including the 2009 *Survey* – to develop a set of specific policy recommendations that could improve its future productivity growth. The focus of this chapter is on business-sector productivity, where market forces work to align production with consumer demands. Productivity is a key determinant of the efficiency with which consumer demands are met. Efficiency of services delivery in the non-market sector is also critical to New Zealand's economic performance, but this is not covered herein. Synergies between boosting productivity and improving inclusiveness are highlighted, as there are opportunities to address inequality and weak productivity growth through win-win policies that deliver improved inclusiveness as well as productivity growth (OECD, 2016b).

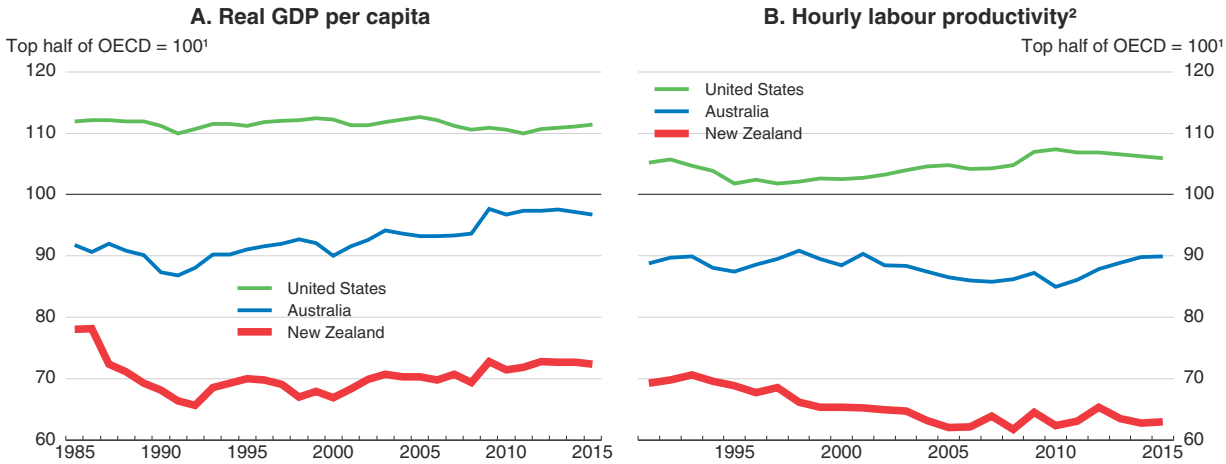
New Zealand's productivity performance in an international context

From the late 19th century until the mid-20th century, New Zealand was consistently among the three or four richest countries in the world by GDP per capita. This performance was underpinned by rents from the agricultural sector. Following the Great Depression, NZ governments adopted protectionist policies, including import tariffs, quotas and capital controls, while labour market flexibility was constrained by legislative requirements for centralised wage bargaining. These policies undermined the efficiency with which resources were allocated and made the economy less resilient in the face of shocks. New Zealand's GDP per capita ranking fell from 3rd highest in 1960 to 9th highest in 1970 (Maddison, 2001). The country's economic performance deteriorated further in the 1970s following the first oil

shock and the loss of New Zealand's major export market for agricultural products following the entry of the United Kingdom into the European Union, taking New Zealand's GDP per capita ranking down to 17th. Moreover, government debt and foreign debt began rising rapidly. To enhance long-term economic performance and economic resilience, major economic reforms were implemented from the mid-1980s to the mid-1990s, inflation was brought under control, and government debt as a share of GDP set on a steep downward path. These measures, which met OECD 'best practice', stopped the decline in New Zealand's GDP per capita ranking but did not reverse it.

GDP per capita has increased since 2010 relative to the top half of OECD countries, but only due to relative increases in hours worked (Figure 1.1). Labour productivity (as measured by GDP per hour worked) has remained flat relative to leading OECD countries since the mid-2000s. Sluggish multi-factor productivity (MFP) growth has been the main contributor to poor labour productivity growth over the last two decades, with the rate of capital deepening close to the OECD average (Figure 1.2).

Figure 1.1. **GDP per capita and hourly labour productivity**



1. Population-weighted average for the top 17 OECD countries, calculated using 2010 purchasing power parity exchange rates.
2. Labour productivity is measured as GDP per hour worked.

Source: OECD (2017), *Economic Policy Reforms: Going for Growth 2017*.

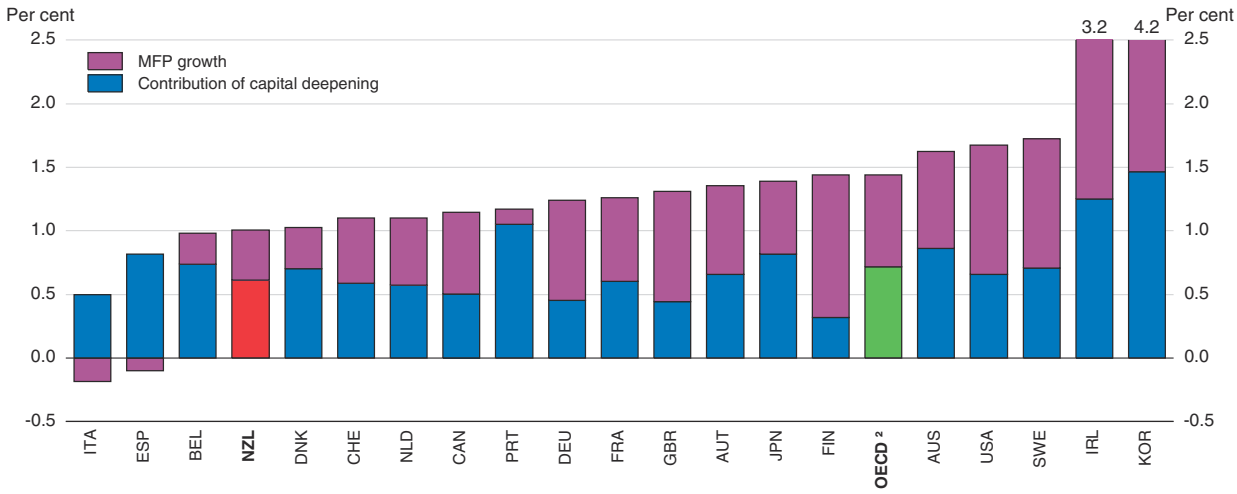
StatLink http://dx.doi.org/10.1787/888933497493

While recent sluggish labour productivity growth is due primarily to slow MFP growth, persistent softness in investment is also a factor in New Zealand's low level of labour productivity (Box 1.1). Non-residential capital formation per capita was below 60% of the OECD average in the late 1990s and remains below 75% of the OECD average (Figure 1.3). Although it is difficult to compare capital stocks across countries directly due to different measurement approaches, sustained weak investment suggests that capital stocks are low in New Zealand compared with OECD peers. Strong growth in NZ employment over recent years means that investment would need to be even higher than elsewhere in order to achieve the same trajectory of the capital-labour ratio. Weak investment and MFP are linked, as low MFP reduces the incentive to invest and improvements in technology are often embodied in capital goods.

New Zealand's low productivity is only partly explained by the industry composition of the economy. If it maintained the same level of labour productivity by industry but had

Figure 1.2. **Labour productivity growth decomposition**

Total economy, average annual growth rate, 1995-2015[1]



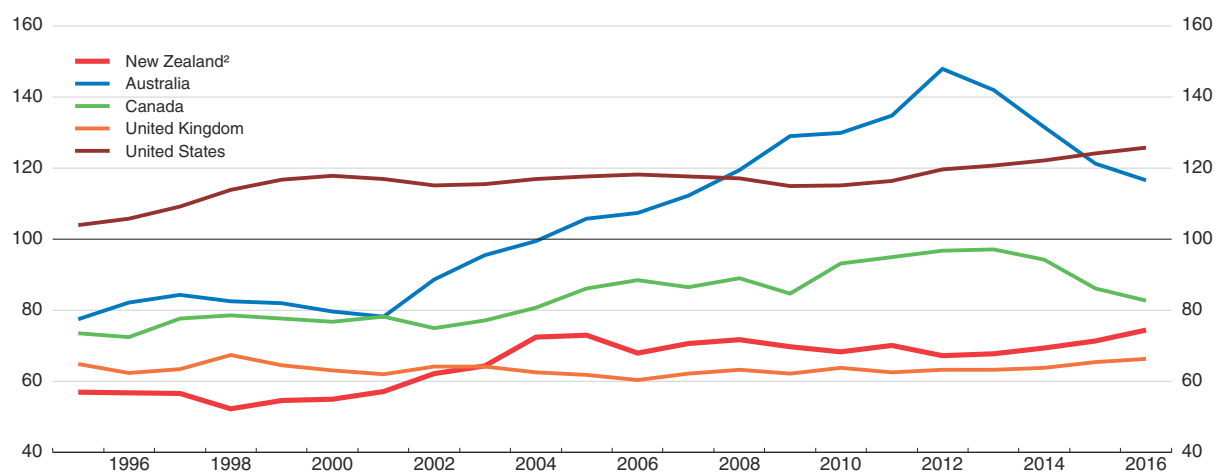
1. 1996-2015 for Austria; 1995-2014 for Australia, Ireland, Japan, Portugal and Spain.
2. Average of the 20 countries for which data are available.

Source: OECD (2017), *Productivity Database*.

StatLink http://dx.doi.org/10.1787/888933497508

Figure 1.3. **Gross fixed non-residential capital formation**

Per person in the labour force, OECD = 100[1]



1. Data for gross non-residential capital formation are in current prices and were converted into a common currency using 2010 purchasing power parity exchange rates. The labour force includes only people aged 15-64. Data for the OECD exclude Chile, the Czech Republic, Estonia, Greece, Hungary, Iceland, Israel, Latvia, Luxembourg, Mexico, Norway, the Slovak Republic, Slovenia and Turkey.
2. Excluding investment related to the Canterbury earthquake rebuild.

Source: OECD, *Economic Outlook and Labour Force Statistics Databases*; A. Wood et al. (2016), "The Canterbury Rebuild Five Years on from the Christchurch Earthquake", *RBNZ Bulletin*, Vol. 79, No. 3, February.

StatLink http://dx.doi.org/10.1787/888933497246

an industry structure that matched the average across the top half of OECD countries (excluding Iceland, Switzerland and the United States, for which data are unavailable), then aggregate labour productivity in New Zealand would be only around 3% higher. It would still lag the top half of OECD countries by more than 35%. However, changes in industry shares have affected the rate of productivity growth, as between 1990 and 2005 New Zealand experienced a stronger-than-average movement of employment from high to low labour productivity industries, notably a faster decline in the employment share of some relatively high productivity industries (electricity, gas, water and wastewater services; transport, storage and communications; and finance and insurance) and a slower decline (agriculture) or faster growth (education) in the employment share of some relatively low productivity industries (Meehan, 2014). Between 1996 and 2015, labour productivity grew around 50% more quickly in the traded than the non-traded sector (based on the sectoral definition in Mano and Castillo (2015)). The rate of productivity growth has slowed more in the traded sector since the global financial crisis, resulting in similar labour productivity growth across traded and non-traded sectors between 2008 and 2015.

Comparing New Zealand's labour productivity with Australia's is instructive, as both countries face similar challenges associated with remoteness from global markets, a factor that is a major contributor to New Zealand's weak productivity performance (Conway, 2016; McCann, 2009). Weak productivity in construction and finance and a smaller and less productive mining industry are the biggest drivers of the gap in productivity between New Zealand and Australia (Box 1.2). Lower productivity (by between 20% and 50%) in several of the biggest industries in New Zealand – including manufacturing, retail and wholesale trade – is also a factor.

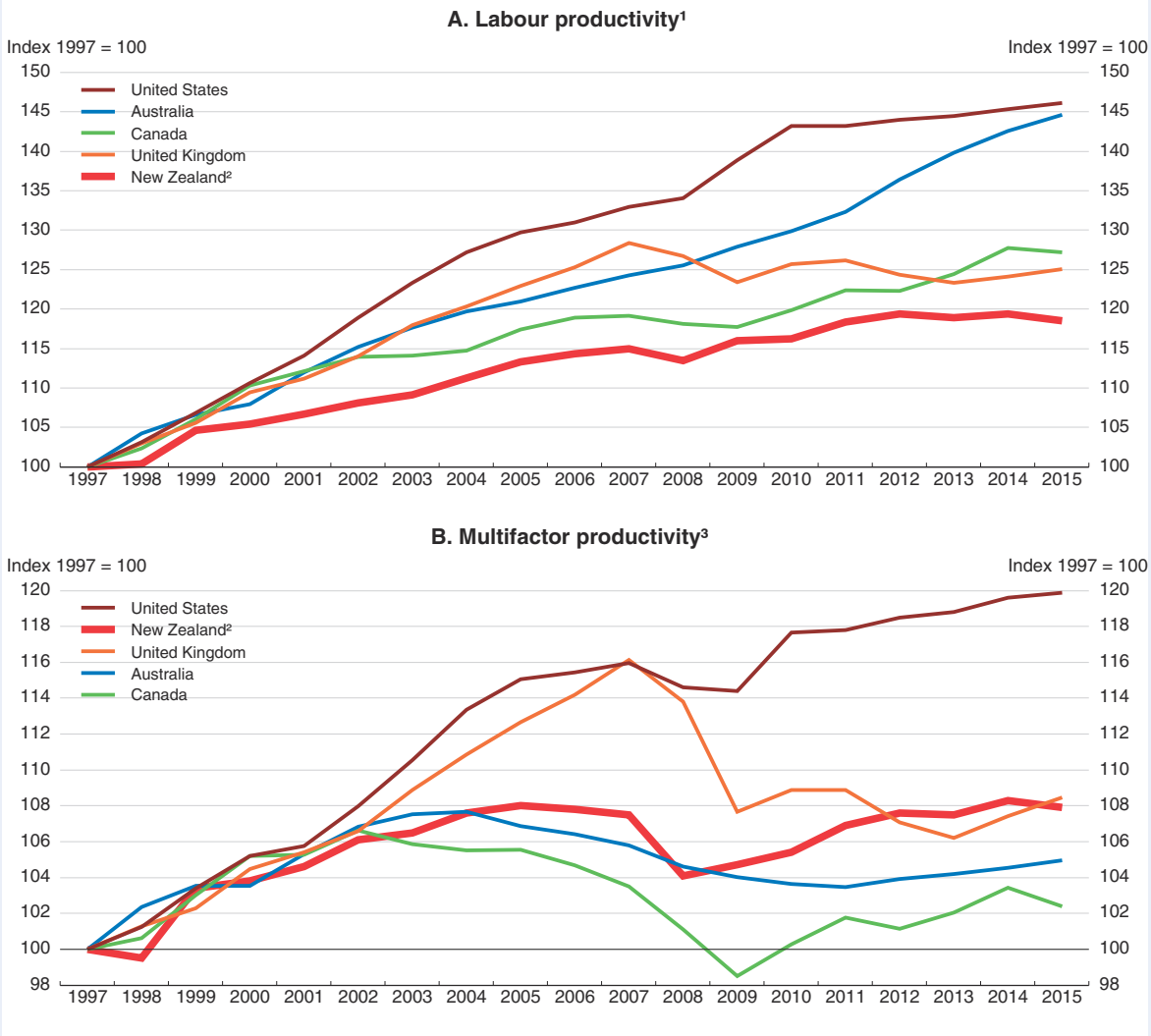
Box 1.1. **Cross-country comparison of business sector productivity**

Data on business sector productivity growth from national statistical agencies exclude productivity growth in non-business sectors such as health care and education, where measuring output is much more difficult. These data suggest that a lack of capital deepening in New Zealand was a key factor in its weak labour productivity performance since 1997 (Figure 1.4). MFP growth lagged well behind the United States, but was comparable to Australia, Canada and the United Kingdom. However, these data must be interpreted with care due to different approaches across statistical agencies.

- For New Zealand, productivity measures are based on hours paid rather than hours worked. This could affect estimates where non-paid overtime, holidays and sick leave grow at a different rate to hours paid. The choice of labour input measure can have a significant effect on productivity estimates (Statistics New Zealand and Treasury, 2010), but, in practice, hours paid and hours worked grew at similar rates during the early 2000s (Statistics New Zealand, 2010).
- Capital input estimates are based on country-specific assumptions about asset lives and depreciation profiles. There can also be differences in the assets included. For example, Statistics New Zealand includes residential buildings, land, inventories, livestock and timber in asset definitions, whereas these are all excluded from OECD productivity estimates. Capital inputs to calculate MFP for Australia and the United Kingdom exclude residential buildings.

Box 1.1. **Cross-country comparison of business sector productivity** *(cont.)*

Figure 1.4. **Productivity trends in the business sector**



1. Based on hours worked.
2. Year ended 31 March of the ensuing year.
3. Based on quality adjusted hours worked/composition-adjusted productivity.

Source: Australian Bureau of Statistics, Cat. 5260.0.55.002, Table 2; Statistics Canada, Table 383-0021; Statistics New Zealand, *Productivity Statistics*, Table 3.01; UK Office for National Statistics, *Multi-factor Productivity Estimates: Experimental Estimates to 2015*; US Bureau of Labor Statistics, *Net Multifactor Productivity and Costs, 1987-2015*.

StatLink http://dx.doi.org/10.1787/888933497515

Box 1.2. **Industry-level comparison of labour productivity in New Zealand and Australia**

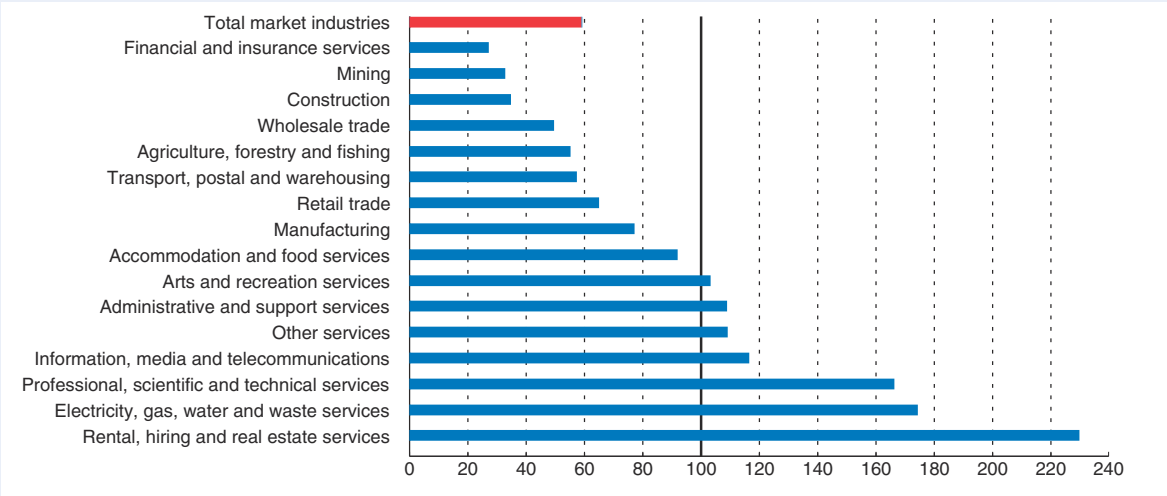
Mason (2013) undertook a shift-share analysis to decompose the gap in labour productivity (LP) between New Zealand and Australia in 2009. Lower productivity in New Zealand was separated into a component due to gaps in labour productivity within each industry i and another due to differences in employment share (S) by industry:

$$LP^{AUS} - LP^{NZL} = \frac{1}{2}\sum_i \left(LP_i^{AUS} - LP_i^{NZL}\right)\left(S_i^{AUS} + S_i^{NZL}\right) + \frac{1}{2}\sum_i \left(S_i^{AUS} - S_i^{NZL}\right)\left(LP_i^{AUS} + LP_i^{AUS}\right)$$

In Figure 1.5, labour productivity and employment shares by industry have been updated to 2015 using growth rate data, retaining the same base year for industry-level output purchasing power parity exchange rates in the absence of more recent data. This analysis shows that differences in industry structure explain about one third of the labour productivity gap between the market sectors of the Australian and NZ economies in 2015, or 13 percentage points of the 40% gap in market sector productivity (Table 1.1). Differences in productivity due to industry structure are primarily explained by the large mining industry in Australia, but also its larger electricity, gas, water and waste services industry, as both of these industries have higher-than-average productivity.

Figure 1.5. **New Zealand labour productivity relative to Australia**

Australia = 100, 2015



Source: OECD estimates based on Australian Bureau of Statistics (2016), *Estimates of Industry Multifactor Productivity, 2014-15*, Cat. No. 5260.0.55.002; Australian Bureau of Statistics (2016), *Australian System of National Accounts, 2014-15*, Cat. No. 5204.0; G. Mason (2013), "Investigating New Zealand-Australia Productivity Differences: New Comparisons at Industry Level", *Working Paper* 2013/02, New Zealand Productivity Commission; Statistics New Zealand (2017), *Productivity Statistics 1978-2015*.

StatLink http://dx.doi.org/10.1787/888933497525

The majority of the gap is explained by substantially lower labour productivity in construction and financial services, as well as a smaller and less productive mining industry in New Zealand. New Zealand's labour productivity is also lower in several of the country's largest industries, including manufacturing, retail and wholesale trade. Mason (2013) found that low labour productivity within industries in New Zealand was primarily due to lower MFP, but that almost 40% of the gap was due to lower capital intensity.

The shift-share analysis undertaken by Mason (2013) and updated here provides a broad assessment of the sources of productivity differences between New Zealand and Australia but should not be interpreted as a definitive or precise comparison of productivity. Results for individual industries are highly sensitive to the choice of purchasing power parity exchange rates and to differences in statistical approaches between

Box 1.2. **Industry-level comparison of labour productivity in New Zealand and Australia** *(cont.)*

Table 1.1. **Industry composition of market sector productivity differences**

Industry	Within-industry productivity[1]	Industry structure[2]
Total market industries	67.2	32.8
Financial and insurance services	25.2	5.6
Mining	12.8	18.9
Construction	33.4	4.8
Wholesale trade	2.7	-1.1
Agriculture, forestry and fishing	3.6	-4.9
Transport, postal and warehousing	8.5	3.4
Retail trade	3.4	0.5
Manufacturing	4.4	-5.3
Accommodation and food services	0.4	0.6
Arts and recreation services	-0.1	0.3
Administrative and support services	-0.5	-1.7
Other services	-0.4	1.0
Information media and telecommunications	-0.9	0.9
Professional, scientific and technical services	-10.7	2.5
Electricity, gas, water and waste services	-7.9	6.8
Rental, hiring and real estate services	-6.6	0.5

1. Share of market sector labour productivity gap between New Zealand and Australia attributed to labour productivity differences within each industry classification (negative values reflect higher labour productivity in New Zealand).
2. Share of market-sector labour productivity gap between New Zealand and Australia attributed to differences in industry shares of employment.

Source: OECD estimates using data sources cited in Figure 1.5.

the two countries. For example, the large gap in productivity in financial and insurance services is likely to overstate efficiency differences, given the dominance of the same firms in both countries and, in banking at least, comparable interest rate margins (RBNZ, 2016; RBA, 2016).

Results vary across studies according to methodology. For example, NZIER (2011) found a similar breakdown to Mason (2013) in terms of the importance of industry structure, capital intensity and MFP in explaining gaps in productivity between New Zealand and Australia, but also found that productivity in the agriculture and mining industries was higher in New Zealand than in Australia. This could be due to the use of market exchange rates rather than (theoretically preferred) purchasing power parity exchange rates. In terms of MFP, the IMF (2016a) differs from Mason (2013) in finding higher MFP in agriculture in New Zealand – placing New Zealand at the global frontier – and a much larger gap of close to 90% between Australian and NZ mining industry MFP. All three studies are consistent in finding that construction industry productivity is substantially higher in Australia than in New Zealand.

Factors contributing to New Zealand's poor productivity performance

Several key factors are evident in a substantial body of work seeking to explain New Zealand's poor productivity performance, each of which is considered below and used to frame the consideration of policy measures in the remainder of the chapter. At a broad level, New Zealand's policy settings compare favourably with those internationally – cross-country analysis has suggested that its policy settings would be consistent with GDP per capita around 20% *above* the OECD average (Barnes et al., 2013).

Remoteness as a barrier to global connections

Geography is an important factor in New Zealand's poor productivity. Indeed, de Serres et al. (2014) find that more than half of New Zealand's productivity gap with leading OECD countries can be explained by remote access to markets and suppliers. Somewhat counterintuitively, as spatial transactions costs have fallen, New Zealand's lack of scale and geographical remoteness have become *bigger* handicaps relative to larger and more globally connected economies that benefit most from agglomeration. As McCann (2009, p. 291) explains: "as spatial transactions costs fall in an environment of increasing returns to scale, if labour is mobile, a centre-periphery divergence forms in which the central regions exhibit agglomeration effects". As transactions costs fall further (for example, through increasing digitalisation) remoteness may become less of a handicap in some areas of economic activity. An economy's ability to benefit from innovation at the global frontier is a positive function of its degree of international connectedness (Saia et al., 2015). The policy challenge is to find measures that can facilitate the development of better global connections and greater agglomeration benefits despite New Zealand's small population and remote location.

Weak competitive pressures

Data limitations preclude comprehensive comparison of competitive pressures across countries, but available price–cost margin data suggest that weak competition is an issue in New Zealand. The Productivity Commission (NZPC, 2014) finds an average price-cost margin across NZ industries of around 30%, which is higher than in 14 of 16 OECD countries analysed in Hoj et al. (2007). This finding is supported by analysis of profit elasticities – an alternative measure based on the sensitivity of firm profits to costs – which suggests that NZ manufacturing industries are characterised by weaker competition than in Finland and the Netherlands (but marginally stronger than in Portugal) (MBIE, 2016). Weak competitive pressures in New Zealand also have an explanation in economic geography, as a small, sparsely populated country is unlikely to be able to sustain the same intensity of competition as larger and more densely populated countries, and the distance from trading partners acts as a barrier to competitive pressures by restricting the entry of foreign providers.

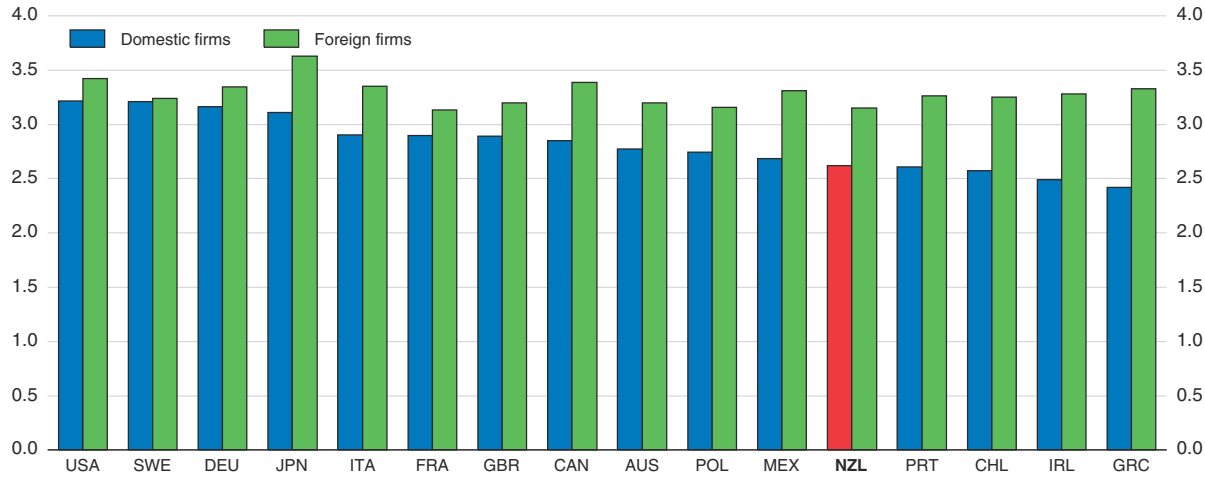
Other data regarding firm performance in New Zealand are consistent with weak competitive pressures. Survey data indicate that management practices are poor relative to other OECD countries, especially among local firms (Figure 1.6). The existence of a substantial number of firms with mediocre management (Green et al., 2011) is suggestive of a lack of competitive pressure, which allows firms to survive without improving their management practices. Firm-level productivity figures indicate that the national productivity frontier has fallen further behind the global frontier and that there has been weak diffusion from the national frontier to other firms, particularly in some services industries (Conway, 2016). Stagnation in productivity growth of laggard firms may be connected to increasing barriers to entry and a decline in competitive pressures (Andrews et al., 2016).

Weak 'up or out' dynamics for firms

An issue closely related to competition is firm dynamics, whereby entry and growth of new firms and growth or decline of existing firms raise aggregate productivity growth. New Zealand has seen a strong rate of job creation by new firms (Figure 1.7, Panel A), driven by a robust start-up ratio (the number of entrants relative to the country's total employment), more than offsetting the slightly below-average size of new start-ups. Post-entry growth and survival rates are around the median of 15 countries for which comparable data are available

Figure 1.6. **Average management quality score in the manufacturing and retail sectors**[1]

Score from 1 (worst practice) to 5 (best practice), 2004-10

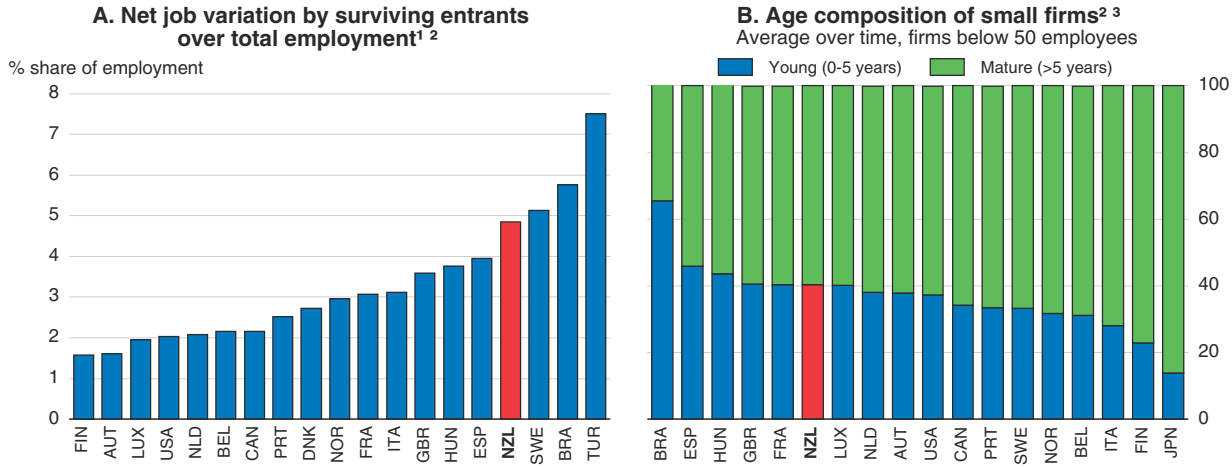


1. The overall management score is an average of responses to 18 survey questions that are designed to reveal the extent to which firms: i) monitor what goes on inside the firm and use this information for continuous improvement ii) set targets and track outcomes; and iii) effectively utilise incentive structures (e.g. promote and reward employees based on performance). The sample is limited to retail and manufacturing firms with between 100 and 5 000 employees. Domestic multinational firms are excluded from this chart. The most recent (2014) survey database continues to indicate relatively poor management quality for the manufacturing industry in New Zealand.

Source: N. Bloom et al. (2012), "Management Practices across Firms and Countries", *NBER Working Paper Series*, No. 17850, February, *www.nber.org/papers/w17850.pdf*; World Management Survey (2016), Survey database.

StatLink http://dx.doi.org/10.1787/888933497531

Figure 1.7. **Job creation by new firms and age composition of small businesses**



1. The graph illustrates the ratio between employment at time t + 3 of surviving entrants and overall country employment at time t. Figures report the average for different time periods t = 2001, 2004 and 2007, conditional on their availability. Sectors covered are: manufacturing, construction, and non-financial business services.
2. Data are preliminary. Owing to methodological differences, figures may deviate from officially published national statistics. Data for Canada refer only to organic employment changes and abstract from merger and acquisition activities.
3. Share of firms by different age groups in the total number of micro and small firms (below 50 employees) in each economy on average over 2001-11 (or available years). For more details, see Figure 6 in Criscuolo et al. (2014).

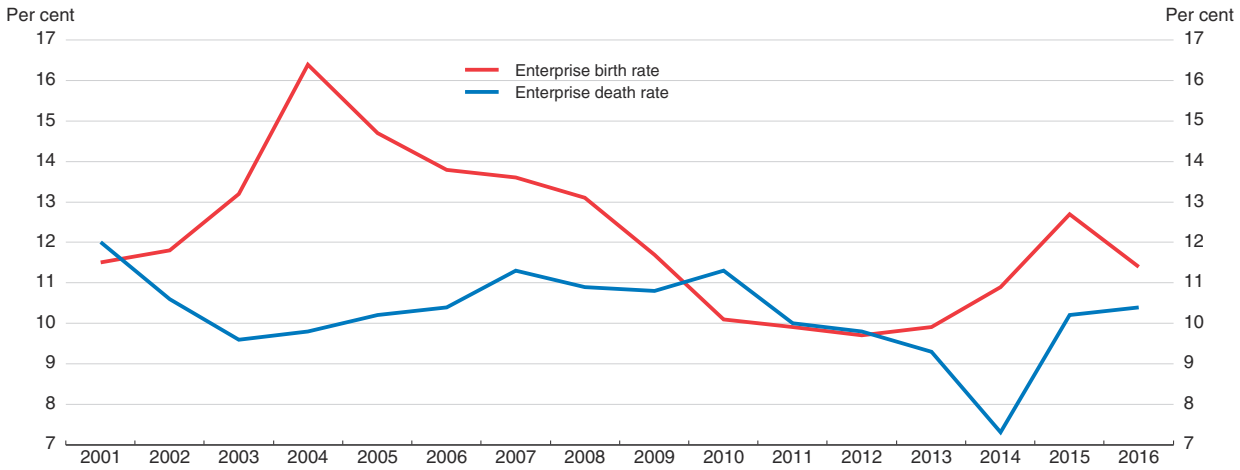
Source: F. Calvino, C. Criscuolo and C. Menon (2015), "Cross-country Evidence on Start-Up Dynamics", *OECD Science, Technology and Industry Working Papers*, 2015/06, OECD Publishing, Paris, Figure 2, *http://dx.doi.org/10.1787/5jrxtkb9mxtb-en*; C. Criscuolo, P.N. Gal and C. Menon (2014), "The Dynamics of Employment Growth: New Evidence from 18 Countries", *OECD Science, Technology and Industry Policy Papers*, No. 14, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jz417hj6hg6-en*.

StatLink http://dx.doi.org/10.1787/888933497543

(Calvino et al., 2015). Post-entry growth rates are strongly correlated with framework policy conditions, so New Zealand's position around the median probably reflects strong framework policies offsetting barriers to up-scaling due to geographical remoteness and small market size. The high proportion of start-ups and young firms among small businesses in New Zealand (Panel B) is a positive indicator, as young firms are important for the creation of new jobs, productivity growth and the introduction of disruptive innovations (Haltiwanger et al., 2012; Criscuolo et al., 2014). New Zealand's strength in this area was compromised by the falling rate of entry between 2004 and 2012, but entry rates have since recovered (Figure 1.8).

Figure 1.8. **Enterprise birth and death rates**[1]

Number of births/deaths as a percentage of the number of enterprises in the business population



1. Data are for the years ending in February, preliminary figures for 2016.

Source: Statistics New Zealand, *NZ Business Demography Statistics: At February 2016*, *www.stats.govt.nz/browse_for_stats/businesses/business_characteristics/BusinessDemographyStatistics_HOTPFeb16.aspx*.

StatLink http://dx.doi.org/10.1787/888933497555

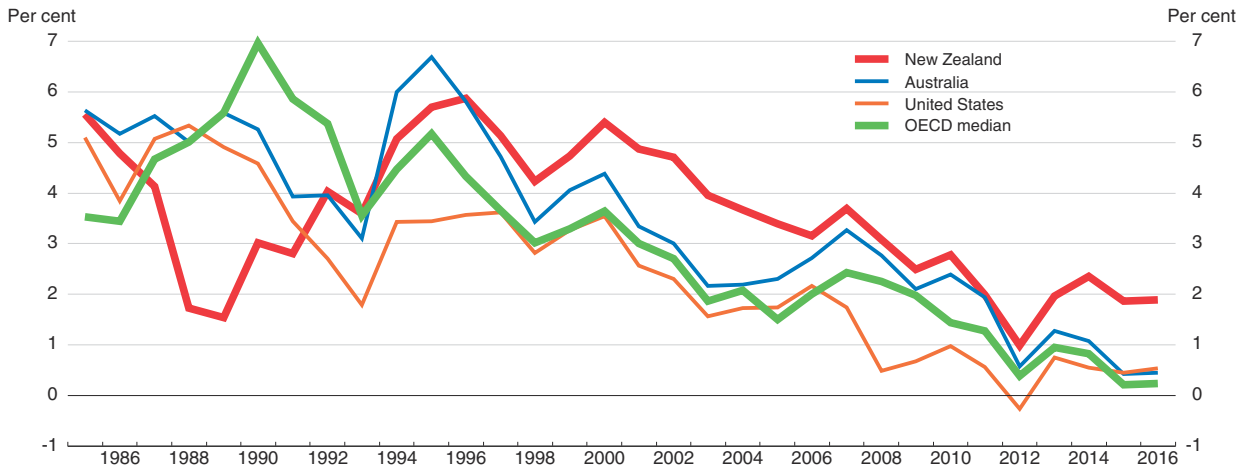
Of more concern is analysis suggesting long-run impediments in the process of productivity-enhancing allocation of labour and capital within the NZ economy. Although employment growth has been fastest among the most productive NZ firms, reallocation has not been as strong as that occurring in Europe after the 2008 financial crisis, and data suggest that firms with low MFP account for a large share of capital and employment (Conway, 2016; OECD, 2015a). The "selection effect" of more productive firms growing faster than their less productive counterparts is a key driver of aggregate productivity growth, with many studies finding it can account for more than half of aggregate productivity growth (Lentz and Mortensen, 2008; Andrews et al., 2014). Evidence of weak allocative efficiency is consistent with the relatively high rate of skills mismatch in New Zealand, as skills mismatches reduce the extent to which higher skilled workers are employed by the most productive firms (Chapter 2).

Low rates of capital investment

Business capital investment in New Zealand is low in comparison with other OECD countries. Household saving rates are low, and the shortfall between saving and investment has meant that New Zealand is reliant on foreign saving and capital inflows. This saving shortfall has placed upward pressure on interest rates (McDermott, 2013) as international investors demand a risk premium that reflects exchange rate risks and exposure to New

Zealand's large negative net international investment position (Figure 1.9; Rose, 2009). The problem is compounded to the extent that firms face a lack of other options to fund capital expenditure. Venture capital, stock and bond markets are relatively thin, although this in part reflects low saving (Figure 1.10). Poorly developed financial markets constrain the ability of innovative firms to attract resources and grow (Andrews et al., 2014), while a lack of venture capital restricts net job creation through reduced entry and slower growth of entrants and incumbents (Calvino et al., 2015).

Figure 1.9. **Comparison of long-term real interest rates**[1]



1. Nominal 10-year government bond yields less five-year average inflation rates.
Source: OECD, Economic Outlook Database.

StatLink http://dx.doi.org/10.1787/888933497565

Low research and development activity

New Zealand's R&D expenditure, especially by the business sector, is low as a share of GDP (Figure 1.11). Only around 20% of the shortfall from the OECD average can be ascribed to differences in industry composition (OECD, 2016c). While it might be reasonable for New Zealand to aspire to a lower level of R&D spending than leading OECD countries due to its industry structure, size and location, its productivity is hampered by its low rate of R&D expenditure – empirical analysis suggests that between 11% and 40% of the MFP gap between New Zealand and leading OECD countries can be explained by weak R&D investment (de Serres et al. 2014). New Zealand ranks around the middle of the OECD for investment in knowledge-based capital (Figure 1.12), performing well in software investment and trademarks but poorly in patents (de Serres et al., 2014).

Policy measures to facilitate global connections

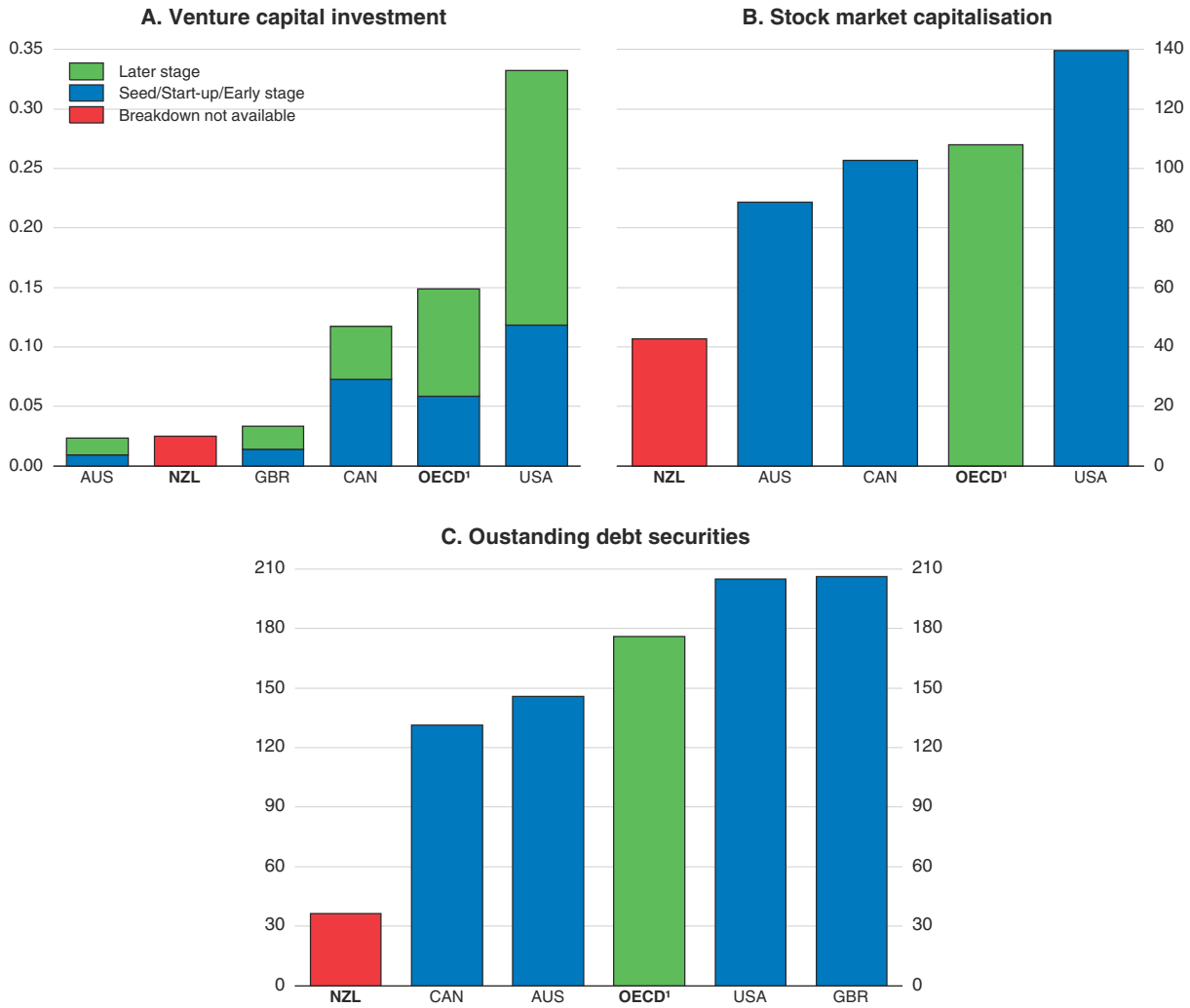
As a small economy, New Zealand is particularly reliant on global connections through trade, investment and migration to benefit from innovation at the global frontier, develop scale, specialise in areas of comparative advantage and stimulate competition.

Some of the costs of developing global connections are declining

Declining costs of global connections offer opportunities for New Zealand as a small remote country. For example, global average airfares declined by around 60% in real terms between 1995 and 2015 (International Aviation Transport Association, 2015). Another

Figure 1.10. **Sources of finance**

As a percentage of GDP, 2015



1. GDP-weighted average of all OECD countries for which data are available.

Source: OECD (2016), *Entrepreneurship at a Glance 2016*, Figure 8.1; OECD (2017), National Accounts Database; World Bank, World Development Indicators database; Bank for International Settlements, Debt Securities Statistics (*http://stats.bis.org/statx/srs/table/c1*).

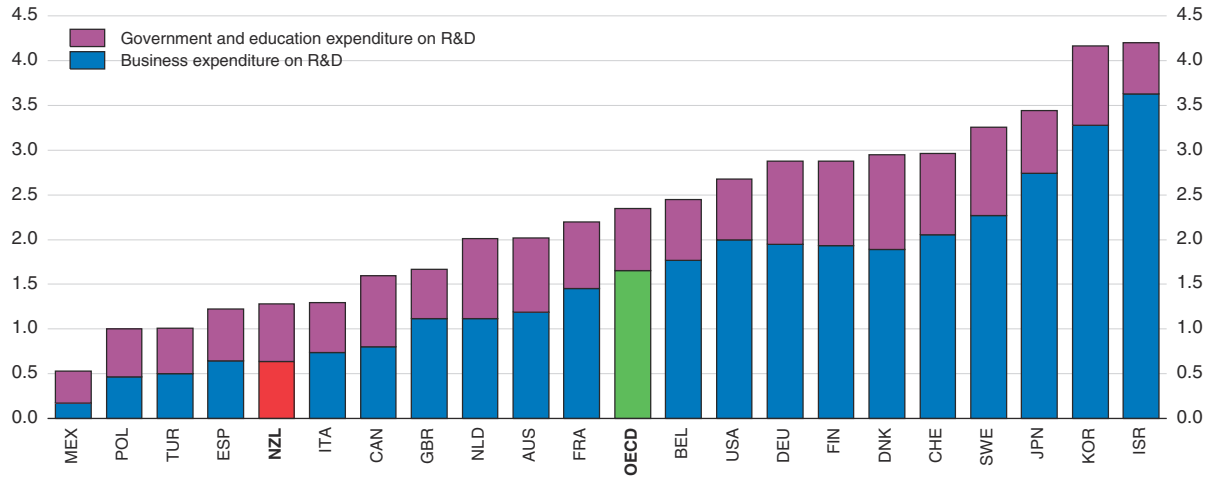
StatLink *http://dx.doi.org/10.1787/888933497577*

relevant area where costs have fallen is in information and communications technology (ICT). Governments have an important role in fostering greater ICT investment and diffusion of ICT services, particularly in countries that have substantial productivity gaps with respect to peers (Dabla-Norris et al., 2015). Broadband adoption has been estimated to increase the productivity of NZ firms by 7-10% (Grimes et al., 2012), and there is an increasing opportunity to export professional, scientific and technical services online, an area where New Zealand has a productivity advantage over Australia (see Box 1.2 above).

There has been a good take-up of both fixed (Figure 1.13) and mobile (Figure 1.14) broadband. The government's Ultra-Fast Broadband Initiative has contributed to a rapid increase in fibre subscriptions since 2010 (albeit from a low base). Yet, average connection speeds remain slow compared with other OECD countries (Figure 1.13, Panel C) and prices for fixed broadband are relatively high. But in terms of investment in ICT more generally, the

Figure 1.11. **Expenditure on research and development**

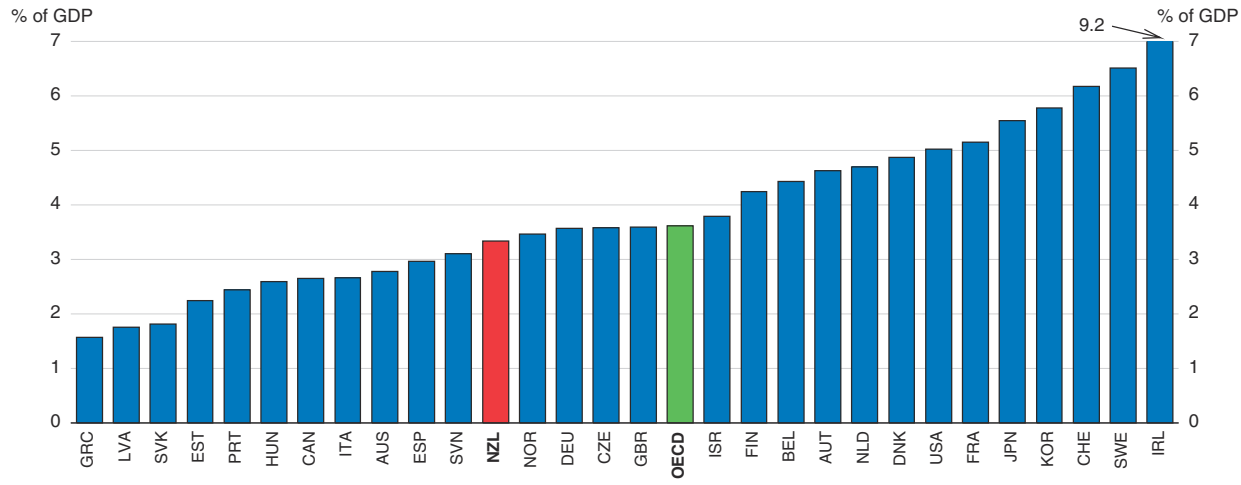
As a percentage of GDP, 2015 or latest year available



Source: Statistics New Zealand; OECD, Main Science and Technology Indicators Database, *http://oe.cd/msti.*

StatLink *http://dx.doi.org/10.1787/888933497252*

Figure 1.12. **Investment in knowledge-based capital,[1] 2015[2]**



1. Includes R&D, mineral exploration and evaluation, computer software and databases, entertainment, literary and artistic originals, and other intellectual property products.
2. Or latest year available.

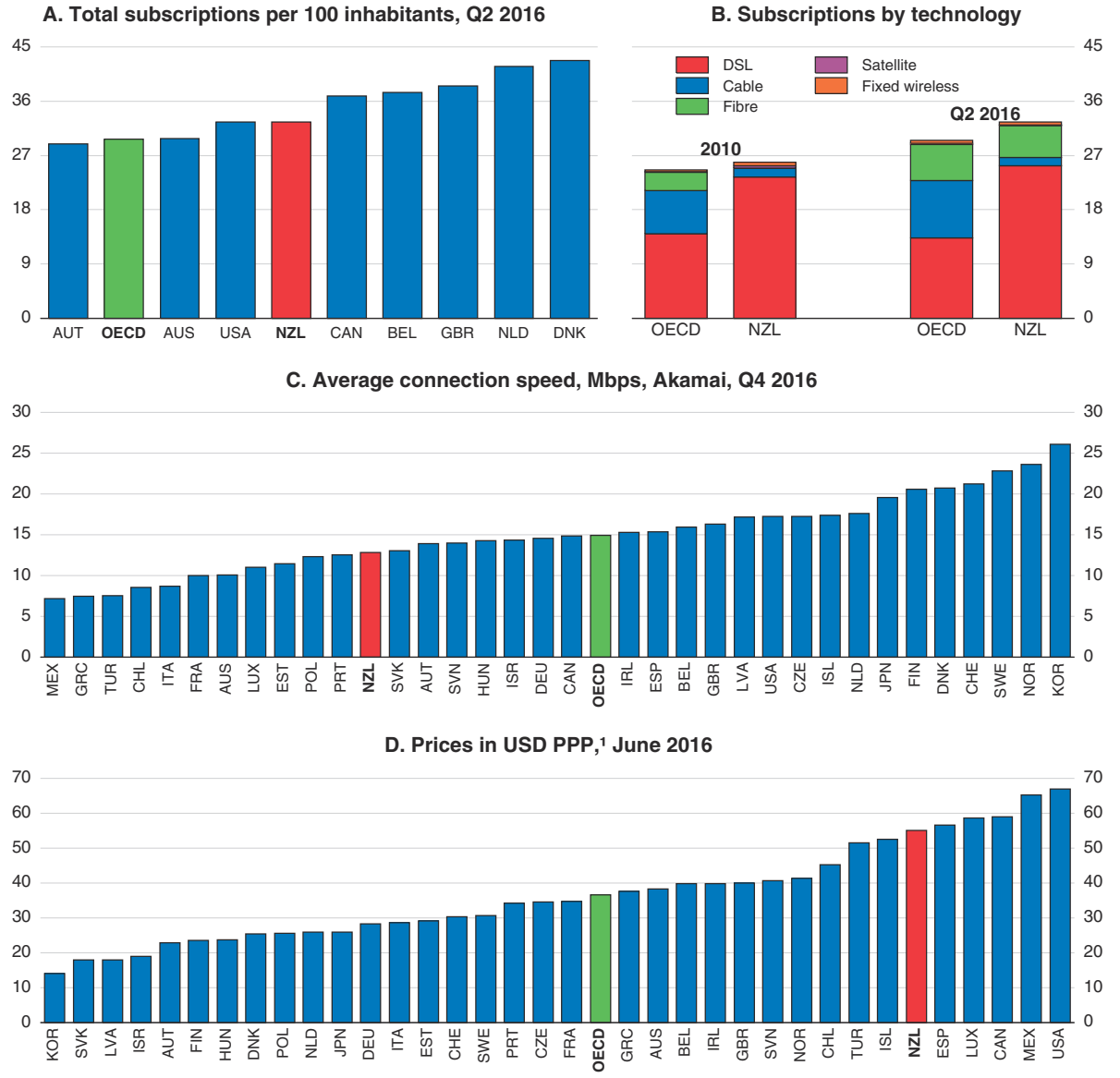
Source: OECD, National Accounts Database.

StatLink *http://dx.doi.org/10.1787/888933497580*

latest available data indicate that New Zealand's investment (as a share of total non-residential gross fixed capital formation) was consistently among the three or four highest in the OECD between 2000 and 2010 (OECD, 2016c).

There are a number of other steps that the government should take to address the high price and low average speed of fixed broadband. Barriers to competition should be removed, in particular constraints on competition associated with the Telecommunications Service Obligation and the ability of the government to overrule the Commerce Commission's determinations. These restrictions contribute to New Zealand having higher barriers to trade in telecommunications than the OECD average (Figure 1.15). The current

Figure 1.13. **Fixed broadband indicators**



1. Prices for high use broadband (> 25/30 Mbps). For low use broadband (> 1.5/2 Mbps), New Zealand has the third highest prices in the OECD.

Source: OECD, Broadband Portal, *www.oecd.org/sti/broadband/oecdbroadbandportal.htm*.

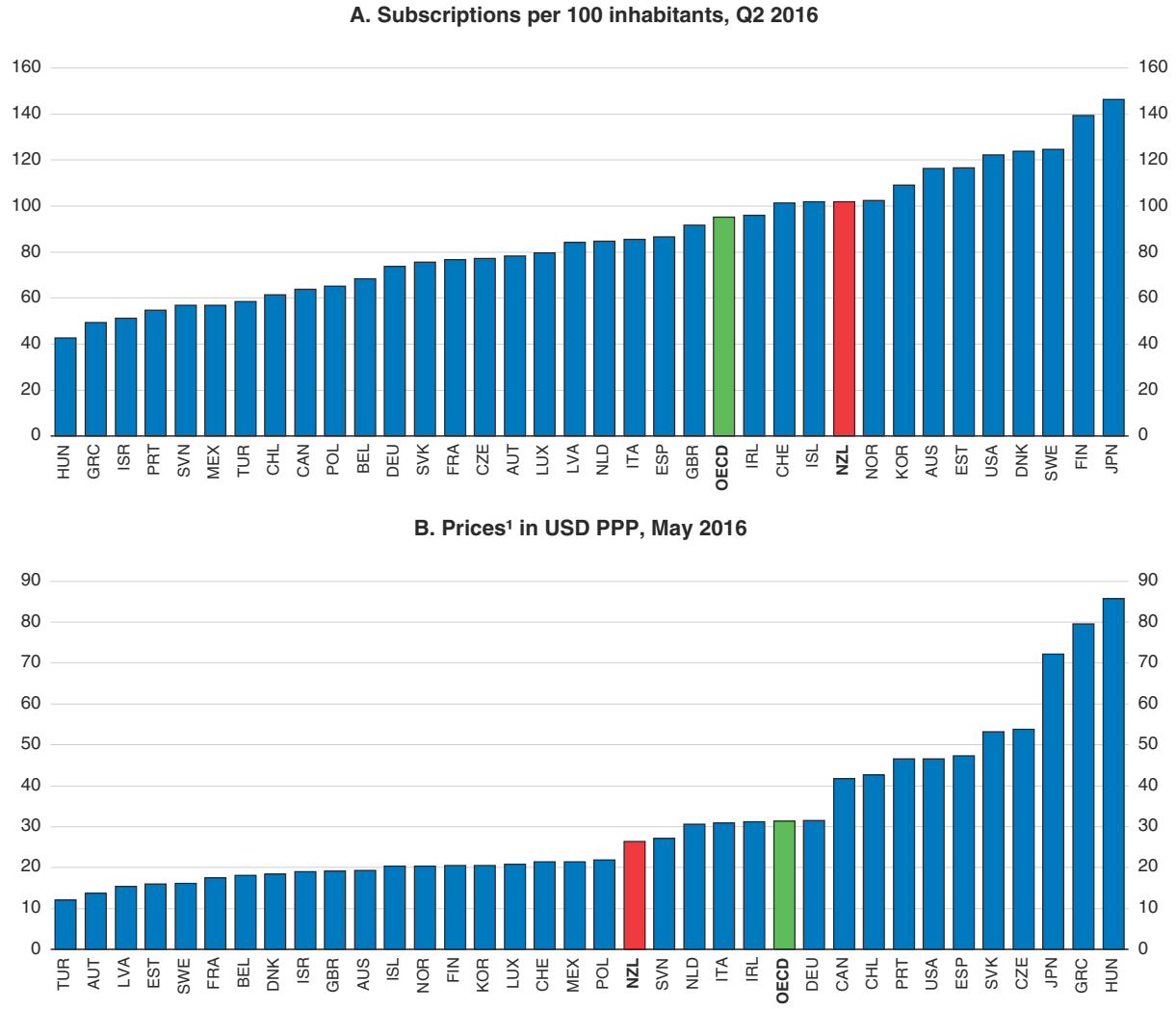
StatLink *http://dx.doi.org/10.1787/888933497593*

review of the Telecommunications Act 2001 is an opportunity to clarify the competition policy and regulatory framework for broadband to ensure benefits for end-users through lower prices and higher connection speeds.

New Zealand has few restrictions on trade

Trade policy settings in New Zealand are supportive of international engagement and productivity growth. Tariffs are low (though there would be benefits from reducing remaining tariffs to reduce the effective distance from markets), and the NZ government is supportive of further multilateral trade agreements such as the Trans-Pacific Partnership,

Figure 1.14. **Mobile broadband indicators**



1. Prices for a basket of 300 calls + 1 GB. Data for baskets of 30 calls + 100 MB and 900 calls + 2 GB show that New Zealand is also below the OECD average.

Source: OECD, Broadband Portal, *www.oecd.org/sti/broadband/oecdbroadbandportal.htm*.

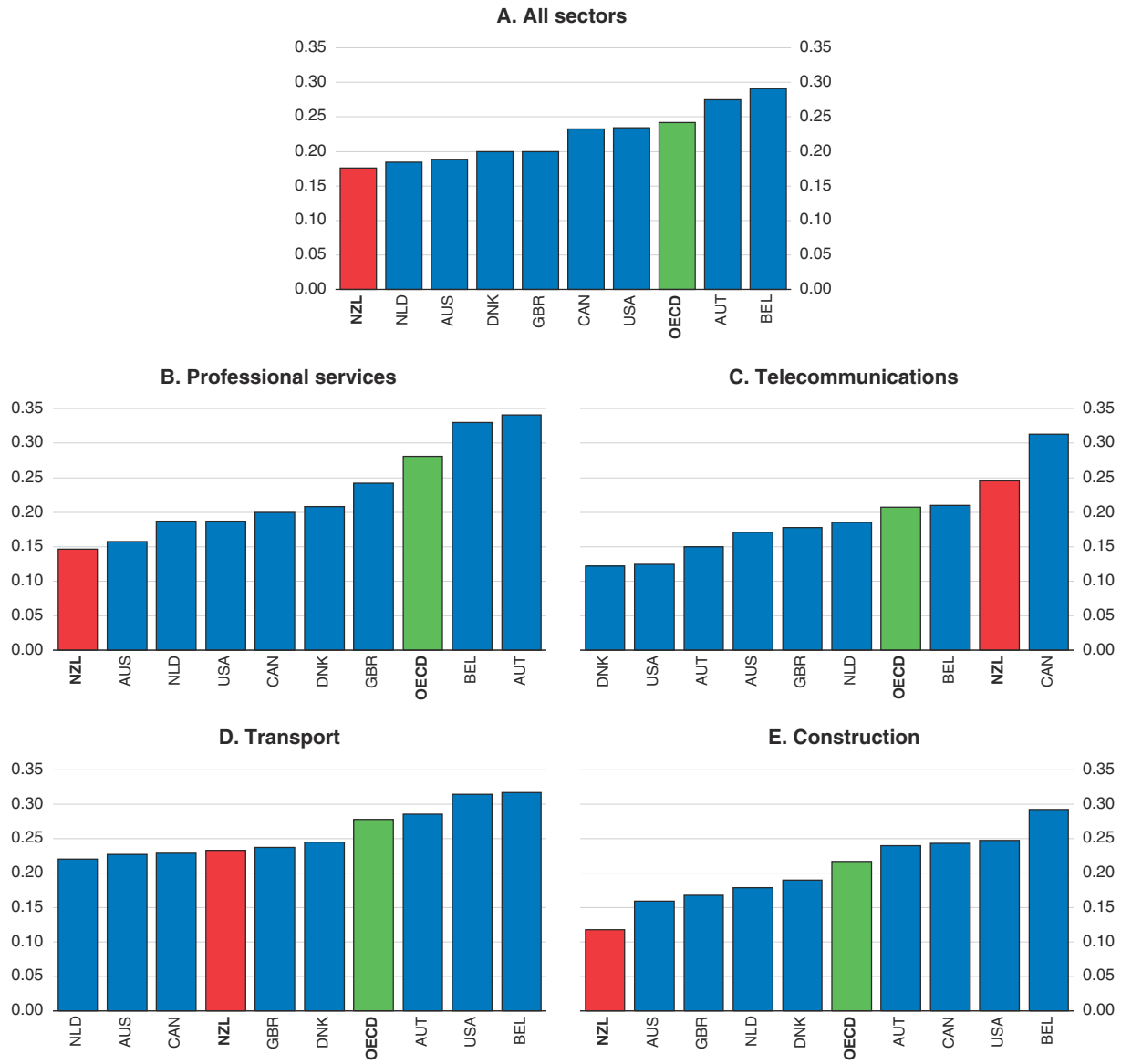
StatLink http://dx.doi.org/10.1787/888933497606

the Trade in Services Agreement and the Regional Comprehensive Economic Partnership. Restrictions on services trade are generally low, with the exception of telecommunications, as discussed above (Figure 1.15). There is scope to further ease restrictions on services trade, including by cutting the time taken to process business visas and introducing measures to reduce restrictions on foreign entry (in particular, barriers to foreign direct investment, as discussed below). While New Zealand's licensing and permits system is generally less restrictive than the OECD average (OECD, 2015b), trade in services could be enhanced by giving stronger consideration to recognising foreign licenses to practise when those licences are based on equivalent or better standards than their NZ counterparts (NZPC, 2014).

The slowdown in trade liberalisation internationally and the threat of increasing protectionism could negatively affect New Zealand's productivity growth. Non-tariff barriers to trade in other countries are of increasing importance, with the annual cost of non-tariff

Figure 1.15. **Services trade restrictiveness index by sector**

Index from 0 (open) to 1 (closed), 2016



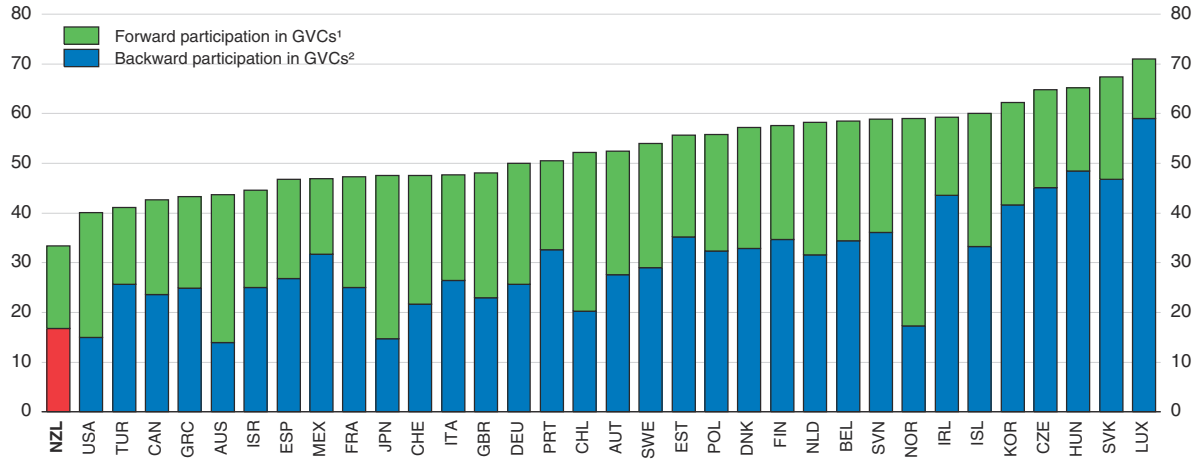
Source: OECD, Services Trade Restrictiveness Index Database.

StatLink http://dx.doi.org/10.1787/888933497614

barriers in the Asia-Pacific Economic Cooperation for New Zealand exporters estimated at USD 5.9 billion (Ballingall and Pambudi, 2016). Addressing barriers to trade in other countries requires commitment and action from other governments, but the NZ government can contribute through direct co-operation, formal agreements and participation in international fora and organisations.

New Zealand has very low engagement in global value chains (GVCs) compared with other OECD countries (Figure 1.16). Such participation increases global connections and productivity by facilitating diffusion of innovation from the global frontier to national frontier firms (OECD, 2015a). Although New Zealand's GVC participation is curtailed by its remoteness

Figure 1.16. **Global value chain participation, 2011**



1. Domestic value added embodied in foreign exports, as a percentage of total gross exports.
2. Foreign value added embodied in exports, as a percentage of total gross exports.

Source: OECD-WTO, Trade in Value-Added Database, *http://oe.cd/tiva*.

StatLink http://dx.doi.org/10.1787/888933497622

and industry structure, the removal of policy barriers could increase participation. In particular, participation in GVCs tends to be higher in countries that are more open to foreign direct investment (Kowalski et al., 2015).

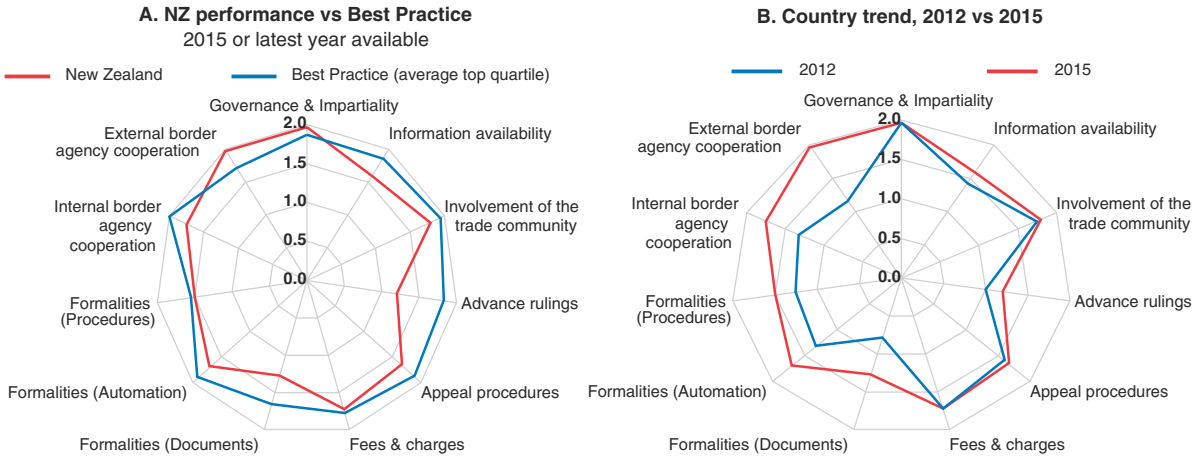
There is scope to improve trade facilitation measures

New Zealand has made progress in terms of trade facilitation measures since 2012, but there is still room for improvement when compared with best practice (Figure 1.17). It ranked a lowly 37th globally for the efficiency of customs and border clearance in the World Bank's Logistics Performance Index in 2016 and 22nd on a weighted average of surveys between 2010 and 2016 (Arvis et al., 2016). This puts New Zealand more than 10 places behind other small, high-income OECD countries such as Belgium, Denmark, Finland and the Netherlands. Services trade restrictiveness is above the OECD average for logistics cargo-handling, primarily due to limitations on administrative procedures related to customs and visas for transport crew (OECD, 2017a). The cost of border compliance to import and export a single shipment is around USD 350, more than double the average for high-income OECD countries (World Bank, 2016a). Reforms with the greatest potential benefits for New Zealand relate to improving information availability, encouraging more extensive use of advance rulings and expanding the acceptance of copies of documents and electronic signatures (OECD, 2016d). There also remains scope to improve multilateral border agency co-operation. Although New Zealand places a greater emphasis on biosecurity controls than most other countries, this should not preclude simplification of procedures and greater use of technology to increase efficiency in customs processes.

There are a number of initiatives underway to improve border efficiency. This includes the Customs Service's efforts to streamline trade facilitation, its "Customs 2020" strategy and associated initiatives to provide more integrated technology-enabled services, and trials to streamline border processing for regular travellers and low-risk goods (NZ Customs Service, 2015; Guy and Wagner, 2016). The Office of the Auditor General is due to release a final report in mid-2017 on its performance audit of information sharing between border agencies.

Figure 1.17. **Trade facilitation measures**

Score from 0 (worst performance) to 2 (best performance)



Source: OECD, *Trade Facilitation Indicators*, *www.oecd.org/trade/facilitation/indicators.htm*.

StatLink http://dx.doi.org/10.1787/888933497634

Barriers to Foreign Direct Investment should be reduced

Foreign Direct Investment (FDI) boosts the productivity of recipient countries through a number of mechanisms. Like other forms of investment, FDI funds capital formation, which increases labour productivity and living standards. It involves a greater degree of control or influence than portfolio investment and is thus more likely to be associated with a lasting relationship and less likely to trigger financial crises (Caldera Sanchez and Gori, 2016). A lasting relationship also increases the likelihood of technological, skills and managerial quality transfers. FDI can open up access to global supply chains and markets, provides additional export opportunities and promotes competition in the domestic market. Recent panel data analysis of OECD countries finds a significant positive relationship between the inward stock of FDI and labour productivity (Sila et al., 2016).

Korea is a useful example, as it was the biggest reformer of FDI policies between 1997 and 2010 among a sample of 40 developed and emerging countries, which led to a dramatic increase in its inflows of FDI (Nicolas et al., 2013). Inward FDI introduced key technologies, improved management skills and has been identified as a causal factor in the country's strong economic growth (Kim and Hwang, 2000; Koojaroenprasit, 2012). In New Zealand foreign owned firms' labour productivity is almost twice as high as domestic firms' (Doan et al., 2014), and foreign investment between 1988 and 2006 is estimated to have increased incomes by NZD 3 300 per worker and increased national wealth by NZD 14 000 per person (Makin et al., 2008). However, the evidence for productive spillovers from foreign into locally owned firms is fairly weak and concentrated in the construction and retail sectors (Doan et al., 2014). The existence of spillover benefits in these sectors is consistent with analysis of a number of European countries, which finds strong spillovers from interactions with downstream customers in construction and from interactions with upstream suppliers in retail trade (Lesher and Miroudot, 2008).

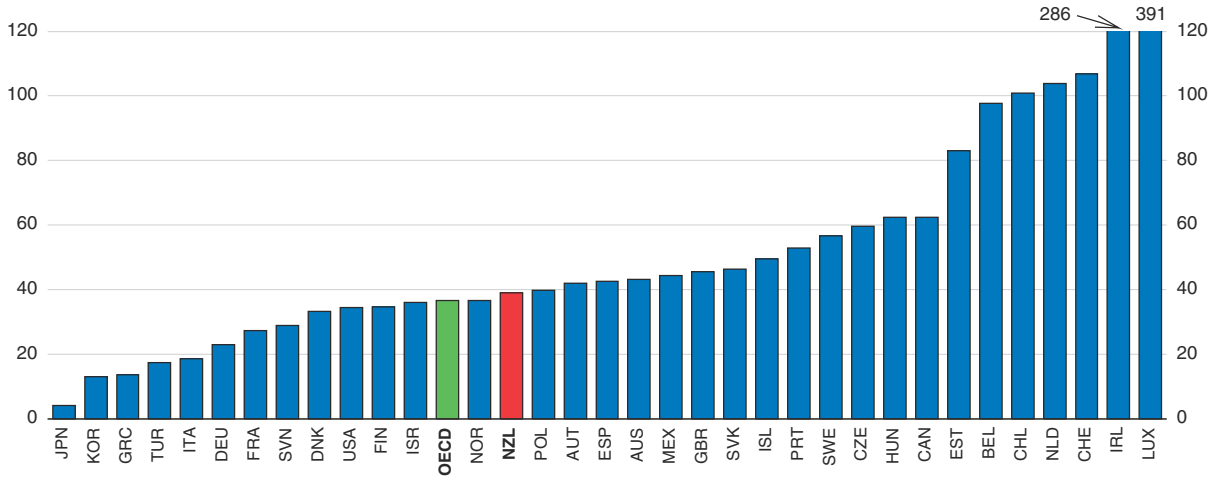
Despite the potential benefits, public attitudes and policies towards liberalisation of FDI inflows have been subject to considerable controversy, raising concerns about loss of national sovereignty and other possible adverse consequences. This is particularly the case

where FDI involves a controlling stake by often large multinational corporations over which domestic authorities, it is feared, have little power.

Inward FDI stocks in New Zealand are relatively low for a small open economy, particularly compared with such other small high-income OECD countries as Belgium, Ireland, the Netherlands and Switzerland (Figure 1.18). Inward FDI stocks are below the OECD average as a share of total inward investment (IMF, 2017). The NZ government recognises the importance of FDI, as reflected in the 2015 establishment of an investment attraction taskforce, which aims to identify and package investment opportunities and match them to foreign investors (NZ Government, 2015). Notwithstanding this support, New Zealand retains a comprehensive foreign investment screening process, something that has not substantially changed in several decades and does not exist in many other countries. Through restricting foreign entry, FDI screening is one of the key horizontal policy measures increasing New Zealand's Services Trade Restrictiveness Index (OECD, 2017a). There are further barriers in some industries, in particular in fisheries (where there is a prohibition of foreign ownership of fishing quotas) and telecommunications (where a foreign equity limit is enforced).

Figure 1.18. **Inward direct investment stock**

As a percentage of GDP, 2016 or latest available data



Source: OECD, *Foreign Direct Investment Database*.

StatLink http://dx.doi.org/10.1787/888933497262

New Zealand's FDI screening process is poorly targeted and imposes a higher threshold for approval than required to address community concerns, and imposes significant compliance costs on investors (Treasury, 2009). The time and resources required to assess FDI applications creates transaction costs and risks deterring FDI, even where proposals would be approved. The Overseas Investment Office assesses applications from foreigners seeking to invest in sensitive land, businesses valued at more than NZD 100 million and fishing quotas. Sensitive land is defined broadly, including all non-urban land over five hectares, certain specified islands, foreshores or seabed, reserves and historic areas, as well as land over 0.4 hectares that adjoins foreshores or seabed, nature reserves, local parks and reserves. All investment proposals that meet these thresholds must be assessed against subjective criteria that include the potential purchaser's business acumen and good character. In

practice, the private benefits of FDI involving sensitive land are not taken into consideration (Heatley and Howell, 2010). Uncertainty for investors is heightened because the relevant minister has discretion as to the weight given to each factor, and, unlike in most other OECD countries, investors cannot get a non-binding preliminary opinion on whether an investment will be blocked (Wehrle and Pohl, 2016). Also unlike most other OECD countries, there are no statutory timeframes for assessing FDI applications, although the Overseas Investment Office aims to make a decision within 30 to 70 working days from the date of application (Wehrle and Pohl, 2016). Compliance costs were reduced in 2016 for re-granting or transfer of leases and for repeat investors, but further steps could be taken to reduce compliance costs and uncertainty.

The scope of the FDI screening process should be narrowed, with mandatory notification informing a public register of other FDI investment. Such a reform would foster productivity improvements by removing barriers to FDI and would align with OECD guidance that "investment restrictions should be narrowly focused on concerns related to national security" (OECD, 2009, p. 3). A number of other countries (including Argentina, Brazil, Chile, Denmark, Germany, Israel, Lithuania, Norway, Spain, Turkey and the United Kingdom) have FDI review mechanisms designed to protect national security interests in a narrow range of sectors, such as defence, or land in border areas or near strategically important facilities (Wehrle and Pohl, 2016). Where screening is retained, investor certainty would be increased by transferring the onus from the investor having to show net benefit to the government having to demonstrate economic or other harm to reject an investment proposal (Guillemette, 2009).

Community concerns about foreign investment could be addressed by progressively removing screening requirements on sectors where FDI offers the greatest potential net benefits to New Zealand and does not raise national security concerns. Experience from Korea shows that opening up FDI gradually can be a useful way to overcome community concerns. There, FDI was initially unpopular when allowed within special economic zones but became more popular as the entry of foreign firms helped to generate employment, sustain production, upgrade technologies and reform corporate governance in the wake of the Asian Financial Crisis (Nicolas et al., 2013). Special economic zones have been proposed as one way to increase FDI flows into New Zealand (Crampton and Acharya, 2015), but regional derogation would be less satisfactory than reforming the national legislation. A sectoral approach would provide an opportunity to demonstrate tangible benefits from reducing FDI restrictions while targeting sectors with the largest potential net benefits, such as the construction and retail industries. Establishing a public register of FDI investment would incur only small (primarily one-off) administrative costs and could help to alleviate community concerns, as would emphasising that the NZ government retains sovereign control over activities on New Zealand land irrespective of ownership. Where possible, the NZ government should also pursue multilateral agreements as a means to reduce FDI barriers, which was an important factor in reducing barriers in Europe.

New Zealand's investment attraction taskforce would benefit from greater private-sector engagement, as foreshadowed in its recent update (NZ Investment Attraction Taskforce, 2016). International experience with such bodies indicates the importance of a lean and efficient structure and of having a board that consists of public- and private-sector representatives (OECD, 2015c).

Mechanisms to enhance integration with Australia should be explored

The economic geography challenges facing New Zealand point to the importance of its relationship with Australia as its major trading and labour market partner (McCann, 2009). Cooperation between Australia and New Zealand is underpinned by the Closer Economic Relations Trade Agreement (CERTA) and a number of related agreements (Box 1.3).

Box 1.3. **New Zealand-Australia economic relations**

A series of formal and informal agreements frame co-operation between Australia and New Zealand, underpinning:

- Free trade on substantially all goods under the CERTA. No tariffs or quantitative trade restrictions on goods originating in the Free Trade Area are permitted, while subsequent agreement eliminated anti-dumping actions between the trans-Tasman partners. The value of trans-Tasman trade in goods has grown on average by 8% each year since CERTA's adoption in 1983 (Australian Productivity Commission, 2015).
- Elimination of restrictions on trade in services except for prescribed industries under the CER Services Protocol. Exceptions are air services and coastal shipping in both countries and broadcasting and television (short-wave and satellite broadcasting), third-party insurance and postal services in Australia only.
- Free movement of people under the Trans-Tasman Travel Arrangements, with Australians and New Zealanders allowed to travel, live and work in one another's country without restriction.
- Lower compliance costs, higher screening thresholds and greater legal certainty of investment under the Protocol on Investment to CERTA.
- Mutual recognition of goods and occupations under the Trans-Tasman Mutual Recognition Arrangement, which allows (with a few exceptions) that a good that may be legally sold in Australia may be sold in New Zealand and vice versa, and that a person registered to practice an occupation in Australia is entitled to practice an equivalent occupation in New Zealand and vice versa.
- Harmonisation of business law provisions, with the aim of reducing transaction costs for firms that operate in both markets, under the Memorandum of Understanding on Harmonisation of Business Law.
- Reductions in other behind-the-border restrictions on trade by reducing differences in standards, regulations and policies through agreements including the Protocol on the Harmonisation of Quarantine Administrative Procedures, the Memorandum of Understanding on Technical Barriers to Trade, the Agreement on Standards, Accreditation and Quality and the Agreement Concerning a Joint Food Standards System.
- Equality of access for government purchases under the Australia and New Zealand Government Procurement Agreement.
- New Zealand ministerial participation in a number of Australian Ministerial Councils that facilitate consultation and joint action on issues such as aboriginal affairs, justice, gender, culture, education, health, energy, environment, local government, procurement, primary industries and workplace relations.

Source: Australian Department of Foreign Affairs and Trade (2016), *Australia-New Zealand Closer Economic Relations Trade Agreement*; Australian and New Zealand Productivity Commissions (2012), *Strengthening trans-Tasman economic relations*, Joint Study, Final Report; Australian Productivity Commission (2015), *Mutual Recognition Schemes*, Research Report.

Agreements between Australia and New Zealand achieve most of the requirements for a common market, but further integration could encourage more trade and investment. The Australian and New Zealand Governments' Single Economic Market approach to closer economic relations aims to harmonise the two economies' regulatory environment to enable businesses, consumers and investors to conduct operations across the Tasman seamlessly. One clear divergence from a common market is that FDI flows in both directions remain subject to screening requirements. While there are higher thresholds specified under the Protocol on Investment, screening of Australian-sourced FDI is still required where the investment involves 'sensitive land', which, as described above, is very broadly defined. If FDI screening were narrowed to focus on national security issues, there would be scope (potentially as part of a stronger bilateral agreement) to remove screening of all trans-Tasman investment not considered to raise national security concerns. Other aspects of a common market that are still lacking include integration of competition policy and banking supervision regimes (Australian and New Zealand Productivity Commissions, 2012).

Further integration through a customs union would offer potential benefits through the abolition of rules of origin requirements on trade in goods and services between the two countries. Such requirements divert resources for administrative tasks and can carry substantial compliance costs (Cado and de Melo, 2007). Rules of origin under the CERTA are based on the change-in-tariff-classification method: for the majority of tariff lines, an exporter must satisfy the condition that there has been a specified change in tariff classification between any imported materials from third countries and the completed good being exported to Australia or New Zealand. The change-in-tariff-classification method has the advantages of simplicity, transparency and relatively low administrative costs but still has drawbacks, as tariff classifications were not designed to confer origin (Cado and de Melo, 2007).

However, forming a full customs union would carry substantial implementation costs, and there are alternative ways to reduce the cost of rules-of-origin requirements. A customs union would require common external tariffs and would also restrict the freedom of the partners to pursue trade arrangements with third countries. The Australian and New Zealand Productivity Commissions (2012) recommended waiving CERTA rules of origin for all items for which Australia's and New Zealand's tariffs are at 5% or less and considering reduction of any tariffs above 5% to that level. This would be a practical means to access gains from removing rules of origin and from lower tariffs without the upfront costs of establishing a customs union but would need to be monitored to ensure that it does not encourage costly diversion of trade in specific items through the country with lower tariffs.

Fostering competition and addressing policy barriers to agglomeration

Boosting competition offers potential improvements in productivity through reallocation of resources to the most productive firms, greater diffusion of existing technologies to laggards, better managerial performance and increased incentives for innovation. Increasing competition can also offer distributional benefits by placing downward pressure on prices, which benefits consumers over shareholders – while these two groups will overlap to a large extent, shareholders are on average wealthier than consumers, with around 90% of equities, bonds, investment funds and other household financial assets held by households in the top net worth quintile (Statistics New Zealand, 2016a). Research has linked slowing productivity and rising inequality internationally with higher firm market power (Krugman, 2015; Reich, 2015; Council of Economic Advisors, 2016).

As discussed below, competition could be sharpened by addressing barriers in urban planning, reforming competition enforcement and regulation and improving bankruptcy legislation. Priority should be given to undertaking an expert review of competition in the construction industry, given its poor productivity relative to international peers, evidence of a lack of competition and its importance to the NZ economy (Box 1.4). Reforms to boost international connections set out above are also important to foster competition through cross-border commerce and FDI.

Box 1.4. **The effects of weak competition on construction industry productivity**

The construction industry produces about 50% of New Zealand's capital formation (Statistics New Zealand, 2016b) and is critical to delivering the expansion of housing supply needed to meet demand. While differences in local characteristics present challenges for comparisons, productivity levels in the NZ construction industry are low relative to Australia (Box 1.2; Mason, 2013) and the United Kingdom (Mason and Osborne, 2007). Recent productivity growth in the NZ construction industry (Jaffe et al., 2016) has been insufficient to close these gaps. At a disaggregated level, labour productivity in residential construction is below that in Australia, while the performance of non-residential construction is more favourable (NZIER, 2013a). Heavy and civil construction has the biggest labour productivity gap relative to Australia (NZIER, 2013a), although differences in the types of projects across the two countries – with mining projects more important in Australia – make comparisons difficult.

The NZ government has had a longstanding work programme investigating productivity issues in construction, including the Building and Construction Productivity Taskforce established in 2008, the Building and Construction Productivity Partnership between 2011 and 2014 and, as part of the government's response to a Productivity Commission inquiry into housing affordability, a 2013 Ministry of Business, Innovation and Employment (MBIE) study of productivity and competition in the residential construction industry. One valuable initiative coming out of MBIE's study was a suspension of anti-dumping actions on residential building materials until 31 May 2017, along with a tariff concessions scheme for a range of goods used in the construction of residential houses (due for review in 2019). Given the scope for import competition to contribute to housing and productivity goals, the NZ government should extend the suspension of anti-dumping actions on residential building materials beyond 2017. The experiment with a suspension of anti-dumping actions should be reviewed to establish whether this has delivered net benefits for consumers, with potential lessons for the use of anti-dumping measures in the rest of the economy.

One explanation of low productivity in the construction industry is a lack of competition in specific markets. Small and remote regions appear highly concentrated, as does heavy and civil construction (NZIER, 2013a). Price-cost margins are suggestive of a lack of competition: margins of just under 20% are lower than in many other industries in New Zealand (NZPC, 2014) but are higher than construction industry margins in eight of nine European countries, the United States and Japan (Bouis and Klein, 2008). Evidence of poor management skills and sluggish adoption of new technology in the construction industry (NZIER, 2013a) is also consistent with a lack of competition. Market entry is unattractive to foreign firms due to the small size of the NZ market, uncertainties around regulatory barriers (in particular, barriers to FDI and the planning process) and the absence of large parcels of urban land for development.

Box 1.4. **The effects of weak competition on construction industry productivity** *(cont.)*

A detailed market study of the construction industry by the Commerce Commission could be undertaken as an exercise of its proposed power to undertake market studies (discussed below). The Commerce Commission has identified the construction industry as particularly susceptible to cartel or price-fixing conduct and has launched a website to help firms in the sector increase their understanding of competition and consumer laws (Commerce Commission, 2014). In countries where the construction industry is characterised by a few large firms, competition policy is important for a flexible supply (Andrews et al., 2011). In New Zealand long vertically integrated supply chains in the building industry may hide anti-competitive behaviour (NZIER, 2013a), and strategic practices such as the provision of (non-transparent) rebates or targeted discounts have the potential to constrain access to distribution channels for building materials (MBIE, 2013). Competition in parts of heavy and civil construction is constrained by highly concentrated markets for asphalt, bitumen storage and concrete (NZIER, 2013b); while some domestic customers have access to bitumen imports, Z Energy is the sole remaining supplier of domestically refined bitumen following its 2016 acquisition of Chevron New Zealand (Commerce Commission, 2016). These issues point to the benefits of a detailed market study by a body with competition expertise and the power to demand information (including confidential information) from industry participants.

Cutting the number of government procurement contracts and increasing in their length have been cited as risking creating entry barriers, further raising market concentration (NZIER, 2013b). Greater concentration reduces choice in future tenders and facilitates supplier collusion. Compared with the rest of the sector, older and larger firms dominate heavy and civil construction, despite no evidence that scale boosts productivity but signs that older firms have lower productivity (Jaffe et al., 2016). Procurement could be improved by developing pipelines of work of different scale to develop a pathway for entry of firms of different sizes and levels of experience, with the objective of maintaining a workably competitive market to minimise the discounted long-term costs of procurement. The government should seek to reduce bid costs and avoid placing too much weight on local experience to further facilitate market entry.

Agglomeration economies are an important source of productivity growth, particularly in cities and industrial clusters (Glaeser, 2010). Across five OECD countries, a city with double the number of residents is estimated to have an average of around 4% higher productivity (Ahrend et al., 2017). In New Zealand the productivity premium in Auckland (compared with the national average) was very close to the OECD average of around 20% for major urban regions in the early 2000s (OECD, 2006). However, labour productivity in Auckland fell relative to the rest of the country between 2000 and 2012, and the Auckland premium in terms of GDP per capita fell from an average of 13% over the period 2000 to 2004 to 6% over 2011 to 2015 (OECD, 2016e; Statistics New Zealand, 2016c). This compares with an average GDP per capita premium of 13% for cities with a population over 1 million using the latest available data (OECD, 2016f). While there could be a number of explanations – including increases in dairy production outside Auckland and capital dilution during a period of rapid population growth in Auckland – the failure of rising population to deliver economic gains relative to the rest of the country suggests that policy settings relating to urban planning and infrastructure have curbed benefits from agglomeration in New Zealand's largest city.

The urban planning system has acted as a barrier to agglomeration and competition

The urban planning system has prevented housing supply from expanding to meet demand in areas where there has been rapid population growth, contributing to rising house prices and missed benefits from agglomeration. Planning decisions have suited some local concentrated interests but have had harmful wider effects, most notably rising land and housing costs. Land prices inside Auckland's urban boundary are nearly 10 times higher than outside, while a suite of complex and restrictive land-use rules (including maximum building heights, minimum lot sizes and parking requirements) have made inner-city development more difficult and expensive (OECD, 2017b), although many of these practices have been reduced or removed through the Auckland Unitary Plan (as described below). As a consequence, housing supply responsiveness lags far behind that in North America, Sweden and Denmark (Caldera Sanchez and Johansson, 2011). High housing costs inhibit people from moving into economically successful, highly productive urban areas, which can reduce national GDP by considerable margins (OECD, 2017c). Planning restrictions that prevent densification are particularly costly, as there is a negative relationship between a region's developed area per capita and its economic growth (OECD, 2017c). In New Zealand doubling density has been estimated to be associated with an 8.6% increase in productivity (Maré, 2008), and higher density areas have been shown to incur lower infrastructure costs for roads and water supply (Adams and Chapman, 2016).

Under-provision of transport and water infrastructure has also restricted development. Inadequate supply of infrastructure is commonly cited as a problem for doing business in New Zealand (World Economic Forum, 2016). Auckland and Wellington are estimated to have the second- and third-worst traffic congestion in Australasia, despite their relatively small size (TomTom, 2016). Nine out of 10 commutes in Auckland are by car, putting substantial pressure on the road network (OECD, 2017b). New Zealand has low rates of public transport use by developed-world standards, and rates have not increased since the early 2000s (NZPC, 2017). The latest available data (from 2014) show that New Zealand is among the bottom third of OECD countries for inland transport infrastructure investment as a share of GDP (OECD, 2016g). Rapid population growth due to high rates of immigration will place additional pressures on infrastructure: projections see demand continuing to increase faster than planned capacity and congestion worsening (Auckland Transport Alignment Project, 2016). The inability of water supply, sewerage and storm-water infrastructure to keep pace with demand has restricted developers' ability to deliver housing in a timely manner (NZPC, 2017).

Transport and water infrastructure is largely the responsibility of local governments in New Zealand and constraints on their finances have restricted provision. Central government does, however, retain a role in planning and funding land transport and almost NZD 1 billion of new spending on rail infrastructure over the next four years was announced in the 2017 budget. Analysis of fiscal systems suggests that local councils generally do not recover the cost of growth-related infrastructure over a council's 10-year planning horizon, and only around half of councils currently experiencing rapid population growth face net fiscal benefits from growth over 25 years (NZPC, 2016). Fiscal benefits from population growth therefore accrue mainly to central government through increases in income and goods and services tax revenue. Heavy reliance by councils on property tax (rate) revenue for infrastructure financing discourages municipalities from accommodating or promoting growth that would push up the tax bill of the existing population (OECD, 2017b), and council benchmarks for debt servicing levels are a further constraint on infrastructure spending (NZPC, 2017).

In recognition of the problems caused by an excessively restrictive planning system, special funding and exemptions have been introduced in critical areas. A NZD 1 billion infrastructure fund has been established to bring forward new roads and water infrastructure needed for new housing (English and Smith, 2016). The Government is currently consulting on a proposal for Urban Development Authorities, which are authorities given the powers to lead intensified urban development in a specific area. Special Housing Areas (regions or districts experiencing significant housing supply or affordability problems) enable faster and more permissive resource consenting processes and more limited notification of development. However, most of the designated Special Housing Areas within Auckland are situated in greenfield areas, potentially frustrating densification objectives (OECD, 2017b). It would also be preferable to reform the planning system rather than providing exemptions.

The recent Auckland Unitary Plan will allow greater densification and some expansion of urban development limits. It represents a major step forward in spatial planning, integrating land use, housing, transport, infrastructure and other urban planning issues. Nevertheless, permitted housing density follows a strange U-shape, with a fall in areas close to the city centre but higher density further out. This form is partly the result of insufficient infrastructure in areas close to the city centre. Large investments are being made in water and transport infrastructure to rectify this problem, which should permit the Plan to be revisited in the future to permit greater densification.

Urban planning has restricted competition in urban areas by discouraging or preventing the development of commercial activity outside designated areas, applying very detailed controls on the types and sizes of businesses that can operate in particular zones and seeking to reduce retail and commercial competition from other locations (NZPC, 2017).

Reforms to the urban planning system are needed

Greater use should be made of spatial planning to integrate land use, housing, transport, infrastructure and other urban planning issues, particularly outside Auckland where spatial planning is voluntary for councils (OECD, 2017b). Spatial planning that lays out a vision for each city's development with a focus on the types and locations of land-based infrastructure required has the potential to deliver better regional co-operation and understanding, more efficient use of existing infrastructure, enhanced responsiveness and cost savings. The Productivity Commission has also recommended that the future planning system should set clear limits and standards within which development can occur to ensure the integrity of natural systems and maintain environmental quality (NZPC, 2017). Greater resources should be provided for councils to build their technical capability in areas such as environmental science and economics in order to underpin a more flexible planning system (NZPC, 2017). Upfront consultation should be used to build a case for densification and overcome opposition from vested interests, particularly in low-density areas close to cities and along public-transport corridors once infrastructure shortages are addressed. The government should also address constraints on infrastructure delivery due to excessive underground private property rights, which can increase the cost of infrastructure due to suboptimal routing (Brown, 2016).

Funding options for water and transport infrastructure should be expanded

Insufficient infrastructure investment can have a number of negative consequences for productivity. In the short run under-provision of infrastructure leads to greater use of other inputs and thus reduces productivity. In the longer run insufficient infrastructure can deter

private investment and lead to firms avoiding New Zealand as a place to do business. Providing further funding options for local governments would enhance their incentives to accommodate growth by moving the cost burden away from existing residents.

Legislation to permit further user charging for infrastructure would foster efficient use and reduce the burden on local government budgets. Rapid advances in transport and communications technology provide new opportunities to use road pricing that increases during peak times, with potential for substantial improvements in system performance (Auckland Transport Alignment Project, 2016). However, road pricing is currently limited to three toll roads, no congestion pricing applies (as has been used effectively in London, Singapore and Stockholm), and legislation restricts pricing to new roads where an alternate toll-free route is available. In the same vein, relatively few councils have introduced volumetric charges for water, and legislation that prevents councils from applying volumetric charging for wastewater should be repealed (NZPC, 2017).

More systematic use of cost-reflective "development contributions" would provide incentives for efficient development decisions and provide relief to local government budgets. Development contributions are one-off levies imposed by territorial authorities on developers to finance parts of the capital costs associated with new development. NZ development contributions do not generally reflect the true underlying cost of infrastructure supply (which differs by location and type of development) (OECD, 2017b), and recent legislative amendments prohibit their use for most types of "community infrastructure", such as libraries and swimming pools.

Targeted rates could also be used to help fund infrastructure through land-value capture mechanisms, in which governments tax some of the property price increase due to infrastructure investment. This would allow councils to reap more of the benefits of population growth (OECD, 2015d). Land value capture mechanisms have been used to fund public infrastructure in Australia, including the Sydney Harbour Bridge. The experience there indicates that land value capture has merit as a potential funding source when a project has a sizeable group of beneficiaries beyond users. However, there can be practical difficulties maintaining levies after a project has been completed, and in matching levies to the magnitude and geographical distribution of benefits (Australian Productivity Commission, 2014).

Another way to diversify council revenue sources would be to allow land rezoning where owners are willing to pay for necessary infrastructure development. This could increase the supply of building sites while providing incentives for development to occur close to existing infrastructure networks but would need to be complemented by regulatory or market-based instruments to avoid developing ecologically valuable land. More generally, allowing councils to share in a revenue base linked to local economic activity (such as income or goods and services tax revenue) would increase their debt-servicing capacity so that they could make greater use of debt financing for infrastructure investments, the benefits of which extend over multiple generations.

Opportunities to make greater use of Public–Private Partnerships (PPPs) to finance infrastructure construction should continue to be investigated. PPPs can offer benefits through access to private technology and innovation (including internationally through FDI), enhanced private sector incentives to deliver projects on time and within budget, introducing competition "for the market", and encouraging better use of pricing and other efficiency-enhancing mechanisms (Australian Productivity Commission, 2014). However, the

small scale of projects and limited council experience and capability may restrict the benefits from PPPs in New Zealand. Successfully assessing risks and determining where to assign them is a complex task that requires substantial capacity in the procuring agency, which is presently lacking at the local government level (NZPC, 2017). There are a number of ways that this problem could be addressed, including developing capacity in local governments, accessing advice from a central agency (such as the Treasury's PPP team), or developing a central agency to source, procure and manage PPP contracts as in Canada.

Leveraging the productivity potential of regional and Māori economies

Regions are important in understanding New Zealand's productivity performance. Some regions have relatively lower GDP per capita and poor productivity performance (OECD, 2016e). Regional economic development based on partnership between central government agencies and local stakeholders can enhance productivity in different types of regions by better integrating and adapting public investments and service provision to local conditions. The NZ government has recently initiated a series of regional economic surveys under the Regional Growth Programme, followed by action plans led by local governments. Policy tools range from road and broadband infrastructure to business development support (in general and specific programmes for the primary sector, tourism, and the Māori population), investment attraction, regional research institutes and clusters. The Regional Economic Development Ministers' Group helps to ensure that regional issues are taken into account in policymaking at the central government level. This approach is consistent with the OECD's regional development policy framework, which emphasises the importance of partnership across levels of government to provide opportunity through a focus on region-specific assets (OECD, 2017d). Regional policy needs to remain focused on effectively meeting the specific needs of all regions, rather than redistribution toward and subsidies for lagging regions, which undermine productivity.

A key driver of several regional economies in New Zealand is Māori economic development. Māori represent 15% of the NZ population and, on average, are younger, have lower incomes and poorer social and health outcomes than non-Māori. A new Action Plan under New Zealand's strategy for boosting Māori economic performance – the Crown-Māori Economic Growth Partnership – will be released this year with the objective of growing a more productive, innovative and internationally connected Māori economic sector. It will be important that quantifiable targets be established for government actions in partnership with Māori and that this initiative be integrated with wider regional development efforts such as the Regional Growth Programme.

Reforming competition enforcement and regulation

As New Zealand's competition enforcement and regulatory agency, the Commerce Commission has a crucial role in fostering competition. Consultation is currently underway to allow the Commerce Commission to undertake market studies, which would help markets work better, especially when obstacles and distortions to competition are not caused by competition law violations (OECD, 2016h). Clear definition of the purpose and goals of market studies, the involvement of stakeholders, adequate funding and the capacity to demand information (including confidential information) will be important to drive the success of this initiative (International Competition Network, 2012). Other actions to support competition include passing the Commerce (Cartels and Other Matters) Amendment Bill, which would clarify the scope of prohibited cartel behaviour and remove exemptions from

the Commerce Act that allow price fixing in international shipping. As argued in previous *Surveys*, the exemption from Commerce Act provisions for airlines under the Civil Aviation Act should also be revoked (OECD, 2011).

The structure of the Commerce Commission – with a board of Commissioners responsible for decision making and management of operations delegated to a Chief Executive – broadly conforms to the OECD's best practice principles for the governance of regulators (OECD, 2014), but reforms could strengthen its independence and accountability. Current arrangements set out in the Commerce Act 1986 and the Crown Entities Act 2004 leave substantial discretion to the government of the day regarding appointments. The Commission's independence could be reinforced by requiring that an independent panel select nominees for Commissioner positions (as described in OECD, 2016i), followed by selection by the relevant Minister based on clear criteria. However, the limited pool of qualified people in New Zealand could be a constraint on implementing such a process. There are no limits on reappointment of Commissioners, which is contrary to the OECD's best practice principles. Continuity and institutional memory would be better served through staggered terms for Commissioners and the Chief Executive. While independent judicial appeal mechanisms through the High Court already exist for various Commerce Commission determinations, accountability could be enhanced by introducing periodic independent assessment of Commerce Commission decisions, as also recommended in previous *Surveys*.

The legislative treatment of firms with market power should be reviewed in order to determine how well the current provisions are addressing behaviour that undermines competition in New Zealand markets, and whether any change in this approach is required. Currently, New Zealand's (and Australia's) treatment of firms with market power is unusual. Firms are prohibited from taking advantage of market power only if they are doing so for the purpose of restricting entry, preventing or deterring competitive conduct or eliminating a competitor. Framing the law around intent can be problematic as proving the purpose of commercial conduct has proven difficult for competition regulators. In Australia amending legislation has been drafted to add a mechanism that brings firms under scrutiny based on the effect of commercial conduct on competition (an "effects test") (Harper et al., 2015).

Improving the insolvency regime

Efficient insolvency regimes contribute to productivity though facilitating reallocation of resources and should: i) incentivise restructuring of viable firms and liquidation of non-viable ones; ii) balance the interest of parties involved to ensure an equitable resolution without discouraging future risk-taking; and iii) provide a timely resolution of insolvency (Adalet McGowan and Andrews, 2016). New Zealand scores close to the OECD average on the OECD's indicator of the efficiency of insolvency regimes, leaving some room for improvement (Andrews et al., 2017). Facilitating liquidation of non-viable firms can be expected to reduce productivity disparities across firms, which can have inclusiveness benefits in the medium-term as lower productivity disparities are associated with less labour income inequality (OECD, 2016j).

New Zealand's insolvency regime should be reformed to address its weaknesses. The time taken to resolve an insolvency case in New Zealand is longer than in leading countries such as Japan, Ireland, Canada, Belgium and Finland (World Bank, 2016b). According to the OECD's indicator of insolvency regimes, arrangements for new financing and special procedures for SMEs are the least efficient aspects of the New Zealand regime (Andrews et al., 2017).

No priority is given to credit obtained after commencement of insolvency proceedings. This may impede continued trading of viable businesses by constraining access to credit – international best practice is to give priority to new financing ahead of pre-existing unsecured creditors. Consideration should be given to introducing separate insolvency regimes for SMEs and large firms. Reserving formal insolvency proceedings for firms of sufficient scale to cover the fixed costs involved is a key design feature that can potentially provide for more timely and cost-effective resolution of SMEs (Andrews et al. 2017). Conversely, where the NZ insolvency regime is already targeted toward the needs of SMEs, this could limit its suitability for large firms, which account for over 30% of employment (based on firms with 250 employees or more; OECD 2016k). Under New Zealand's insolvency regime a restructuring plan can be imposed on dissenting creditors by a majority, which is beneficial as this can boost aggregate productivity growth by promoting the timely restructuring of viable firms that encounter temporary financial difficulties. However, there is no requirement that dissenting creditors receive at least as much under a restructuring plan as they would under liquidation, which can have an adverse effect on credit supply.

There is also scope to improve New Zealand's personal insolvency regime, which affects the ability of entrepreneurs and small business owners to get a fresh start. Cross-country evidence suggests that entrepreneur-friendly insolvency laws can increase self-employment rates, increase small business owners' use of insolvency proceedings and attract better entrepreneurs (Adalet McGowan and Andrews, 2016). Consideration should be given to reducing the discharge period, which at three years is longer than in the United States, United Kingdom or Canada, and to relaxing bankruptcy conditions: there are currently few exemptions for pre-bankruptcy assets as well as strict restrictions on civil and economic liberties prior to discharge.

Facilitating capital investment

Barriers to investment associated with the tax system and SME financing contribute to New Zealand's weak rate of capital investment and hence its low labour productivity. Evidence from OECD countries indicates that high corporate taxes and weak financial development are associated with lower capital stocks (Egert, 2017). Along with the removal of barriers to FDI, measures to facilitate capital investment have the potential to boost wages and thus inclusiveness as labour productivity increases with a higher capital-labour ratio.

Tax reform could boost capital investment

New Zealand's broad-based, low-rate tax system is simple and efficient, but there are opportunities for reforms to improve its efficiency and equity while boosting productivity through greater capital investment. However, the last major system review was undertaken during 2009 (Tax Working Group, 2010). Now would be an appropriate time to take another detailed look at the system in the light of trends in international taxation and improvements in technology and data sharing.

The exclusion of imputed rents and capital gains from the tax base and generous tax provisions that allow rental property investors to offset short-term losses against other income favour housing investment and contribute to New Zealand's relatively low saving rate (OECD, 2011). Under simple assumptions, high-income earners pay a real effective tax rate of over 40% on bank deposits, compared with 25% on investment in rental housing and 0% on owner-occupied housing (Treasury, 2010). Generous tax treatment of housing can have adverse efficiency effects by distorting the allocation of saving and investment, as well as

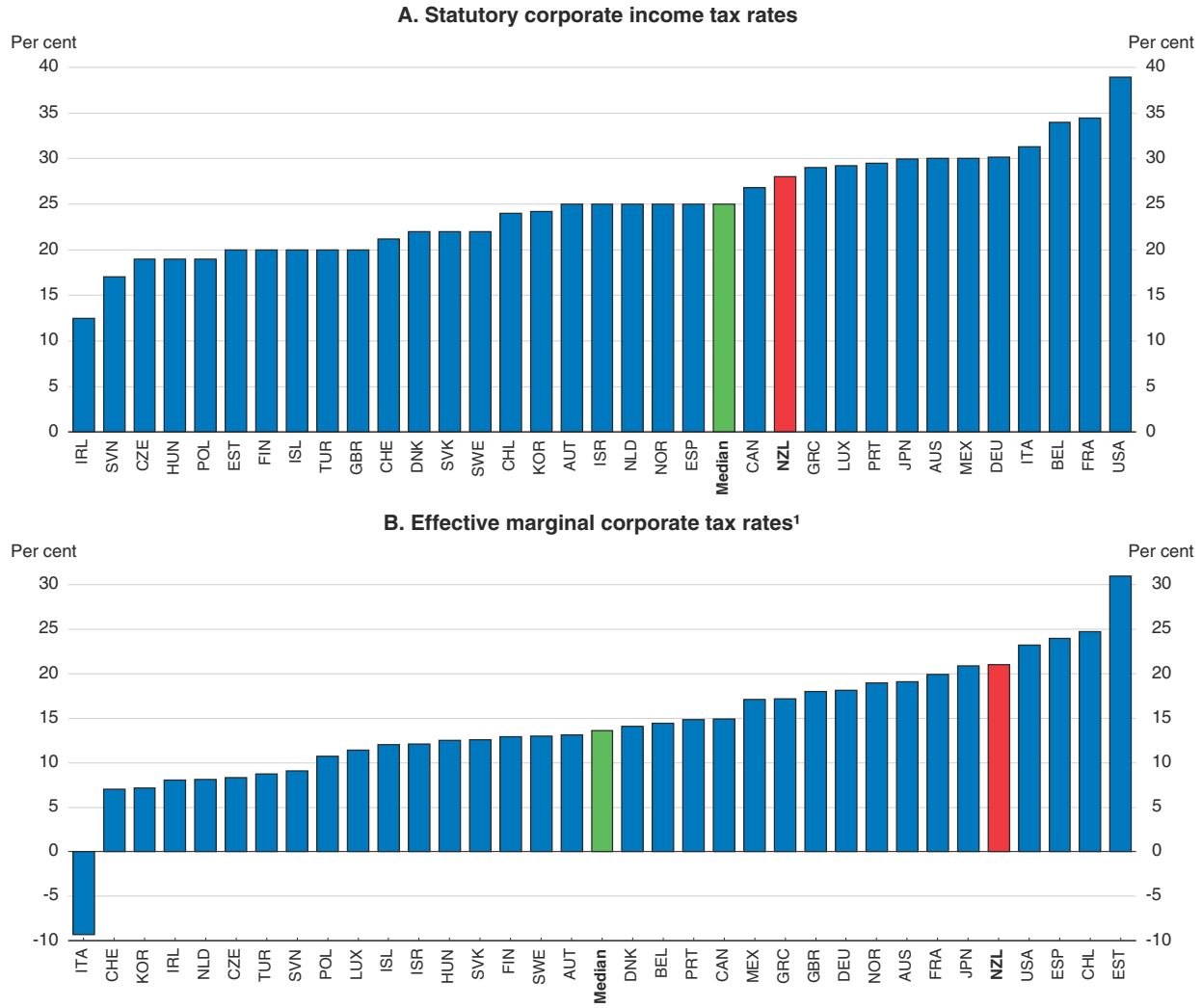
regressive distributional implications (Andrews et al., 2011). The tax-favoured nature of home ownership may have contributed to the sharp increase in the real price of NZ housing over the past 20 years and is likely to have encouraged excessive leveraging in pursuit of tax-preferred income (Brook, 2014). Real house price rises lower saving because capital gains (excluded from saving) increase homeowners' net worth, stimulating their consumption, and may reduce saving by recent house purchasers due to their need to finance higher interest payments on larger mortgages. The positive effect of house price growth on consumption has been estimated to be particularly strong in New Zealand (BIS, 2017).

New Zealand's high effective corporate tax rate increases the user cost of capital and thus reduces aggregate investment, FDI and entrepreneurial activity (Djankov et al., 2010), with substantial negative implications for economic growth (Johansson, 2016; Bartolini et al., 2017). As the Tax Working Group (2010) highlighted, it is difficult for New Zealand, as a small country, to maintain a high corporate tax rate while other countries continue to lower theirs. That trend has continued: five OECD countries implemented general corporate income tax reductions in 2015, and four have announced rate cuts in the coming years (OECD, 2016l). New Zealand's corporate tax rate of 28% is above the OECD median of 25% in 2016 (Figure 1.19, Panel A). The effective marginal corporate tax rate, which is more relevant for investment decisions, is considerably less competitive (Panel B). In contrast to most other countries, the effective tax rate is not much lower than the nominal rate in New Zealand owing to its relatively broad corporate income tax base. As having a broad tax base reduces the efficiency cost of taxation, the focus of measures to reduce the effective corporate tax rate should be on lowering the nominal rate (although there might also be scope to lower the effective rate by increasing building depreciation allowances towards the true economic rate). While the negative effect of New Zealand's high effective corporate tax rate is reduced because its remoteness often makes location decisions depend more on factors other than tax, a high corporate tax rate also increases incentives for multinational firms to shift profits abroad through tax planning (Inland Revenue and Treasury, 2016). Tax avoidance by multinational companies is estimated to have cost New Zealand more than NZD 600 million in 2013, or around 7% of total corporate tax revenue (Cobham and Jansky, 2017).

A lower effective corporate tax rate could increase the attractiveness of investing in New Zealand. Revenue raised from corporate taxation was just over 4% of GDP in the year to June 2016 (Treasury, 2016), so a cut to match the OECD median rate would reduce revenue by around 0.4% of GDP. However, the overall fiscal cost would be lower, as the cost of dividend imputation would also fall. Considering the capital tax base and the corporate tax rate as part of a holistic review of the tax system would allow trade-offs with other tax cuts to be considered, for example reductions in personal tax rates. A review could also consider other tax bases such as land (which is immobile and therefore taxing it is non-distortionary), capital gains and negative environmental externalities. One downside of a corporate tax cut is that some of the benefits accrue to foreign investors. From a productivity perspective, however, benefits for foreigners are important to attract foreign capital and boost labour productivity through raising the capital-labour ratio.

Another issue to consider is the scope to boost productivity by ensuring that tax provisions encourage saving. The NZ government has a strong record on saving, but not the private sector. Removing regulatory and infrastructure barriers to the expansion of housing supply (as discussed above) would reduce capital gains on property, obliging households to save more out of current income to meet their consumption objectives in retirement. The 2011 *Survey* advanced a number of policy options to address low private

Figure 1.19. **Corporate income tax rates, 2016**



1. The effective marginal corporate tax rate is the percentage increase in the cost of capital of a marginal investment – that is, an investment that pays just enough to make the investment worthwhile – as a result of the corporate income tax rate and tax base.

Source: OECD, *Tax Database*; Oxford University Centre for Business Taxation, CBT tax database.

StatLink http://dx.doi.org/10.1787/888933497276

saving, including extending automatic enrolment in the national retirement savings scheme (Kiwisaver) to all employees and considering an increase in the default contribution rate, as well as decreasing taxation of returns on non-housing saving vehicles (OECD, 2011). Reducing the tax rate on saving and corporate income would require other reforms that increase revenue, such as a capital gains tax or a land tax (Brook, 2014). Introducing a broad-based capital gains tax would address the favourable treatment of housing investment relative to deposits but would also increase taxation of saving and involve a number of trade-offs considered in previous studies (Table 1.2).

SME and entrepreneurship financing

As noted above, young firms are crucially important for the introduction of disruptive innovations, resource reallocation, the creation of new jobs and enhancing productivity

Table 1.2. **Key advantages and disadvantages of introducing a broad-based capital gains tax**

Based on a capital gains tax on realisation with no indexation for inflation

Advantages	Disadvantages
Increase progressivity of the tax system.[1]	Inefficient lock-in due to incentive to hold on to assets to avoid paying capital gains tax.
Improve horizontal equity by taxing income whether it is earned on capital gains or otherwise.	Taxes accrue on nominal as well as real gains.[2]
Improve efficiency through reducing tax-driven incentive to make investments in assets that provide capital gains rather than income, in particular housing.	In the absence of other tax changes, can discourage saving and investment through reducing post-tax returns, particularly if there are strict limits around relief for capital losses.
Reduce incentive to shelter income from tax by transforming ordinary income into capital gain.	Taxing gains on shares has potential for some double taxation of retained profits on which company tax has already been paid.[3]

1. US and Australian evidence indicates that taxation of capital gains is highly progressive. This is likely to be the case for New Zealand too, as the distribution of wealth is more unequal than that of income: the top 20% of NZ households own almost 70% of net wealth and more than 75% of net wealth excluding owner-occupied dwellings (Statistics NZ, 2016c).
2. This is a feature of a nominal tax system more broadly and is more important for taxation of interest-bearing assets. Because capital gains taxed on realisation benefit from deferral of tax payments, real after-tax gains increase over time and thus capital gains are less affected by taxation of nominal gains than are interest-bearing assets (Burman, 2009).
3. Retained profits are not subject to full double taxation to the extent that there is a value placed on unused imputation credits that can be used for future dividends, as this value will be capitalised into the value of the company and thus increase capital gains (Burman and White, 2009).

Source: OECD (2006), *Taxation of Capital Gains of Individuals: Policy Considerations and Approaches*, OECD Tax Policy Studies No. 14; OECD (2011), *OECD Economic Surveys New Zealand*, OECD Publishing; Tax Working Group (2010), *A Tax System for New Zealand's Future*, Report of the Victoria University of Wellington Tax Working Group; Treasury and Inland Revenue (2009), "The Taxation of Capital Gains", *Background Paper for the Tax Working Group*.

growth. More developed markets for seed and early-stage venture capital are positively associated with resource flows to patenting firms (Andrews et al., 2014) and are associated with a larger size of new-entrant firms and higher post-entry growth (Calvino et al., 2015). There is a case for public support for venture capital investment on the grounds that it generates knowledge spill-over benefits that are not taken into account by investors, with international estimates indicating that venture capital generates three times as much innovation as an equal amount of corporate R&D (Lerner, 2010). Start-up financing in New Zealand is supported by the government's NZ Venture Investment Fund (NZVIF), which invests alongside private venture capital funds (through the NZD 260 million Venture Capital Fund) and angel investors (through the NZD 40 million Seed Co-Investment Fund). While NZ venture capital investment has grown, it remains below the OECD median (Figure 1.10).

A strength of the NZVIF model is that it pairs government funding with private-sector investors who are likely to be much better placed than the government to choose investment opportunities and provide mentoring to businesses. Returns for private investors are leveraged as NZVIF shares fully in losses but can take a lower share of gains where investors exercise their option to buy out NZVIF investment. International studies show that a mix of public and private venture capital funding can have a positive impact on the provision of venture capital, but further analysis is needed to understand the drivers of those results (Wilson, 2015). Successful venture capital programmes internationally, such as Australia's Innovation Investment Funds and the US Small Business Innovation Research Program, have had similar designs (OECD, 2016m).

The government should closely monitor outcomes under the Venture Capital and Seed Co-Investment Funds. Further funding may be required, but care is needed to make sure

additional funding is incremental and justified by a market-failure rationale. An impact assessment of the extent to which NZVIF investments have provided direct and spillover benefits would be worthwhile. It is also important for governments to help overcome market failures in SME and entrepreneurship financing. In particular, government should address SMEs' skills gaps in finance and provide information for credit-risk assessment of SME financing in order to encourage investors' participation (OECD, 2015e).

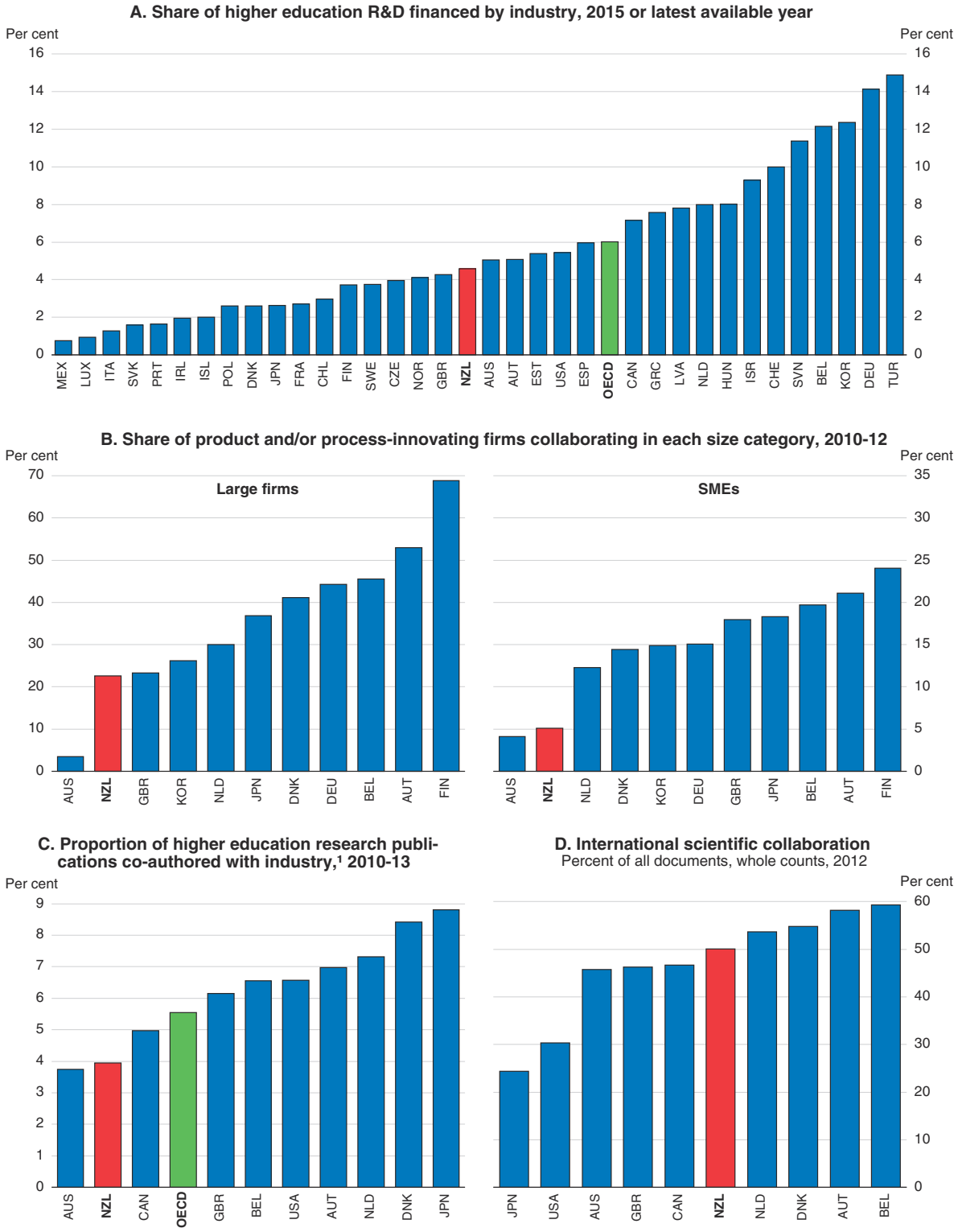
Investment in innovation

As highlighted above, NZ R&D expenditure is low compared with other OECD countries, particularly business expenditure on R&D. While this may reflect geographic factors and industry composition to some extent, low R&D spending is associated with weak MFP growth and hinders the adoption of foreign technologies. There is a limited amount of collaboration between firms and higher education or research institutions, both in terms of the share of higher education R&D funded by industry and the share of firms collaborating, in particular for small firms (Figure 1.20, Panels A and B). Only a small proportion of higher education research publications are co-authored with industry (Panel C). Collaboration between firms and research institutions is particularly important for small businesses that otherwise might not have access to advanced machinery and skilled personnel (OECD, 2015a). The lack of collaboration is thus especially concerning, given the importance of small firms to the NZ economy. International collaboration by researchers in New Zealand is above the OECD median (Figure 1.20, Panel D). However, authors from small countries are more likely to engage in international collaboration, and more intensive collaboration among many small OECD peers suggests there is potential for further improvement if NZ researchers can use digital technologies to overcome the disadvantage of being located further from potential international collaborators.

Current policy provides relatively low levels of support

Government support for business R&D in New Zealand is unusual compared with other OECD countries in terms of both the low level of support and the absence of R&D tax incentives that provide an enhanced (i.e. greater than 100%) allowance for eligible expenses (Figure 1.21). The R&D tax loss credit that took effect in the 2015-16 tax year does provide favourable treatment for R&D expenditure by allowing net losses to be "cashed out" instead of carried forward. However, this applies only under very specific conditions: the firm must make a net loss, have at least 20% of total expenditure on R&D labour expenditure and meet further corporate eligibility conditions. R&D performed by NZ firms grew by more than 8% per year between 2010 and 2016 but remains well below that of most other OECD countries. Government funding of business R&D is low not just in absolute terms but also as a proportion of business R&D (11%, compared with an OECD average of more than 13%). Assistance is primarily delivered through Callaghan Innovation, a government agency that administers R&D grants. R&D growth grants are available to businesses that have spent at least 1.5% of their revenue in the last two financial years on R&D, while project grants are targeted at firms that are not eligible for a growth grant, such as firms undertaking their first R&D (Callaghan Innovation, 2015). The cost of marginal R&D projects in New Zealand can be reduced by 20% if the business receives a growth grant, or as much as 40% where a business is eligible for a project grant. Where marginal R&D is not eligible for grants – for example, firms with annual R&D spending of more than NZD 25 million per year – there is zero reduction in the marginal cost. The NZ government has committed to increasing its expenditure on R&D (NZ Government, 2016).

Figure 1.20. **Collaboration by NZ researchers**



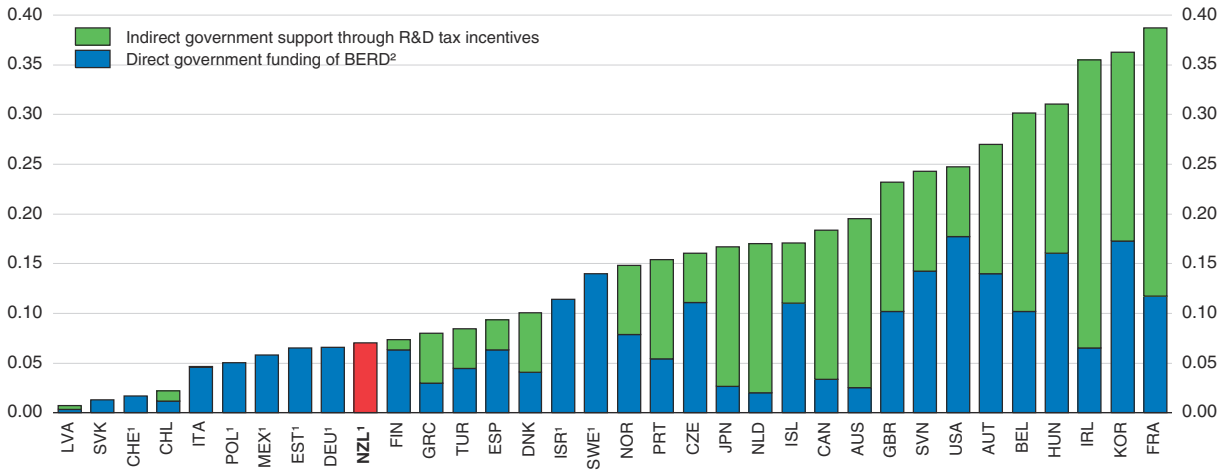
1. Includes universities having produced more than 5000 publications during 2010-13.

Source: Statistics New Zealand; OECD, Main Science and Technology Indicators Database; OECD (2015), *OECD Science, Technology and Industry Scoreboard 2015*, Figures 3.3.1 and 3.10.1; Leiden University (2016), CWTS Leiden Ranking 2016.

StatLink http://dx.doi.org/10.1787/888933497644

Figure 1.21. **Direct and indirect funding of business R&D by governments**

As a percentage of GDP, 2014 or latest available data



1. Estonia, Germany, Mexico, New Zealand and Switzerland did not provide any indirect government support through R&D tax incentives. For Israel, the R&D component of incentives cannot be identified separately at present. No data on the cost of expenditure-based R&D tax incentive support are currently available for Poland and Sweden. Data on direct government support for New Zealand are for the year to March 2016.
2. Business enterprise expenditure on R&D.

Source: OECD (2017), *R&D Tax Incentive Indicators*, *http://oe.cd/rdtax* and *Main Science and Technology Indicators*, *http://oe.cd/msti;* Statistics New Zealand.

StatLink *http://dx.doi.org/10.1787/888933497282*

The Innovative New Zealand package provided additional science and innovation funding in the 2016 and 2017 budgets, including increased funding for R&D grants to meet rising demand while maintaining the same rate of support.

Increasing support for R&D could boost productivity, but evidence for New Zealand remains mixed

While there is a need to tailor the level of support to specific country settings, empirical studies suggest that a socially efficient correction for market failures should reduce the marginal cost of R&D by around 50% (IMF, 2016b). Fiscal support for R&D is typically justified on the basis of addressing market failures associated with difficulties for firms to fully appropriate returns to R&D investment (spillovers) and difficulties in finding external finance, particularly for small or young firms (OECD, 2016n). Higher R&D spending is inclusive in that it is associated with higher disposable income for households across the income distribution (OECD, 2016j). Increasing innovation in an economy also improves income mobility, providing opportunities for people throughout the income distribution (Aghion et al., 2015, 2016).

Evidence regarding the benefits of R&D for NZ firms is somewhat mixed. There is little evidence that higher intangible investment (which includes, but is not limited to, R&D investment) is associated with higher productivity or profitability (Chappell and Jaffe, 2016). Receipt of an R&D grant significantly increases the probability of applying for a patent or introducing new goods and services but has much weaker effects on process innovation (Jaffe and Le, 2015) and has no significant effect on average productivity across all firms (Wakeman, 2017a). There is evidence that innovative NZ firms grow faster than other firms but still struggle to improve their productivity (Wakeman, 2017b). While none of these

studies sought to estimate the spillover benefits from R&D – and thus the optimal level of government support – the lack of benefit accruing to NZ firms suggests that spillovers from NZ R&D may also be small. These results are consistent with the finding that factors relating to New Zealand's size, distance from major economic centres, industry composition and small average firm size militate against R&D activity (Crawford, 2007). It is also consistent with returns to innovation increasing with market size (Acemoglu and Linn, 2004).

The average rate of support for R&D of 11%, as noted above, is well below the socially efficient level indicated by international empirical studies. There is thus scope for productivity gains from increasing the overall level of support and an immediate need to remove the annual cap on R&D growth grants in order to promote firm growth and spill-overs from R&D by large firms, which play a leading role in carrying out large-scale innovations.

Grant assistance for R&D could be complemented by a broad-based R&D tax incentive, as grants and tax incentives have different strengths (Table 1.3). One advantage of introducing an R&D tax incentive that provides an enhanced allowance for R&D expenditure is that it could reduce the administrative burden of R&D support. In 2015-16 Callaghan Innovation spent more than NZD 13 million on business R&D contract management, accounting for more than 8% of the total value of grants awarded (Callaghan Innovation, 2016). Most OECD countries use a combination of direct grants and R&D tax incentives to support business R&D (Figure 1.21). Whether grants or tax incentives are preferred, the innovation and R&D funding system should be streamlined with a view to reducing transaction and administrative costs (OECD, 2017b).

Table 1.3. **Relative strengths of tax incentives and grants to support business R&D**

Tax incentives to support R&D	Grants to support R&D
Broad-based scheme that minimises administrative costs and avoids the need for governments to pick winners, with attendant costs from rent-seeking and lobbying.	Scope to target specific areas with bigger spillovers and/or public goods.
More suited to encouraging R&D activities oriented to development of applications that have the potential to be brought to the market within a reasonable timeframe.	Better for supporting the research component of R&D, which occurs earlier in the process and typically carries bigger spillovers.
Open-ended entitlements that do not generally require annual spending authorisation and can therefore maintain marginal incentives for further R&D spending.	Provides immediate benefits to capital-constrained start-ups.

Further adjustments to innovation policy are warranted

As a small country New Zealand is likely to be at the forefront of research only in some specific areas, and it is likely to be cheaper and more effective to import knowledge (embodied in goods imports or through FDI) in many other areas. This heightens the importance of focusing R&D in specific areas, as well as the importance of a rigorous and transparent selection process. The 2015-25 National Statement of Science Investment partially shifted research funding from budget allocations for research institutions to contestable funding open to all institutions and science fields so as to improve R&D spending efficiency and support impact-driven science (MBIE, 2015). This has the potential to improve value for money by increasing research quality and relevance but should be monitored to ensure that uncertain funding does not negatively affect career development and retention of human resources for science and technology, as occurred previously for some Crown Research Institutes (OECD, 2007). New Zealand already allocates more public funds through

project-based funding than institutional block funding, in contrast to most other OECD countries (OECD, 2016o).

Fiscal and other support could improve collaboration between research institutions and industry in New Zealand, with potential productivity benefits through sharing of risk, exploiting economies of scale and scope, and addressing information asymmetries between firms. Initiatives to encourage this type of collaboration can also shrink the productivity gap between less and more productive firms, potentially reducing labour income inequality (OECD, 2016j). Existing initiatives include student grants administered by Callaghan Innovation, financial incentives for industry linkages, and funding for Centres of Research Excellence and to commercialise publicly funded research through the Commercialisation Partner Network. These types of initiatives offer potential benefits, particularly where there is stable long-term support for particular R&D collaborations (Innovation Policy Platform, 2016).

There is a need for government to strengthen financial incentives for industry linkages, as incentives for career success within tertiary institutions remain focused on scientific publications. This could be pursued by including industry linkages more explicitly as a criterion in evaluation for the Performance-Based Research Fund, as for 'knowledge exchange' funding in the United Kingdom and the allocation of Research Block Grants in Australia, with the allocation of the latter to be based on a greater weight for research income from business and other end-users from 2017 (OECD, 2017e). The Australian Government also plans to promote, through engagement with universities, revision of the appointment and promotion arrangements for academics so that time spent in business is given greater recognition (Australian Government, 2016a).

Finally, there are potential benefits from greater coordination between support for start-ups provided by Callaghan Innovation and by the NZVIF. Callaghan Innovation provides such support through several programmes including business incubators and accelerators, which rely on good mentoring to help start-ups develop to a point where angel or venture capital funding might be attracted. The overlap between these programmes and angel and venture capital funding through NZVIF means that the two organisations need to work more closely together. For example, the limited number of people with the requisite skills and experience to act as mentors is a strong argument for Callaghan and NZVIF working together to shortlist experts best placed to assist the start-ups that their programmes are supporting.

Recommendations to improve productivity in New Zealand's economy

(Key recommendations are in bolded italics)

Promote international connections

- ***Progressively narrow screening of foreign investment. Continue to reduce compliance costs and boost predictability for investors.***
- Reform trade facilitation through improving information availability, making more extensive use of advance rulings, expanding acceptance of copies of documents and improving multilateral border agency co-operation.
- Waive rules-of-origin requirements for trade between New Zealand and Australia on all items for which tariffs in both countries are at 5% or less, and reduce any tariffs above 5% to that level.

Recommendations to improve productivity in New Zealand's economy *(cont.)*

(Key recommendations are in bolded italics)

Promote benefits from agglomeration

- ***Enhance councils' incentives to accommodate growth, for example by sharing in a tax base linked to local economic activity. Apply user charging more broadly for infrastructure, including congestion charging.***
- Pursue further options to broaden funding for infrastructure, including targeted property taxes that capture increases in land value from the provision of new amenities and more cost-reflective developer contributions. Further develop alternative delivery models, such as Public–Private Partnerships.
- Make greater use of spatial planning to coordinate new housing development with infrastructure provision.

Drive productivity improvements through enhanced competition

- ***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.***
- Facilitate competition in construction through a Commerce Commission market study into the industry and extending suspension of anti-dumping actions on residential building materials beyond 2017.
- Reduce the time taken to resolve insolvency cases, and investigate whether continued trading of viable firms is impeded by not giving priority for new financing ahead of pre-existing unsecured creditors. Consider introducing separate insolvency regimes for SMEs and large firms.

Reform the tax system to remove barriers to capital investment

- ***Undertake a tax review that considers corporate and personal income tax settings and potential new tax bases.***

Increase investment in innovation

- ***Increase fiscal support for business research and development.***
- ***Maintain or increase long-term support for successful collaboration between research institutions and industry.***
- Remove the annual cap on growth grants for research and development.

Bibliography

Acemoglu, D. and J. Linn (2004), "Market Size in Innovation: Evidence from the Pharmaceutical Industry", *Quarterly Journal of Economics*, Vol. 119, No. 3, pp. 1048-90.

Adalet McGowan, M. and D. Andrews (2016), "Insolvency Regimes and Productivity Growth: A Framework for Analysis", *OECD Economics Department Working Papers*, No. 1309, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jlv2jqhxgq6-en*.

Adams, M. and R. Chapman (2016), "Do Denser Urban Areas Save on Infrastructure? Evidence from New Zealand Territorial Authorities", *Policy Quarterly*, Vol. 12, No. 4, pp. 63-70.

Aghion, P., U. Akcigit, A. Bergeaud, R. Blundell and D. Hémous (2015), "Innovation and Top Income Inequality", *NBER Working Papers*, No. 21247.

Aghion, P., U. Akcigit, A. Hyytinen and O. Toivanen (2016), "Living the 'American Dream' in Finland: The Social Mobility of Innovators", Presentation at the Annual Meeting of the American Economic Association, San Francisco.

Ahrend, R., E. Farchy, I. Kaplanis and A. Lembcke (2017), "What Makes Cities More Productive? Agglomeration economies and the role of urban governance: Evidence from 5 OECD Countries", *OECD Productivity Working Papers*, No. 2017-02, OECD Publishing, Paris.

Andrews, D., M. Adalet McGowan and V. Millot (2017), "Insolvency Regimes, Zombie Firms and Capital Reallocation", *OECD Economics Department Working Papers*, OECD Publishing, Paris, forthcoming.

Andrews, D., A. Caldera Sánchez and Å. Johansson (2011), "Housing Markets and Structural Policies in OECD Countries", *OECD Economics Department Working Papers*, No. 836, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kgk8t2k9vf3-en*.

Andrews, D. and F. Cingano (2014), "Public Policy and Resource Allocation: Evidence from Firms in OECD Countries", *Economic Policy*, April 2014, pp. 253-96.

Andrews, D., C. Criscuolo and P. Gal P (2016), "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", *OECD Productivity Working Papers*, No. 2016-05, OECD Publishing, Paris.

Andrews, D., C. Criscuolo and C. Menon (2014), "Do Resources Flow to Patenting Firms?: Cross-Country Evidence from Firm Level Data", *OECD Economics Department Working Papers*, No. 1127, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jz2lpmk0gs6-en*.

Arvis, J., D. Saslavsky, L. Ojala, B. Shepherd, C. Busch, A. Raj and T. Naula (2016), *Connecting to Compete 2016: Trade Logistics in the Global Economy*, The World Bank, Washington, DC.

Auckland Transport Alignment Project (2016), *Auckland Transport Alignment Project: Supporting Information*, *www.transport.govt.nz/assets/Uploads/Land/Documents/ATAP-Supporting-Information.pdf*.

Australian Government (2016a), "Delivering a High-Performing Research Sector in Australia: Watt Review Response", May.

Australian and New Zealand Productivity Commissions (2012), *Strengthening Trans-Tasman Economic Relations*, Joint Study, Final Report.

Australian Productivity Commission (2014), *Public Infrastructure*, Inquiry Report, Melbourne.

Australian Productivity Commission (2015), *Mutual Recognition Schemes*, Research Report, Melbourne.

Ballingal, J. and D. Pambudi (2016), "Quantifying the Costs of Non-Tariff Measures in the Asia-Pacific Region: Initial Estimates", *NZIER Public Discussion Paper*, Working Paper No. 2016/4, Wellington.

Barnes, S., R. Bouis, P. Briard, S. Dougherty and M. Eris (2013), "The GDP Impact of Reform: A Simple Simulation Framework", *OECD Economics Department Working Papers*, No. 834, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kgk9qjnhkmt-en*.

Bartolini, D., O. Akgun, B. Cournède, A. Johansson and J.-M. Fournier (2017), "Tax Policy and Long-Term Economic Growth", *OECD Economics Department Working Papers*, Paris, forthcoming.

BIS (2017), *BIS Quarterly Review March 2017: International Banking and Financial Market Developments*, Basel.

Bouis, R. and C. Klein (2008), "La concurrence favorise-t-elle les gains de productivité? Analyse sectorielle dans les pays de l'OCDE", *Economie et Statistique*, No. 419-420, pp. 73-99.

Brook, A. (2014), "Options to Address New Zealand's Saving-Investment Imbalance", *New Zealand Treasury Working Paper*, No. 14/17, Wellington.

Brown, W. (2016), "When tunnel vision is blind", *National Business Review*, September 16.

Burman, L. (2009), "Taxing capital gains in Australia: assessment and recommendations." in: *Australian Business Tax Reform in Retrospect & Prospect,* Thomson Reuters, Sydney.

Burman, L. and D. White (2009), "Taxing Capital Gains in New Zealand: Assessment and Recommendations", *Background Paper for Consideration at the Third Session of the Tax Working Group*, Wellington.

Cado, O. and J. de Melo (2007), "Why OECD Countries Should Reform Rules of Origin", *The World Bank Research Observer,* Vol. 23, No. 1, pp. 77-105.

Caldera Sanchez, A. and F. Gori (2016), "Can Reforms Promoting Growth Increase Financial Fragility? An Empirical Assessment", *OECD Economics Department Working Papers*, No. 1340, OECD Publishing, Paris.

Caldera Sánchez, A. and Å. Johansson (2011), "The Price Responsiveness of Housing Supply in OECD Countries", *OECD Economics Department Working Papers*, No. 837, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5kgk9qhrnn33-en*.

Callaghan Innovation (2015), *Guidelines: Ministerial Direction for Business R&D Grants*, Wellington.

Callaghan Innovation (2016), *Annual Report 2016*, Auckland.

Calvino, F., C. Criscuolo and C. Menon (2015), "Cross-country evidence on start-up dynamics", *OECD Science, Technology and Industry Working Papers*, No. 2015/06, OECD Publishing, Paris.

Chappell, N. and A. Jaffe (2016), "Intangible Investment and Firm Performance", *Motu Working Paper*, No. 16-14, Wellington.

Cobham, A. and P. Jansky (2017), "Global distribution of revenue loss from tax avoidance", *WIDER Working Paper*, No. 2017/55, United Nations University World Institute for Development Economics Research, Helsinki.

Commerce Commission (2014), "Commerce Commission Launches Website for Construction Industry", *Media Release*, 7 May, Wellington.

Commerce Commission (2016), *Z Energy cleared to acquire Chevron subject to divestments*, Media Release, *www.comcom.govt.nz/the-commission/media-centre/media-releases/detail/2016/z-energy-cleared-to-acquire-chevron-subject-to-divestments*.

Conway, P. (2016), "Achieving New Zealand's Productivity Potential", *Productivity Commission Research Paper*, No. 2016/1, Wellington.

Council of Economic Advisers (2016), *2016 Economic Report of the President*, US Government Printing Office, Washington, DC.

Crampton, E. and K. Acharya (2015), *In the Zone: Creating a Toolbox for Regional Prosperity*, The New Zealand Initiative, Wellington.

Crawford, R., R. Fabling, A. Grimes and N. Bonner (2007), "National R&D and Patenting: Is New Zealand an Outlier?", *New Zealand Economic Papers*, Vol. 41, No. 1, pp. 69-90, *http://dx.doi.org/10.1080/00779950709558499*.

Criscuolo, C., P.N. Gal and C. Menon (2014), "The Dynamics of Employment Growth: New Evidence from 18 Countries", *OECD Science, Technology and Industry Policy Papers*, No. 14, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jz417hj6hg6-en*.

Dabla-Norris, E., S. Guo, V. Haksar, M. Kim, K. Kochhar, K. Wiseman and A. Zdzienicka (2015), "The New Normal: A Sector-Level Perspective on Productivity Trends in Advanced Countries", *IMF Staff Discussion Note*, SDN/15/03, Washington.

de Serres, A., N. Yashiro and H. Boulhol (2014), "An International Perspective on New Zealand's Productivity Paradox", *NZPC Working Paper*, No. 2014/1.

Djankov, S., T. Ganser, C. McLiesh, R. Ramalho and A. Shleifer (2010), "The Effect of Corporate Taxes on Investment and Entrepreneurship", *American Economic Journal: Macroeconomics 2*, July, pp. 31-64.

Doan, T., K. Iyer and D. Maré (2014), "Productivity spillovers from foreign direct investment in New Zealand", *Ministry of Business, Innovation and Employment Occasional Paper*, No. 14/01, Wellington.

Egert, B. (2017), "Regulation, institutions and aggregate investment: New evidence from OECD countries", *OECD Economics Department Working Paper*, OECD Publishing, Paris, forthcoming.

English, B. and N. Smith (2016). *$1b fund to accelerate housing infrastructure*, *www.beehive.govt.nz/release/1b-fund-accelerate-housing-infrastructure*.

Glaeser, E. (2010), "Introduction", in *Agglomeration Economics*, The University of Chicago Press, *www.nber.org/books/glae08-1*.

Green, R., R. Agarwal, P. Brown, H. Tan and K. Randhawa (2011), "Management Matters in New Zealand: How Does Manufacturing Measure Up?", *Ministry of Economic Development Occasional Paper*, No. 11/03, Wellington.

Grimes, A., C. Ren and P. Stevens (2012), "The need for speed: impacts of internet connectivity on firm productivity", *Journal of Productivity Analysis*, Vol. 37, pp. 187-201.

Guillemette, Y. (2009), "Structural Policies to Overcome Geographic Barriers and Create Prosperity in New Zealand", *OECD Economics Department Working Papers*, No. 696, OECD Publishing, Paris, *http://dx.doi.org/10.1787/224223031816*.

Guy, N. and N. Wagner (2016), "Low-risk travellers streamlined at the border", Budget release, 26 May, *www.beehive.govt.nz/release/low-risk-travellers-streamlined-border*.

Haltiwanger, J., R. Jarmin and J. Miranda (2012), "Who Creates Jobs? Small versus Large versus Young". *Review of Economics and Statistics*, Vol. 95, No. 2, pp. 347-61, *http://dx.doi.org/10.1162/REST_a_00288*.

Harper, I., P. Anderson, S. McCluskey and M. O'Bryan QC (2015), *Competition Policy Review*, *Final Report*, Commonwealth of Australia, March.

Heatley, D. and B. Howell (2010), "Overseas Investment: Is New Zealand Open for Business?", New Zealand Institute for the Study of Competition and Regulation.

Høj, J., M. Jiminez, M. Maher, G. Nicoletti and M. Wise (2007), "Product Market Competition in the OECD Countries: Taking Stock and Moving Forward", *OECD Economics Department Working Papers*, No. 575, OECD Publishing, Paris, *http://dx.doi.org/10.1787/108734233645*.

International Aviation Transport Association (2015), *Annual Review 2015*, Miami.

International Competition Network (2012), *Market Studies Good Practice Handbook*, Advocacy Working Group, Rio de Janeiro.

IMF (2016a), *New Zealand: Selected Issues*, IMF Country Report No. 16/40, Washington.

IMF (2016b), *Fiscal Monitor: Acting Now, Acting Together*, April, Washington

IMF (2017), *International Investment Position by Indicator*, IMF Data Warehouse.

Innovation Policy Platform (2016), *R&D collaboration of universities and PRIs with firms*, *www.innovationpolicyplatform.org/content/rd-collaboration-universities-and-pris-firms*.

Inland Revenue and Treasury (2016), *New Zealand's Taxation Framework for Inbound Investment: A Draft Overview of Current Tax Policy Settings*, Wellington.

Jaffe, A. and T. Le (2015), "The Impact of R&D Subsidy on Innovation: a Study of New Zealand Firms", *NBER Working Paper*, No. 21479, *www.nber.org/papers/w21479*.

Jaffe, A., T. Le and N. Chappell (2016), "Productivity distribution and drivers of productivity growth in the construction industry", *Motu Working Paper*, No. 16-08, Wellington.

Johansson, Å. (2016), "Public Finance, Economic Growth and Inequality: A Survey of the Evidence", *OECD Economics Department Working Papers*, No. 1346, OECD Publishing, Paris, *http://dx.doi.org/10.1787/094bdaa5-en*.

Kim, J. and S. Hwang (2000), "The Role of Foreign Direct Investment in Korea's Economic Development: Productivity Effects and Implications for the Currency Crisis", in *The Role of Foreign Direct Investment in East Asian Economic Development*, NBER-EASE Vol. 9, University of Chicago Press.

Koojaroenprasit, S. (2012), "The Impact of Foreign Direct Investment on Economic Growth: A Case Study of South Korea", *International Journal of Business and Social Science,* Vol. 3, No. 21, pp. 8-19.

Kowalski, P., J. Lopez Gonzalez, A. Ragoussis, and C. Ugarte (2015), "Participation of Developing Countries in Global Value Chains: Implications for Trade and Trade-Related Policies." *OECD Trade Policy Paper,* No. 179, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5js33lfw0xxn-en*.

Krugman, P. (2015), "Challenging the Oligarchy", *The New York Review of Books*, 17 December.

Lentz, R. and D. Mortensen (2008), "An Empirical Model of Growth Through Product Innovation", *Econometrica*, Vol. 76, No. 6, pp. 1317-73.

Lerner, J. (2010), "The Future of Public Efforts to Boost Entrepreneurship and Venture Capital", *Small Business Economics*, Vol. 35, Issue 3, pp. 255-64.

Lesher, M. and S. Miroudot, (2008), "FDI spillovers and their interrelationship with trade", *OECD Trade Policy Working Paper*, No. 80, *www.oecd.org/dataoecd/63/42/41457019.pdf*.

Maddison, A. (2001), *The World Economy: A Millennial Perspective*, OECD Development Centre, Paris.

Makin, A., W. Zhang and G. Scobie (2008), "The contribution of foreign borrowing to the New Zealand Economy", *NZ Treasury Working Paper*, No. 08/03, Wellington.

Mano, R. and M. Castillo (2015), "The Level of Productivity in Traded and Non-Traded Sectors for a Large Panel of Countries", *IMF Working Paper*, Washington.

Maré, D. (2008), "Labour Productivity in Auckland Firms", *Ministry of Economic Development Occasional Paper*, No. 08/09, Wellington.

Mason, G. (2013), "Investigating New Zealand–Australia Productivity Differences: New Comparisons at Industry Level", *Working Paper*, No. 2013/02, NZ Productivity Commission, Wellington.

Mason, G. and M. Osborne (2007), "Productivity, Capital-Intensity and Labour Quality at Sector Level in New Zealand and the UK", *New Zealand Treasury Working Paper*, No. 07/01, Wellington.

McCann, P. (2009), "Economic Geography, Globalisation and New Zealand's Productivity Paradox", *New Zealand Economic Papers*, Vol. 43, No. 3, pp. 279-314.

McDermott, J. (2013), "Understanding the New Zealand Exchange Rate", speech delivered by John McDermott, Assistant Governor and Head of Economics at the Reserve Bank of New Zealand to Federated Farmers, Wellington, November.

Ministry of Business, Innovation and Employment (MBIE) (2013), "Residential Construction Sector: Market Study", *Options Paper,* Wellington.

MBIE (2015), *National Statement of Science Investment: 2015-2025*, Wellington.

MBIE (2016), "Competition in New Zealand Industries: Measurement and Evidence", *Occasional Paper* 16/01, Wellington.

Meehan, L. (2014). "Structural Change and New Zealand's Productivity Performance", *NZPC Research Note*, No. 2014/4, Wellington.

Nicolas, F., S. Thomsen and M. Bang (2013), "Lessons from Investment Policy Reform in Korea", *OECD Working Papers on International Investment*, No. 2013/02, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5k4376zqcpf1-en*.

NZ Customs Service (2015), *Annual Report 2014-15*, Wellington.

NZ Government (2015), *International Investment for Growth*, Business Growth Agenda, Wellington.

NZ Government (2016), *Business Growth Agenda: Towards 2025*, Wellington, *www.mbie.govt.nz/info-services/business/business-growth-agenda/towards-2025*.

NZ Investment Attraction Taskforce (2016), *Update November 2016*, *www.nzte.govt.nz/media/7090601/1042-investment-taskforce-ar-web.pdf*.

NZIER (2011), "Industry productivity and the Australia–New Zealand income gap", *NZIER Public Discussion Document*, Working Paper No. 2011/3, Wellington.

NZIER (2013a), "Construction Productivity: An Evidence Base for Research and Policy Issues", *NZIER Report to the Building & Construction Sector Productivity Partnership*, Wellington.

NZIER (2013b), "Construction Industry Study: Implications for Cost Escalation in Road Building, Maintenance and Operation", *NZIER Final Report to the Ministry of Transport*, Wellington.

NZPC (NZ Productivity Commission) (2014), *Boosting Productivity in the Services Sector*, Inquiry Report, Wellington.

NZPC (2016), *Better Urban Planning*, Draft Report, Wellington.

NZPC (2017), *Better Urban Planning*, Inquiry Report, Wellington.

OECD (2006), *Taxation of Capital Gains of Individuals: Policy Considerations and Approaches*, *OECD Tax Policy Studies No.* 14, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264029507-en*.

OECD (2007), *Reviews of Innovation Policy: New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/19934211-en*.

OECD (2009), *Guidelines for Recipient Country Investment Policies Relating to National Security*, Recommendation adopted by the OECD Council on 25 May, OECD Investment Division, Paris.

OECD (2011), *OECD Economic Surveys: New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-nzl-2011-en*.

OECD (2014), *The Governance of Regulators*, OECD Best Practice Principles for Regulatory Policy, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264209015-en*.

OECD (2015a), *The Future of Productivity*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264248533-en*.

OECD (2015b), *Indicators of Product Market Regulation*, Paris, *www.oecd.org/economy/growth/indicatorsof productmarketregulationhomepage.htm*.

OECD (2015c), *Policy Framework for Investment 2015 Edition*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264208667-en*.

OECD (2015d), *OECD Economic Surveys New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-nzl-2015-en*.

OECD (2015e), *New Approaches to SME and Entrepreneurship Financing: Broadening the Range of Instruments*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264240957-en*.

OECD (2016a), *Better Life Index: New Zealand*, *www.oecdbetterlifeindex.org/countries/new-zealand/*.

OECD (2016b), *The Productivity–Inclusiveness Nexus*, OECD Publishing, Paris.

OECD (2016c), "Business Enterprise R&D Expenditure by Industry (ISIC 4)", *Research and Development Statistics*, *https://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDUSTRY_ISIC4*.

OECD (2016d), *Trade Facilitation Indicators*, *www.oecd.org/trade/facilitation/indicators.htm*.

OECD (2016e), *OECD Regional Outlook 2016: Productive Regions for Inclusive Societies*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264260245-en*.

OECD (2016f), "Metropolitan Areas Database", *Regional Statistics and Indicators*, *www.oecd.org/gov/regional-policy/regionalstatisticsandindicators.htm*.

OECD (2016g), "Infrastructure Investment", *OECD Data*, *https://data.oecd.org/transport/infrastructure-investment.htm*.

OECD (2016h), *Competition and Market Studies in Latin America: The case of Chile, Colombia, Costa Rica, Mexico, Panama and Peru*, OECD Publishing, Paris.

OECD (2016i), *Being an Independent Regulator*, The Governance of Regulators, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264255401-en*.

OECD (2016j), "Promoting Productivity and Equality: A Twin Challenge", *OECD Economic Outlook*, Vol. 2016, Issue 1, OECD Publishing, Paris.

OECD (2016k), *Entrepreneurship at a Glance 2016*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/entrepreneur_aag-2016-en*.

OECD (2016l), *Tax Policy Reforms in the OECD 2016*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264260399-en*.

OECD (2016m), *OECD Economic Surveys Canada*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eco_surveys-can-2016-en*.

OECD (2016n), *OECD Business and Finance Outlook 2016*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264257573-en*.

OECD (2016o), "New Zealand", in *OECD Science, Technology and Innovation Outlook 2016*, OECD Publishing, Paris *http://dx.doi.org/10.1787/sti_in_outlook-2016-en*.

OECD (2017a), *OECD Services Trade Restrictiveness Index (STRI): New Zealand*, Trade and Agriculture Directorate, Paris.

OECD (2017b), *Environmental Performance Review: New Zealand*, OECD Publishing, Paris.

OECD (2017c), *The Governance of Land Use*, Joint work of the Working Party on Rural Policy and the Working Party on Urban Policy, OECD Publishing, Paris.

OECD (2017d), *Regional Development Policy*, *www.oecd.org/gov/regional-policy/regionaldevelopment.htm*.

OECD (2017e), *OECD Economic Surveys Australia*, OECD Publishing, Paris.

Reich, R.B. (2015), *Saving Capitalism: For the Many, not the Few*, Knopf, New York.

Reserve Bank of Australia (RBA) (2016), "The Australian economy and financial markets", *Chart Pack*, Sydney.

Reserve Bank of New Zealand (RBNZ) (2016), "S20 banks: summary income statement and related ratios", *Statistics*, Wellington, *www.rbnz.govt.nz/statistics/s20*.

Rose, D. (2009), "Overseas Indebtedness, Country Risk and Interest Rates", *Policy Quarterly*, Vol. 5, Issue 1, pp. 3-8.

Saia, A., D. Andrews and S. Albrizio (2015), "Productivity Spillovers from the Global Frontier and Public Policy: Industry-Level Evidence", *Economics Department Working Papers,* No. 1238, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5js03hkvxhmr-en*.

Sila, U., H. Morgavi and J. Dall'Orso (2016), "Trends in Productivity and Sources of Productivity Growth in Slovenia", *Economics Department Working Papers,* No. 1368, OECD Publishing, Paris, *http://dx.doi.org/10.1787/a6691907-en*.

Statistics New Zealand (2010), *Labour Hours Paid for Productivity Statistics*, Wellington.

Statistics New Zealand (2016a), *Household Net Worth Statistics: Year Ended June 2015*, Wellington. *www.stats.govt.nz/browse_for_stats/people_and_communities/Households/HouseholdNetWorthStatistics_HOTPYeJun15.aspx*.

Statistics New Zealand (2016b), *National Accounts: Income and Expenditure, www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/NationalAccountsIncomeExpenditure_MRYeMar15.aspx*.

Statistics New Zealand (2016c), *National Accounts: Regional GDP, www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/regional-gdp-info-releases.aspx*.

Statistics New Zealand and Treasury (2010), *Taking on the West Island: How Does New Zealand's Labour Productivity Stack Up?*, Wellington.

Tax Working Group (2010), *A Tax System for New Zealand's Future*, Report of the Victoria University of Wellington Tax Working Group, Wellington.

TomTom (2016), *TomTom Traffic Index*, *www.tomtom.com/en_gb/trafficindex/list*.

Treasury (2009), *Review of the Overseas Investment Screening Regime*, Policy Document and Regulatory Impact Statement, draft *www.treasury.govt.nz/publications/informationreleases/overseasinvestment/pdfs/oi-cpa-ris-oir.pdf*.

Treasury (2010), *Saving in New Zealand – Issues and Options*, New Zealand Government, Wellington.

Treasury (2016), *Financial Statements for the Government of New Zealand for the Year Ended 30 June 2016*, Wellington, *www.treasury.govt.nz/government/financialstatements/yearend/jun16*.

Wakeman, S. (2017a), "The Impact of R&D Grants on the Performance of New Zealand Firms", *Productivity Commission Research Note,* No. 2016/5, Wellington, forthcoming.

Wakeman, S. (2017b), "Innovation and the Performance of New Zealand Firms", *Productivity Commission Staff Working Paper*, No. 2016/2, Wellington, forthcoming.

Wehrlé, F. and J. Pohl (2016), "Investment Policies Related to National Security: A Survey of Country Practices", *OECD Working Papers on International Investment*, No. 2016/02, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5jlwrrf038nx-en*

Wilson, K.E. (2015), "Policy Lessons from Financing Innovative Firms", *OECD Science, Technology and Industry Policy Papers*, No. 24, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5js03z8zrh9p-en*.

World Bank (2016a), *Doing Business 2017: Equal Opportunity for All*, 14th Edition, Washington.

World Bank (2016b), "Resolving Insolvency", *Doing Business: Measuring Business Regulations*, *www.doingbusiness.org/data/exploretopics/resolving-insolvency*.

World Economic Forum (2016), *The Global Competitiveness Report 2016-17*, Insight Report, K. Schwab (ed.), Geneva.

© OECD 2017

Chapter 2

Adapting to the changing labour market

Technological change is increasing the productivity of highly skilled workers but creating more challenging labour-market conditions for their low-skilled counterparts. These pressures are likely to grow, especially in light of progress being made in Artificial Intelligence. The NZ labour force is upskilling to meet these challenges, but more progress will be needed to keep ahead of the race with technology. Young New Zealanders will need to continue their education to higher levels than in the past and acquire skills that are more highly valued in the labour market. To maintain valuable skills, workers of all ages will need to engage more in lifelong learning. Some will need to retrain when their occupation becomes obsolete. Getting the most out of skills will also depend on allocating skills to their most productive uses. Reducing New Zealand's high rates of qualification and skills mismatches would boost both wages and productivity. With the possibility of more workers being displaced than in the past, greater efforts may need to be considered to help them get back into jobs.

Technical progress is changing the labour market and, with advances in digitalisation, notably Artificial Intelligence (AI), may have even more profound effects in the not so distant future. Technical progress has increased the productivity of more-skilled workers, whose skills are complementary to new technologies, relative to low-skilled workers, and can be expected to continue to do so (Bessen, 2016). Low-skilled workers are likely to face increasingly challenging labour market conditions (Arntz et al., 2016). To hold down well paid jobs, workers will need to upskill, notably by acquiring skills that are in demand. For this to occur, students will need good information about the labour market consequences of their study choices, and the education and training system will need to be responsive to skills demand emanating from the labour market. The need to engage in lifelong learning is also likely to be greater than ever. In many cases workers will need to retrain for new occupations because their old occupations will become obsolete. With the possibility of more workers being displaced than in the past, greater efforts may be needed to help get such workers back into work. Some predominantly low-skilled welfare beneficiary groups, notably disability- and sole parent beneficiaries, face challenging labour market conditions, calling for reinforced activation measures so that their skills can grow instead of atrophying, which would facilitate better integration of these groups into society.

For New Zealanders to get the most out of their skills, it is not just a question of adapting them to labour market requirements and using them, but also of whether or not skills are allocated to their most productive uses. New Zealand stands out as having substantial skills mismatches. Reducing them would increase both wages and productivity. To a large extent, many of these mismatches are attributable to the preponderance of very small firms in New Zealand and a relatively high share of part-time work. Even so, steps could be taken to reduce mismatches. One way of reducing over-qualification is for more young New Zealanders to acquire qualifications in fields with good labour market prospects as this would reduce the proportion of field-mismatched workers, many of whom are obliged to accept work that only requires lower levels of education attainment. To reduce mismatch in information-processing skills (such as literacy, numeracy and problem solving in a technologically rich environment), the most important reforms are those that increase the responsiveness of new housing supply to demand, thereby reducing the cost to workers of relocating to find a better job match.

This chapter begins with a discussion of the labour market implications of skill-biased technological change, including labour force upskilling, the future of work and the emergence of non-standard working arrangements. The remainder considers policies to facilitate adaptation to these challenges. Such policies include those aimed at increasing education attainment, reducing qualification and skills mismatches, strengthening information-processing skills, helping displaced workers get back to work and reinforcing activation of those disabled with unused work capacity and of sole parents.

The labour market implications of technical change

Employment is growing faster for high-skilled workers than for others

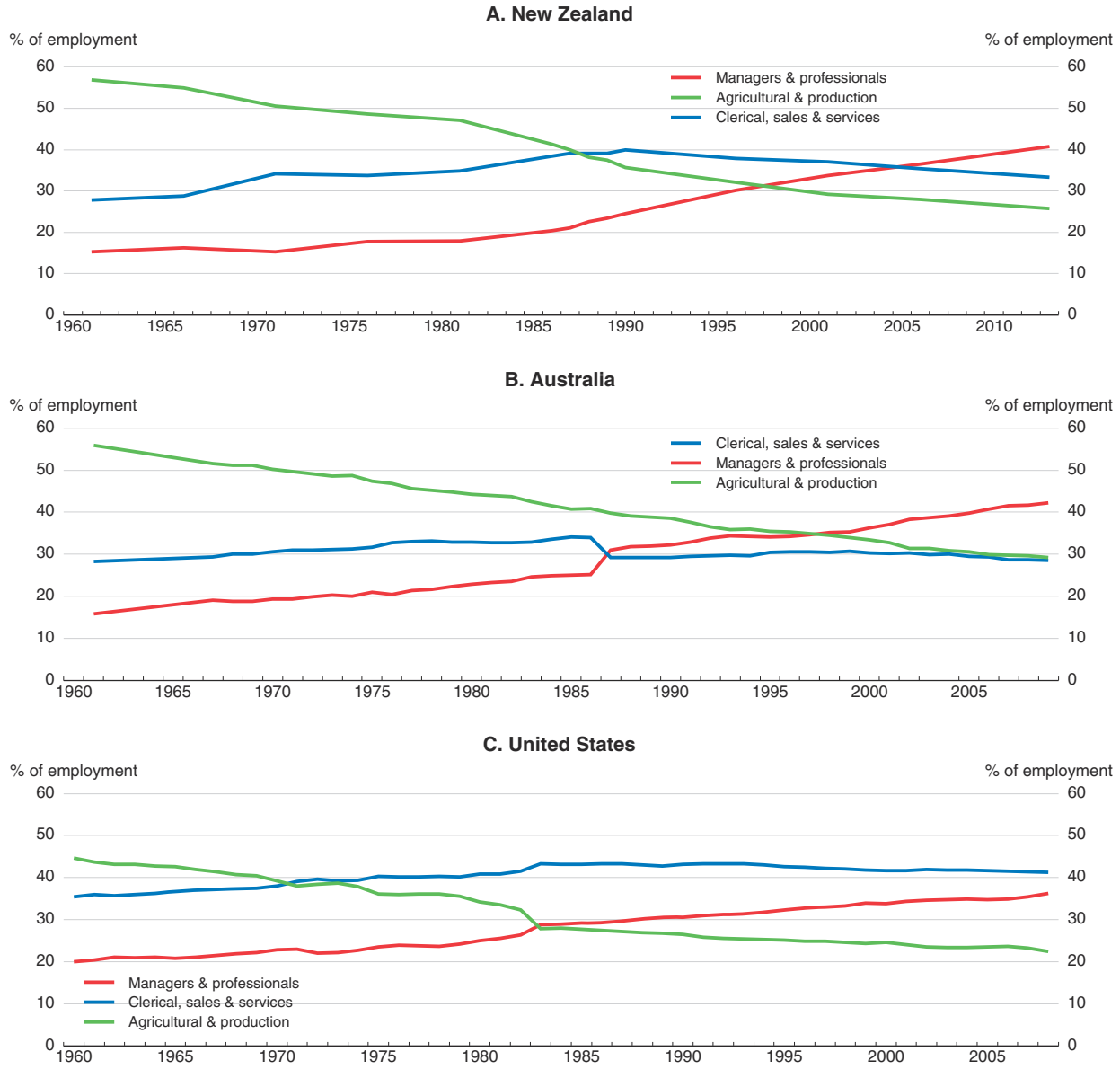
Technical change has long been increasing demand for more highly skilled workers relative to demand for other workers. In the early 20th century the diffusion of electricity boosted productivity in industry and services, increasing demand for workers with complementary skills and reducing it for low-skilled labour, especially in the agricultural sector. The process continued as subsequent waves of technology were diffused, including telephones, the automobile, aeroplanes and, especially since the 1980s, information and communications technology (ICT). Technical change is increasing the demand for more highly skilled workers relative to others because high-skilled workers are complementary to the new technologies, which increases their productivity.

The effects of technical change can be seen in the more rapid growth of employment in occupations with high average levels of education attainment than in others. In New Zealand the share of workers employed in high-skilled occupations, such as professionals and managers, has increased since 1960, while the share in predominantly low-skilled occupations, such as production and related workers and agricultural workers, has declined (Figure 2.1, Panel A). The employment share for other occupations, which have average education levels between these two groups, rose until the early 1990s but has since fallen, reversing most of the increase since 1950. Similar patterns can be observed in other OECD countries (Handel, 2012), including Australia (Panel B) and the United States (Panel C), albeit less pronounced and later than in New Zealand.

From the early 1980s to the late 1990s, the job shift toward high-skilled occupations and away from low-skilled occupations in New Zealand was particularly rapid, even relative to the United States. The NZ spurt is likely to have been associated with structural reforms that increased product-market competition and made public enterprises more efficient (reducing over manning with low-skilled workers). Low-skilled workers displaced at this time took longer to find new jobs than their high-skilled counterparts, contributing to the sharp shift towards high-skilled workers. A faster increase in educational attainment in New Zealand (and Australia) than in the United States at this time is likely also to have contributed.

Job skill requirements appear to have been increasing slowly in OECD countries, giving time for the labour force to adapt, notably through educational choices. Handel (2012) finds that both for the United States and Europe the shifts in employment shares associated with evolution towards a post-industrial society involve rising demand for both cognitive and interpersonal skills and declining demand for both skilled and unskilled physical abilities. In the United States, for example, mean job education requirements increased by 0.15 years over 1997-2009. Over the same period, mean cognitive, verbal and interpersonal/social skill requirements rose by 0.07-0.11 standard deviations. By contrast, mean craft, physical and repetitive skill requirements declined by 0.02-0.06 standard deviations. At these rates it would take 80 years for job education requirements to rise by one year and for cognitive and skills demands to rise by 0.5-0.75 standard deviations. Within broad occupational groups, there was virtually no change in average skill requirements. Similar results pertain for Europe. While New Zealand was not included in this study, there was little variation in results for the countries that did participate, suggesting that the conclusions may well also be applicable to New Zealand. This is all the more likely, given that occupational skill measures tend to be similar across countries (Handel, 2012) and that

Figure 2.1. **Long-run broad occupational employment shares**



Source: M. Handel (2012), "Trends in Job Skill Demands in OECD Countries", *OECD Social, Employment and Migration Working Papers*, No. 143; Statistics New Zealand, 2013 Census QuickStats about work and unpaid activities, Table 11.

StatLink http://dx.doi.org/10.1787/888933497301

shifts in occupation employment shares in New Zealand are similar to those in many other OECD countries.

Since the 1980s, digitalisation has been the dominant form of technical change. It has automated many repetitive tasks, a process referred to as routine-replacing technical change. This has most affected many middle-skilled jobs. By contrast, high-skilled jobs have many abstract tasks, and many low-skilled jobs, such as personal carers, require motor skills, judgement and/or social interaction (Autor et al., 2003). Routine-replacing technical change is hypothesised to lie behind the rise in employment shares of high- and low-skilled occupations in Europe and the United States in recent decades and falls in the shares of middle-skilled

occupations, a phenomenon known as polarisation or "hollowing out" (Autor, 2015; Goos et al., 2014). In New Zealand the employment share rose markedly for high-skilled occupations over 1991-2011, whether classified on the basis of earnings or average years of education, but fell for middle-skilled and low-skilled occupations, especially the former (Table 2.1).

Table 2.1. **Levels and changes in occupational employment shares in New Zealand, 1991-2011**

	Average employment share in 1991	Percentage point change in employment share, 1991-2011
Occupations[1]		
High paid	19.5	7.3
Middle paid	50.2	-5.5
Low paid	30.3	-2.5
High education	35.4	9.5
Middle education	48.6	-7.1
Low education	16.0	-2.5

1. Occupations are defined at the two-digit level of the classification system in use up until 2011. High-paid (low-paid) occupations have median earnings one standard deviation above (below) the all occupation average, while middle-paid occupations have median earnings within one standard deviation of the all occupation average.
High-education occupations typically require tertiary education. They include teaching professional, other professionals, life science professionals, science professionals, life science associate professors, public administration, science associate professors, other associate professors and corporate managers.
Middle-education occupations typically call for upper secondary attainment. They include office clerks, customer service, building trades, metal and machinery trades, precision trades, agriculture and fisheries personal services, sale persons and other trades.
Low education occupations have limited educational requirements. These occupations include industrial plant operators, building and related occupations, machine operators, elementary occupations and drivers.

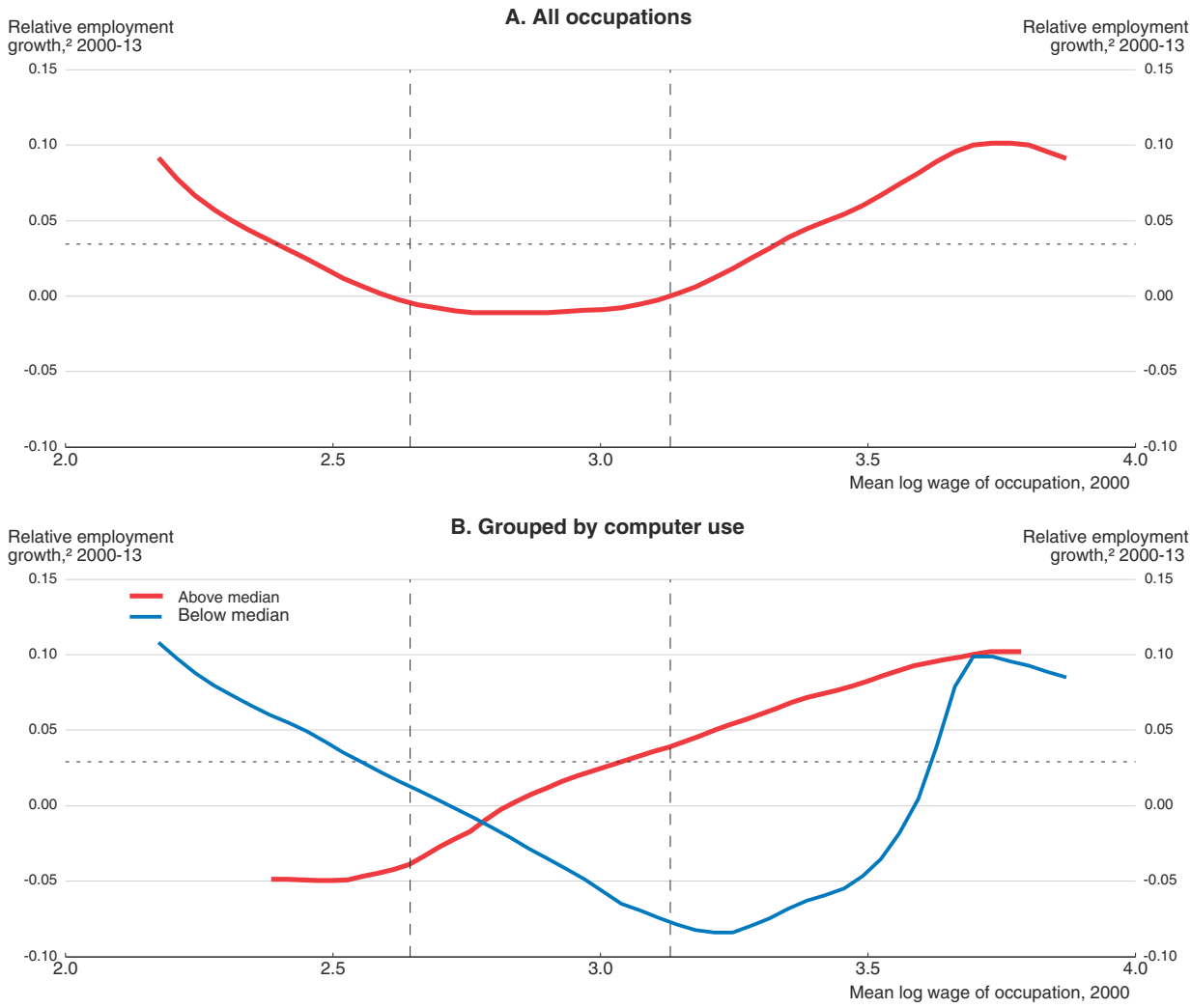
Source: Statistics New Zealand, Household Labour Force Survey.

Bessen (2016) finds that polarisation in the United States occurred in occupations with below-average computer use but not in occupations with above-average computer use (Figure 2.2). He finds that computerisation increases the productivity of workers who use computers more intensively than others, the more so the more highly skilled they are. Over time occupations that use computers intensively substitute for others in employment. He also finds that there has even been an increase in demand for employees with university degrees in occupations that do not normally require a university degree if they have high rates of computerisation. Rising computer use is associated with growth in well-paid jobs and shrinkage in others. To shift to these well-paid occupations workers need to learn new complementary skills, which are costly or difficult to acquire, so only some workers do so. This leads to greater wage inequality within occupations. Computer use is estimated to have accounted for 38-45% of the increase in wage inequality in the United States since 1990 (ibid). Bessen also finds that polarisation in the United States may have been caused by other factors, such as globalisation, if repetitive cognitive tasks are easier to offshore than others. New Zealand is well placed to face changes brought about by computer use as PIAAC found its workforce had very high overall skills when testing problem solving in a technologically rich environment, and had a very small proportion of the workforce with below average skills.

The supply of high-skilled workers is growing faster than the supply of others

The supply of skills, as measured by educational attainment, has been steadily increasing in New Zealand. The proportion of the population with less than upper

Figure 2.2. **Job polarization: employment growth of occupations by computer use in the United States**[1]



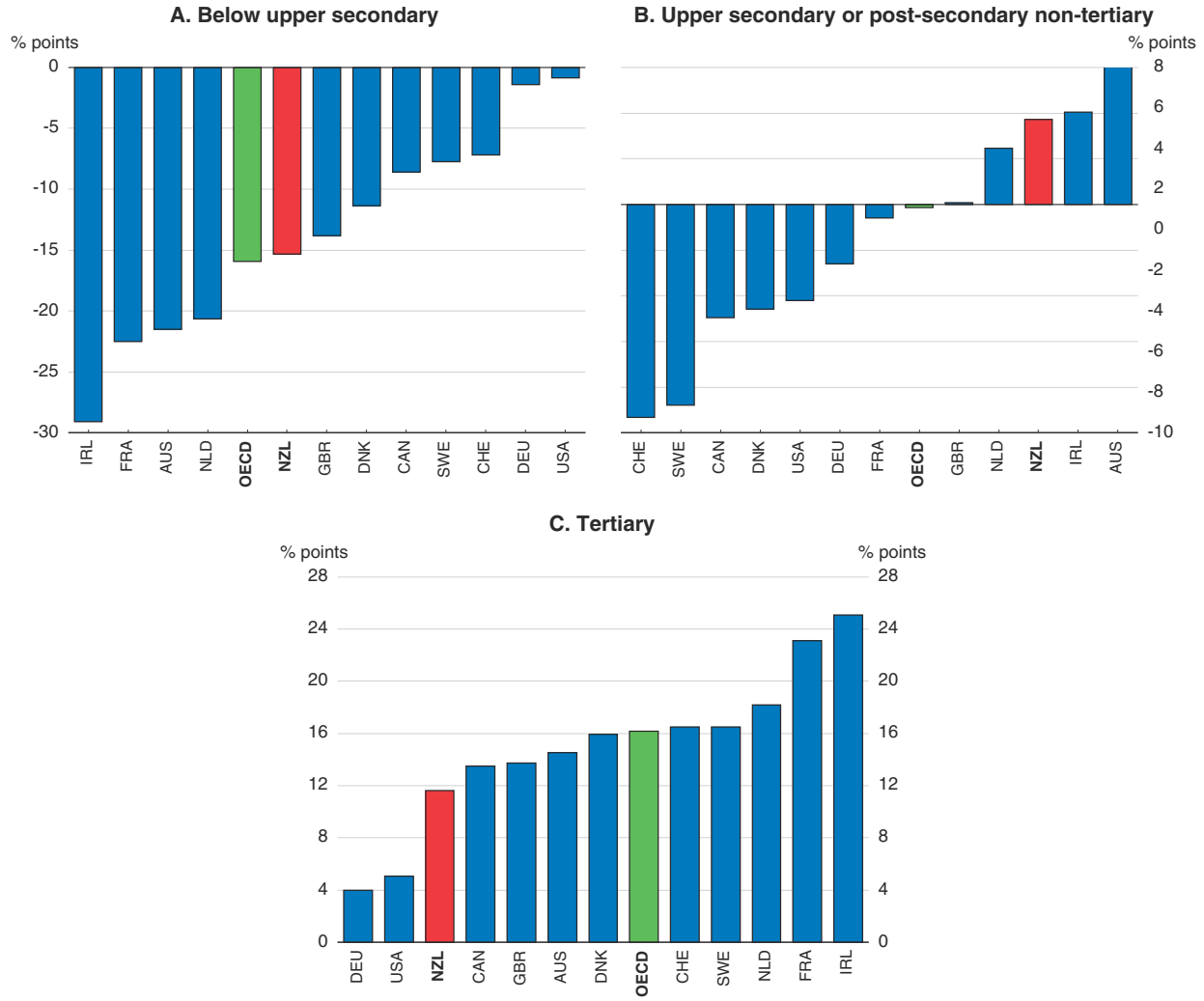
1. Shows smoothed weighted average of percentage growth in hours worked for 317 detailed occupations. Smoothing done with an Epanechnikov kernel with 0.3 bandwidth. Panel B shows occupations with above-median and below-median computer use separately. Dashed vertical lines are at the 25th and 75th percentiles in the occupational wage. Horizontal dotted line is total hours growth.
2. Annual growth in employment relative to the entire labour force.

Source: J. Bessen (2016), "How Computer Automation Affects Occupations: Technology, Jobs and Skills", *Boston University School of Law – Law & Economics Working Paper*, No. 15-49, October, *www.bu.edu/law/faculty/scholarship/working-paper-series*.

StatLink *http://dx.doi.org/10.1787/888933497650*

secondary attainment is lower for 25-34 year-olds than for 55-64 year-olds, while a much higher proportion of 25-34 year-olds have tertiary education than do 55-64 year-olds; there has also been a small increase in upper secondary or equivalent attainment (Figure 2.3). However, increases in educational attainment have been greater in most other countries, and levels are also higher for the younger age group than in New Zealand. A greater proportion of 25-34 year-olds have less than upper secondary attainment in New Zealand than the OECD average (Figure 2.4, Panel A), and a smaller proportion have tertiary attainment (Panel C). Young people from lower socio-economic and/or Māori/Pasifika backgrounds are over-represented among those who have less than upper secondary attainment and under-represented among those who have tertiary attainment (Ministry of

Figure 2.3. **Educational attainment gap between young and old,[1] 2015**



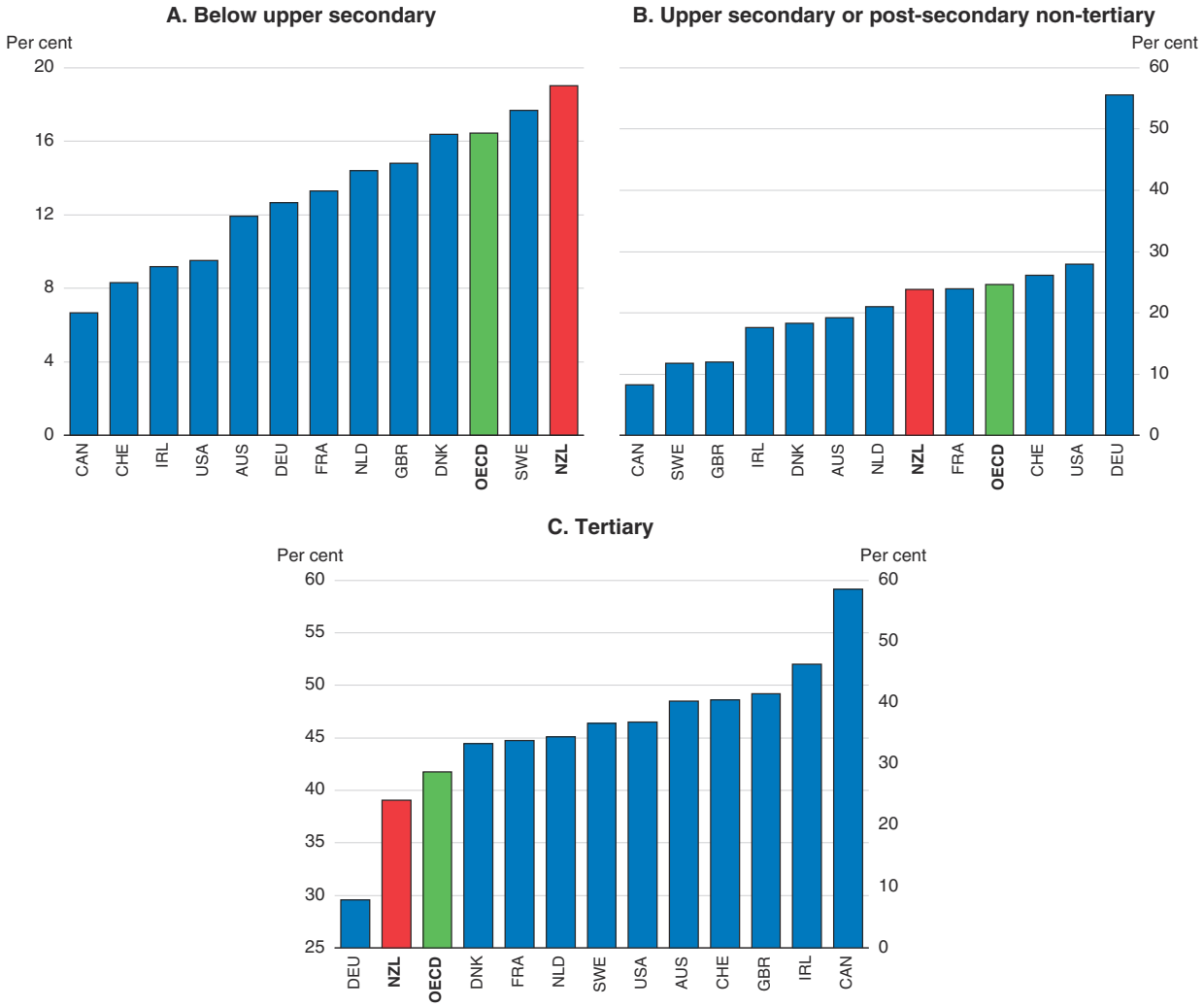
1. The young are defined as the 25-34 year-olds age group and the old as the 55-64 year-olds age group.
Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Table A1.3.

StatLink http://dx.doi.org/10.1787/888933497312

Education, 2015). In contrast to most other countries, the higher share of the 25-34 age group with tertiary attainment than the 55-64 age-group share uniquely reflects the increase in attainment at the Bachelor's degree level, with no increase at the post-graduate level (Figure 2.5). The proportion of the 25-34 age group with post-graduate attainment is much lower than in most other OECD countries. This may reflect the preponderance of small firms in New Zealand, as they offer fewer highly specialised jobs than large firms. The share of 25-34 year-olds with short-cycle tertiary attainment is also lower than in most other OECD countries.

International migration is contributing to the rising supply of skills in New Zealand. Over time, New Zealand has gained more people with university degrees through immigration than it has lost through emigration. As a share of New Zealand's population aged 15 or over in 2010, immigrants comprised 55.3% of those with high (i.e. tertiary) education while NZ citizens with high education living abroad (i.e. emigrants) represented

Figure 2.4. **Level of educational attainment of the young,[1] 2015**

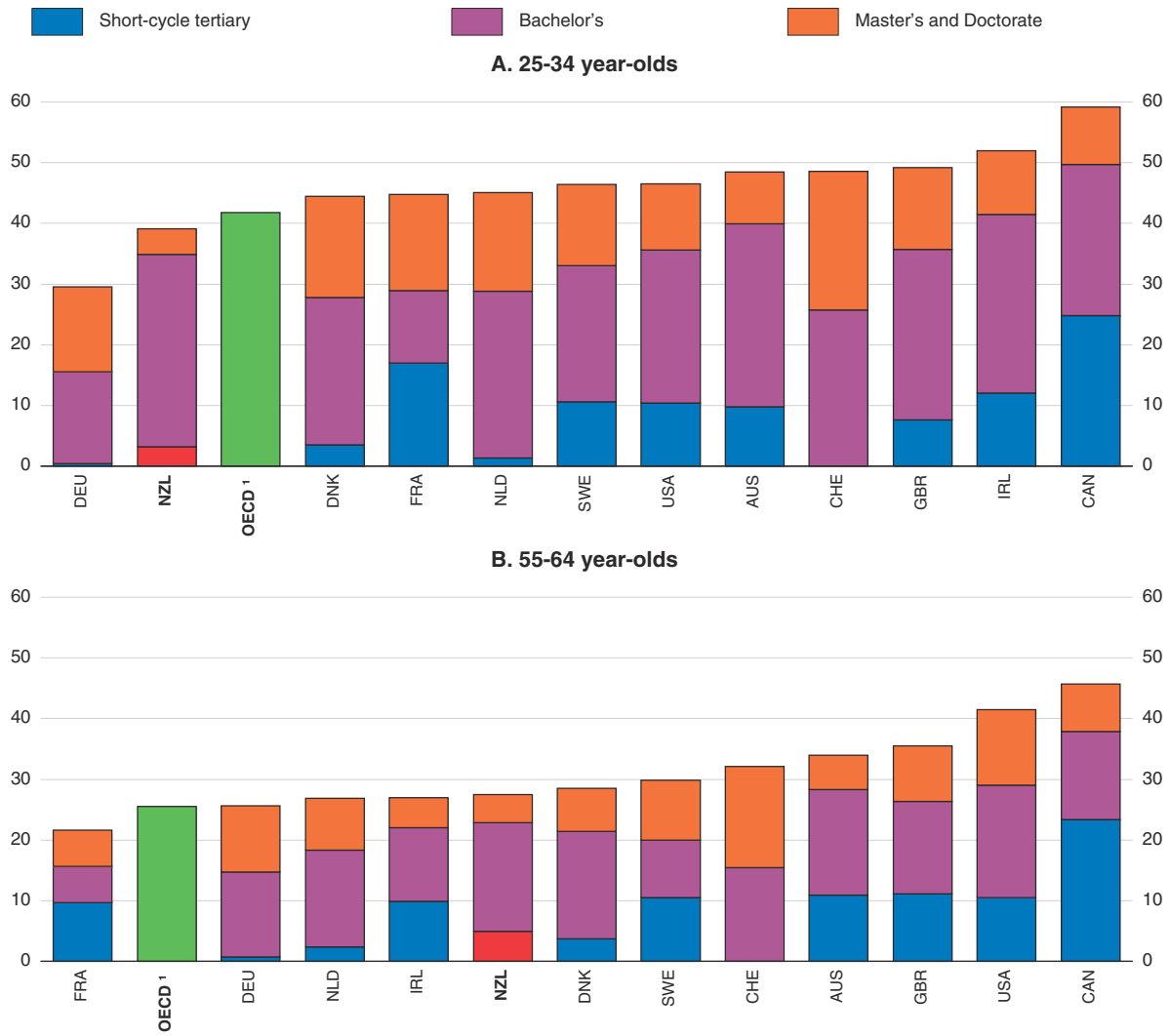


1. The young are defined as the 25-34 year-olds.
Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Table A1.3.

StatLink http://dx.doi.org/10.1787/888933497324

29.1% (Table 2.2). Thus, net migration contributed 26.3% of the NZ population aged 15 or over with high education. By contrast, net migration only contributed 8.8% of the population with less than university attainment. In subsequent years, for which data are available only by occupation, international migration has continued to add to the stock of highly skilled workers. Net immigration of professionals, who have the highest average level of education attainment, was far higher than for any other occupational group over 2011-16, although some professionals may not be very highly skilled judging by their earnings. At the other end of the spectrum, there were population losses from net migration in low-skilled occupations. These outcomes suggest that New Zealand's immigration policy has continued to contribute to upskilling of the NZ population, more than offsetting the effects of large outflows of high-skilled workers. In April 2017 the government announced a series of changes, including adding remuneration thresholds for the Skilled Migrant Category (residence), which should result in higher-skilled immigrants. While data on permanent and long-term migration

Figure 2.5. **Decomposition of tertiary education attainment by age group, 2015**



1. As there are missing data for some sub-components for some countries, only the total tertiary for the OECD average is shown.
Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Table A1.2.

StatLink http://dx.doi.org/10.1787/888933497667

continue to show a preponderance of net immigration in generally higher-skilled occupations, it should be borne in mind that these data do not capture short-term (i.e. less than one year) migration flows, such as for the Working Holiday Schemes and Study to Work, which have grown substantially and generally entail low-skilled work, and that migrants may undertake less skilled work in New Zealand than in their home country.

Growth in supply of skills appears to have been well calibrated with non-cyclical growth in demand

It is difficult to judge whether growth in the supply of skills has been well calibrated to growth in demand for skills in New Zealand over the long term owing to a lack of data on earnings by level of education attainment. Over the period 2005-16, for which data are available, earnings premiums point to relative demand for workers with short-cycle tertiary qualifications or post-secondary non-tertiary qualifications running ahead of

Table 2.2. **Impact of net migration on the skills of the population**

	Immigration	Emigration	Net migration
Education level[1]		Stocks (thousands), 2010	
High education	332.6	174.7	157.9
Low-middle education	551.6	340.5	211.1
Total	884.2	515.2	369.0
		% of population aged 15 and over, 2010	
High education	55.3	29.1	26.3
Low-middle education	23.0	14.2	8.8
Total	29.5	17.2	12.3
Occupation[2]		% share, 2011-16	
Professionals	37.4	33.9	52.2
Managers	9.8	10.1	8.9
Clerical and administrative workers	6.9	7.2	5.6
Technicians and trade workers	17.4	16.2	23.1
Community and personal service workers	13.7	14.0	12.4
Sales workers	6.1	7.9	- 1.6
Labourers	5.6	6.5	1.8
Machinery operators and drivers	3.0	4.1	- 1.8
Total of above occupations (thousands)	243.1	196.3	38.6

1. Low education refers to lower secondary education; medium education corresponds to upper secondary education and post-secondary non-tertiary education; and high education refers to tertiary education.
2. Occupations of permanent and long-term migrants ranked by decreasing years of education.

Source: Statistics New Zealand; OECD (2015), *Connecting with Emigrants – A Global Profile of Diasporas 2015*.

supply (Table 2.3). The timing of these gains suggests that the Canterbury rebuild and expansion in construction activity in Auckland were important factors. The decline in the share of the population with such qualifications also contributed to the shortage (Table 2.4). Earnings premiums for higher tertiary qualifications display no clear trend, suggesting that relative demand broadly increased in line with relative supply. Short-cycle tertiary earnings premiums are higher than in Australia and the United States while premiums for people with bachelor's or higher qualifications are higher than in Australia but much lower than in the United States (OECD, 2016a).

Table 2.3. **Earnings premiums for NZ workers**[1] **by level of educational attainment**

Upper secondary education = 100

	2005	2010	2011	2012	2013	2014	2015	2016
Below upper secondary education	82	83	82	82	92	94	93	91
Post-secondary non-tertiary education	102	107	107	99	113	113	118	115
Tertiary education	124	129	122	121	136	146	145	140
Short-cycle tertiary education	105	104	101	102	114	127	128	124
Bachelor's or equivalent education	141	143	134	132	133	145	139	133
Master's, Doctoral or equivalent education	..	..	..	..	174	176	177	166

1. Earnings of full-time, full-year workers aged 25-64.

Source: OECD (2016), "Education and earnings", *Education at a Glance* (database).

Trends in unemployment and inactivity rates may be indicative of growing short-term skills shortages. For the population aged 25-64, unemployment rates only rose modestly (22%) for people with tertiary education attainment (as a proxy of skills) between 2005 and 2015

Table 2.4. **Education attainment by highest level of qualification**

Population aged 15 years and over, per cent of all qualifications

	2005	2010	2011	2012	2013	2014	2015
No qualifications or not stated	26.3	25.6	24.5	24.2	24.4	22.7	22.2
School qualification	25.0	23.6	24.5	23.9	25.8	26.0	25.7
Tertiary diplomas/certificates	34.2	33.1	33.6	33.7	29.8	29.7	30.7
Bachelors degree or higher	14.5	17.7	17.4	18.3	20.0	21.5	21.4

Source: Ministry of Education, *Education Counts*.

but doubled for others (Table 2.5). These differences were more pronounced for the population aged 25-34, for whom rates more than doubled for those with up to secondary attainment and were unchanged at the tertiary level. Inactivity rates (defined as 100% minus the participation rate), fell markedly (by around 30%) between 2005 and 2015 for people with tertiary attainment, but not for others.

Table 2.5. **Employment, unemployment and inactivity rates by educational attainment and age group**

	Below upper secondary education		Upper secondary and post-secondary non-tertiary education		Tertiary education	
	2005	2015	2005	2015	2005	2015
Employment rate						
25-34 year-olds	67.9	63.3	81.7	78.4	81.5	86.1
25-64 year-olds	70.0	69.1	84.2	81.3	84.1	87.5
Unemployment rate						
25-34 year-olds	5.5	11.2	3.0	6.8	3.3	3.3
25-64 year-olds	3.4	6.2	2.3	4.8	2.3	2.8
Inactivity rate[1]						
25-34 year-olds	26.6	25.5	15.3	14.8	15.2	10.6
25-64 year-olds	26.6	24.7	13.5	13.9	13.6	9.7

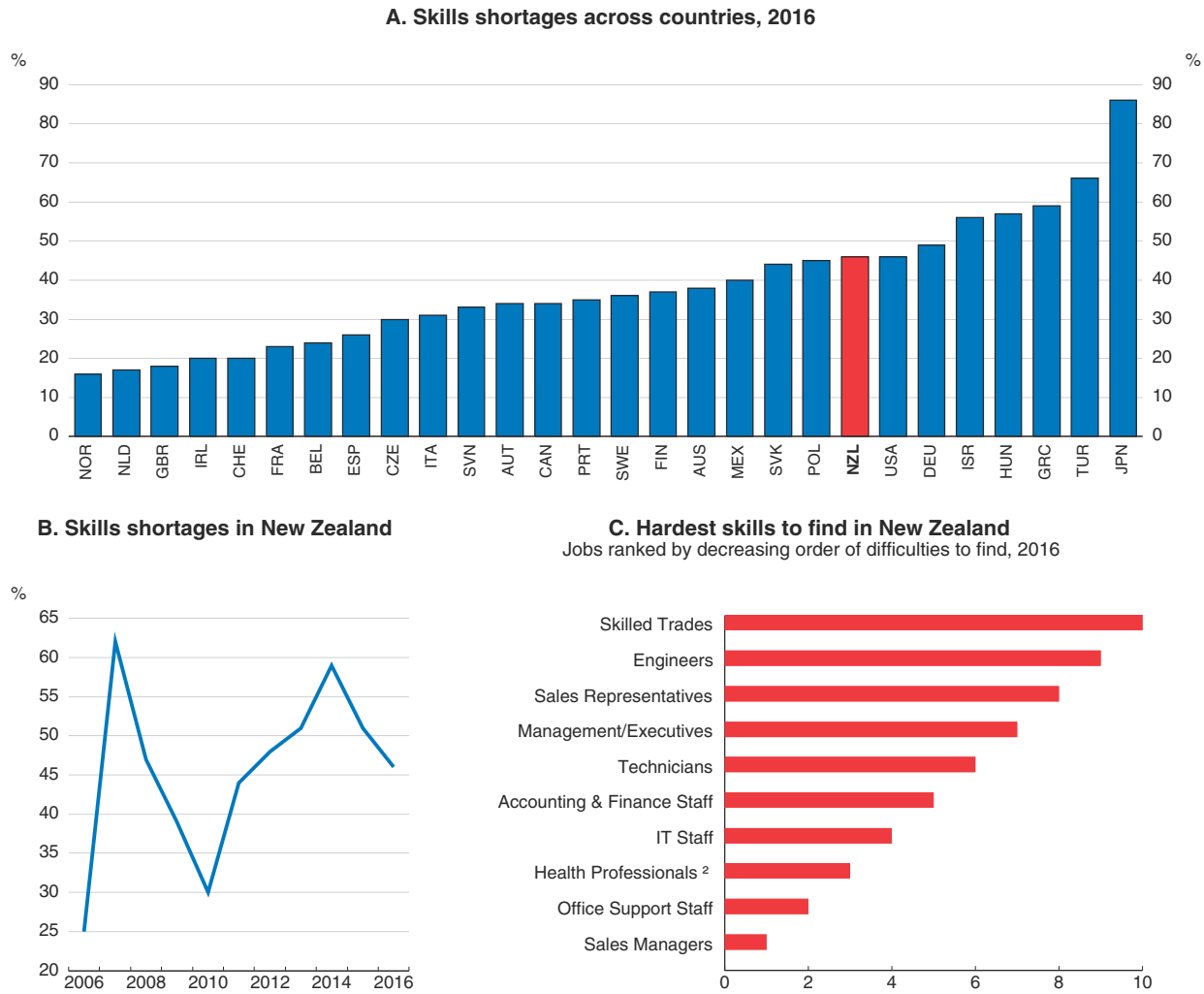
1. The inactivity rate is calculated by dividing working-age population not in the labour force by the working-age population.

Source: OECD (2016), "Educational attainment and labour force status", *Education at a Glance* (database).

The Manpower Group survey of employers also indicates that there are short-term skills shortages, which are greater than in most other countries (Figure 2.6, Panel A). These shortages increased markedly following the Canterbury earthquakes but have been declining since 2014, albeit to higher levels than a decade ago (Panel B). NZ firms report that the hardest jobs to fill are for skilled tradespersons, engineers, sales representatives and management/executives (Panel C). Demand for workers in the first two categories has been boosted by the large increase in construction activity associated with the Canterbury earthquake rebuild and, more recently, housing and infrastructure investment, especially in Auckland. Wage increases in the construction industry have outpaced those in other industries in recent years except real estate, which is also benefiting from some of the same factors. Some construction occupations and engineers are listed as occupations for which there are both long-term and short-term shortages in New Zealand for the purposes of issuing work visas. Firms report that the two top reasons why they find it hard to fill jobs is the lack of available applicants (26%) and lack of hard skills (technical competences, 24%) (Manpower Group, 2016). Only 7% of firms cite the lack of soft skills (workplace competencies)

Figure 2.6. **Firms facing skills shortages**[1]

As a percentage of all firms with ten or more employees



1. Survey based. Firms are classified as facing a skills shortage if they report having difficulties filling jobs.
2. Doctors and other non-nursing.

Source: ManpowerGroup, *Talent Shortage Survey*, various years.

StatLink http://dx.doi.org/10.1787/888933497331

as a reason for difficulties filling vacant positions. However, a number of other surveys and reports have highlighted the need for non-cognitive skills (Auckland Co-Design Lab, 2016). Given the short-term nature of this increase in labour demand associated with the Canterbury rebuild, it is appropriate that it has largely been met through temporary immigration instead of through the education and training system.

The diffusion of digital technologies is expected to favour high-skilled workers

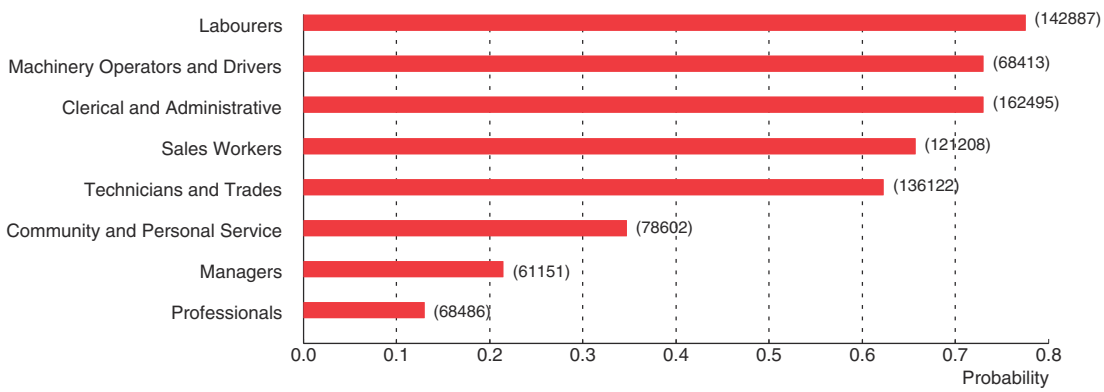
In a widely quoted study, Frey and Osborne (2013) estimated the risk that narrowly defined occupations in the United States could be automated out of existence in the next couple of decades. They note that many repetitive tasks have already been automated, contributing to weak employment and wage growth for mid-level skills, and that this process will soon have run its course. On the other hand, progress in Artificial Intelligence (AI), which

entails machines learning from processing vast amounts of data, will make it possible to automate less routine tasks, such as driving. Frey and Osborne identify the main engineering bottlenecks that will ultimately set the boundaries for the application of computer-controlled equipment to perform tasks currently undertaken by human beings as being: creative intelligence; social intelligence; and perception and manipulation. These bottlenecks make it difficult to automate jobs mainly occupied by people with university degrees but less so to automate low-skilled jobs. Based on expert opinion on tasks that could be automated with likely advances in AI, the authors estimate that 47% of current employment is in occupations at high risk (more than 70%) of automation (possibly) over the next decade or two, 19% in occupations with medium risk (30-70%) and 33% in occupations with low risk (less than 30%). Applying this approach to UK data, Deloitte (2015) show that occupations with a high susceptibility to automation saw sharp employment declines between 2010 and 2015, while jobs that are less exposed experienced rapid growth.

NZIER (2015) applies Frey and Osborne's estimates of job automation to NZ employment data. It finds that 46% of the NZ labour force faces a high risk of having their current job automated, similar to Frey and Osborne's estimate for the United States; concomitantly, New Zealand's occupational structure is similar to the United States'. As in the United States, the risk of automation is higher for low-skilled jobs than for high-skilled jobs. NZIER finds that 75% of labouring jobs have a high risk of being automated over the next decade or two, while at the other end of the skills spectrum only 12% of professional jobs are at high risk of automation (Figure 2.7). As rural areas of New Zealand have a higher proportion of low-skilled jobs than major urban centres, workers in such areas are more exposed to the risk of job automation.

Figure 2.7. **Employment at high risk of automation**

Numbers in brackets represent the number of jobs at high risk, 2015



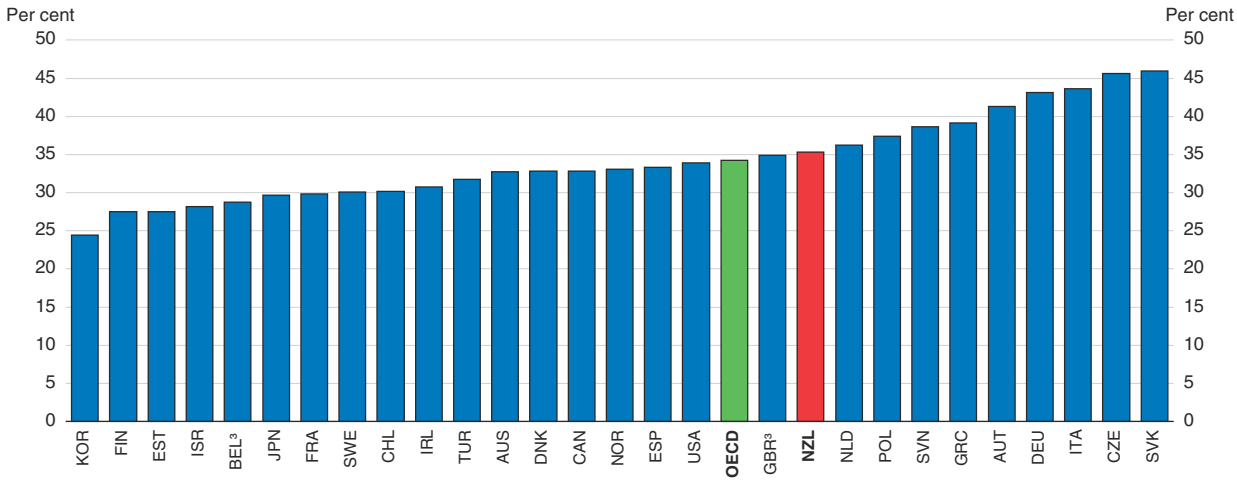
Source: NZIER (New Zealand Institute of Economic Research) (2015), "Robot Nation? The Impact of Disruptive Technologies on Kiwis", *NZIER Insight*, 55-2015.

StatLink http://dx.doi.org/10.1787/888933497672

However, the Frey and Osborne "occupation-based" approach probably overstates the risks of job losses from automation, as occupations classified as being at high risk often contain many tasks that are hard to automate. Taking a "task-based" approach using the PIAAC data on tasks that workers report using, Arntz et al. (2016) estimate that 34% of US jobs are at risk (meaning that more than 50% of tasks could be automated) over the next 10-20 years, with 9% at high risk (more than 70% of tasks are automatable) (Figure 2.8).

Figure 2.8. **Risk of job automation**

Jobs at risk of automation,[1] 2012 and 2015[2]



1. Jobs are at risk of being automated if at least 50% of their tasks are automatable.
2. Data correspond to 2012 for countries participating in the first round of the Survey of Adult Skills: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden, United States and United Kingdom. Data correspond to 2015 for countries participating in the second round of the Survey of Adult Skills: Chile, Greece, Israel, New Zealand, Slovenia and Turkey.
3. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2012, 2015); Arntz, M. et al. (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, *http://dx.doi.org/10.1787/5jlz9h56dvq7-en*.

StatLink *http://dx.doi.org/10.1787/888933497340*

Results for New Zealand are similar: 35% of jobs are at risk of automation, with 9% at high risk. As in other countries, low-skilled and low-income NZ workers are much more likely to have their jobs automated than high-skilled, high-income workers (Figure 2.9). Thus, like Frey and Osborne, Arntz et al. find that low-skilled workers are likely to bear the brunt of adjustment costs because the potential to automate their jobs is higher than for highly qualified workers.

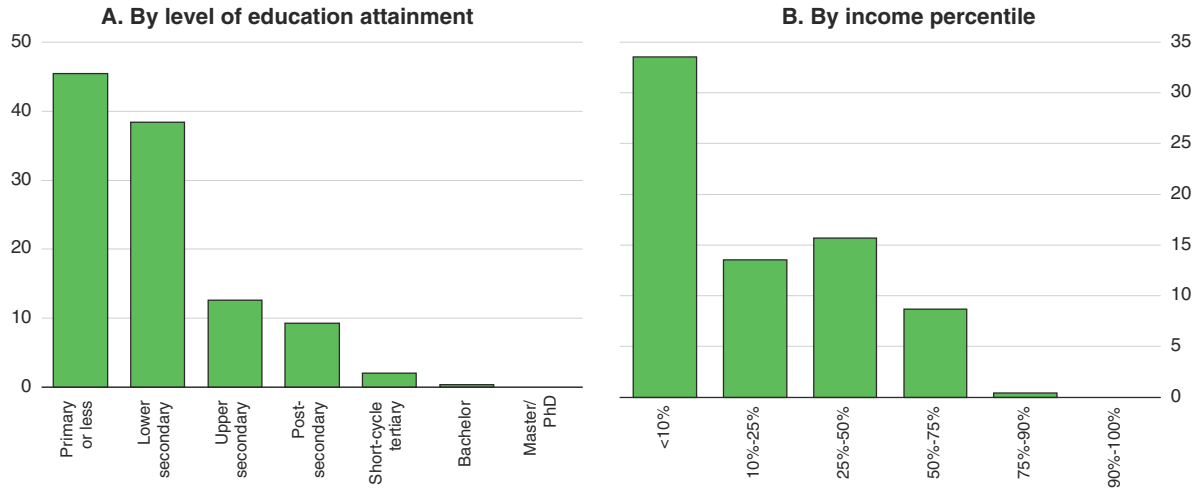
As discussed above, working in an occupation at medium to high risk of automation does not necessarily lead to job loss. Indeed, the increase in productivity from computerisation can expand demand for employees in an occupation as they are substituted for employees in other occupations benefiting less from computerisation (Bessen, 2016). At the same time, however, the tasks performed will evolve from routine towards non-routine tasks that require higher levels of judgement and social interaction. Many occupations, including currently low-skilled ones, will become more highly skilled. As discussed above, increased demand will be strongest in high-skilled occupations with heavy computer use. Thus, allowing for substitution effects does not alter the conclusion that the low-skilled are likely to be the hardest hit by the diffusion of digital technologies, potentially increasing inequalities in income.

Many workers with disabilities will face more difficult labour market conditions

A disproportionate share of low-skilled workers world-wide has health problems or disabilities. Workers with these problems are far more likely than others not to have completed upper secondary education, more likely to have dropped out of school prematurely and less likely to have benefitted from job-related vocational training (OECD, 2010). The education gap between people with and without disabilities is larger for younger

Figure 2.9. **Share of NZ workers with high automation potential by education attainment and income level**

Share of workers in jobs at high risk of automation,[1] 2015



1. Workers are at high risk of automation if at least 70% of their tasks are automatable.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2015); Arntz, M. et al. (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, *http://dx.doi.org/10.1787/5jlz9h56dvq7-en*.

StatLink http://dx.doi.org/10.1787/888933497358

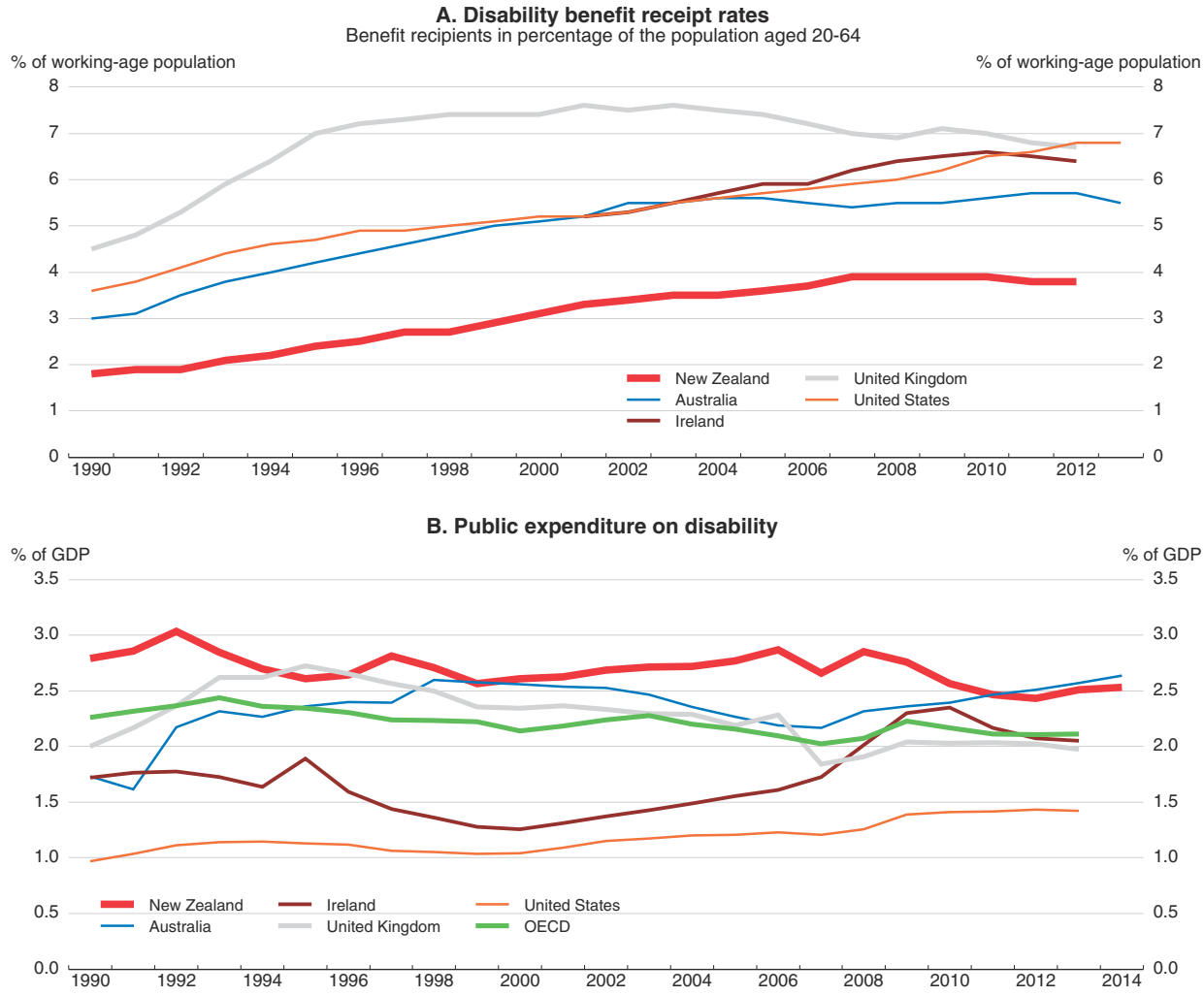
cohorts than for older ones in most OECD countries, exposing younger cohorts of workers with disabilities more to the negative effects of skill-biased technological change on employment opportunities. Access to jobs by disabled individuals has become more difficult in recent years owing to changing working conditions in OECD countries in response to greater competition and more rapid technical change. Job security has declined for a growing number of workers on temporary or atypical contracts, and workloads and work pressure have increased (OECD, 2010). Social integration of people with disabilities is poor, with lower employment rates and higher inactivity, unemployment and poverty rates than for people without disabilities.

The share of the working-age population receiving a disability benefit doubled in New Zealand between 1990 and 2007, when it reached around 4%, but has since been stable (Figure 2.10, Panel A). This rate is lower than in most other OECD countries (OECD Social Expenditure Database). Benefit receipt rates also increased in other English-speaking countries (with data), where rates remain higher than in New Zealand. As in most other countries, the rising structural trend in disability benefit receipt rates is not entirely attributable to population ageing (older working-age cohorts have much higher disability rates than younger groups) (OECD, 2010). Public expenditure on disability is around 2½ per cent of GDP in New Zealand, which is close to the OECD average (Panel B). This comparatively higher expenditure in relation to the benefit receipt rate reflects the fact that New Zealand does not have partial disability benefits, which compensate for loss of earnings from partial disability and consequently are smaller than benefits for full disability, in contrast to many other countries.

Sole parents will also face more difficult labour market conditions

A disproportionate share of sole parents also has low educational attainment and as such is likely to encounter increasingly difficult labour market conditions. While recent

Figure 2.10. **Disability benefits**



Source: OECD (2010), *Sickness, Disability and Work – Breaking the Barriers*, Figure 2.9 with updates; OECD (2017), *Social expenditure Database*.
StatLink http://dx.doi.org/10.1787/888933497681

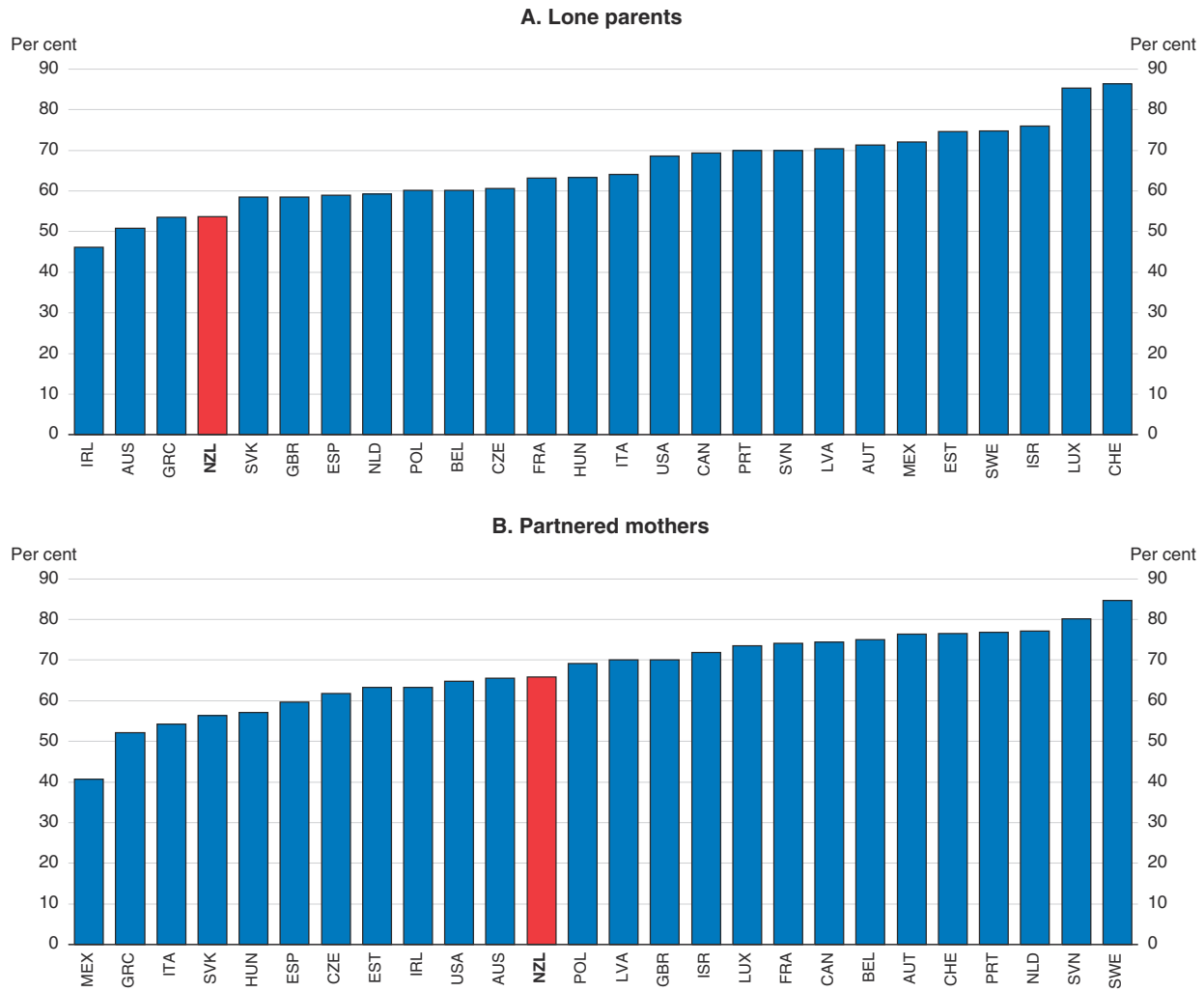
welfare reforms in New Zealand (see the previous *Survey* (OECD, 2015a) for more information) have succeeded in increasing the employment rate for sole mothers closer to that for partnered mothers, the gap remains large by international comparison (Figure 2.11). Under the NZ government's investment approach to welfare payments, scarce activation resources have been targeted on sole parent beneficiaries at greatest risk of long-term benefit dependency. For sole parents these reforms increased the probability of exiting benefit receipt and ended the upward trend in average benefit levels owing to higher rates of part-time work.

Digital technologies are facilitating the emergence of non-standard work arrangements

Digital technologies are redefining the boundaries of firms, which, as Coase (1937) explained, are determined by the need to minimise transactions costs within employer-employee relationships. Technical changes that lead to enhanced monitoring, standardised job tasks and that make information on worker reputation more widely available may be

Figure 2.11. **Employment rates of lone parents vs partnered mothers**

Parent mothers aged 15-64 years with at least one child aged under 15, 2014 data



Source: OECD (2016), *Family Database*.

StatLink http://dx.doi.org/10.1787/888933497699

reducing the transactions costs associated with contracting out job tasks, thus supporting outsourcing of work (Katz and Krueger, 2016). Katz and Krueger also point out that improvements in information technology and deeper markets for contractors increasingly mean that large organisations may reap efficiency gains and cost savings from hiring specialised contractors for non-core activities (such as janitorial services, food services, information technology, accounting and legal services), rather than managing such activities in-house. Working arrangements beyond the firm boundary are typically described as alternative or non-standard.

The number of people in alternative working arrangements worldwide is growing quickly, although there are no data available to determine whether or not this is also so for New Zealand. Katz and Krueger update the US Bureau of Labor Statistics Contingent Work Survey (CWS) of main jobs to assess recent US trends in alternative work, which is defined in the CWS as: agency temporary help workers; on-call workers and contract company workers;

and independent contractors or freelancers. They find that the share of workers in alternative working arrangements rose from 10.7% in February 2005 to 15.8% in late 2015. This growth in alternative work accounted for 94% of net employment growth in the United States between 2005 and 2015. They also find that only 0.5% of workers work through an online intermediary, such as Uber or Task Rabbit. However, the number of people working through such online platforms (sometimes referred to as the 'gig economy') is growing quickly (Farrell and Greig, 2016).

Manyika et al. (2016) take a broader approach to alternative work, notably by not limiting coverage to workers' main job, and find a higher incidence of such working arrangements. They define independent work as that which entails: a high degree of autonomy; payment by task, assignment or sales; and/or a short-term relationship between the worker and the customer. On this basis, they estimate that the independent workforce represents some 20-30% of the working-age population in the United States and EU-15 countries and that approximately 15% of independent earners use digital platforms. Thus, the platform (or gig) workforce is relatively small compared to other forms of alternative work arrangements, but it is growing very rapidly.

The shift towards independent work could have economic benefits by raising labour force participation, stimulating consumption, providing opportunities for the unemployed and boosting productivity (Manyika et al., 2016). But these developments in the United States and EU-15 countries also raise concerns about more workers having limited access to income security protections, such as workers' compensation, and not being covered by minimum wage and anti-discrimination laws. Another issue is that independent workers face potential hurdles of reduced access to credit, not being paid for work performed and complex tax filing, licensing and regulatory compliance requirements.

A key issue that arises is whether or not people working in such arrangements are employees. This is key for defining employer responsibilities versus those falling to the employee. In common law countries, such as New Zealand and the United States, courts have distinguished between an employee and an independent contractor in case law (*Bryson v Three Foot Six Ltd.*). The interpretation of the law can create some uncertainty for online platform companies and those who, as employees or contractors, work for them (Kennedy, 2016). Platform companies are discouraged from helping workers to link with one another for advice or support or for arranging free financial guidance because doing so would increase the chance that courts would find the existence of an employer-employee relationship. Of course, such a finding would be appropriate if there really were such a relationship, but today the outcome is still quite uncertain.

The starting point for the NZ authorities to adapt policies to the development of non-standard work arrangements is to collect data on the number of workers concerned and their characteristics, for example to replicate the U.S Bureau of Labor Statistics' Contingent Worker Survey and/or the Manyika et al. study. The authorities will also need to consider how, if at all, laws and regulations governing the world of paid work should be reformed to allow for non-standard work arrangements and in particular, whether the common-law definition of an employee remains pertinent in all cases.

Adapting to technical change that favours high-skilled workers

Given ongoing technical progress that is likely to favour high-skilled workers (see Figures 2.1, 2.2 and 2.9), young people will need to continue their initial education to higher

levels than in the past and in fields that are in demand to have good job prospects. It will be important for the education system to put more emphasis on developing learning skills and personal characteristics, such as the ability to build relationships, curiosity and creativity, and less on acquiring knowledge. Workers will need to upgrade or re-orient their qualifications frequently to adapt to changing labour market requirements. And, more workers than in the past may need to rely on the social safety net to support them as they transition away from declining occupations. Insofar as technical progress may result in deteriorating labour market prospects for the low skilled and some of them may not manage to upskill sufficiently to avoid being left behind, it may be necessary to increase redistribution through the tax-transfer system to maintain social cohesion and inclusiveness.

NZ workers' strong information-processing skills should facilitate adjustment to technological progress

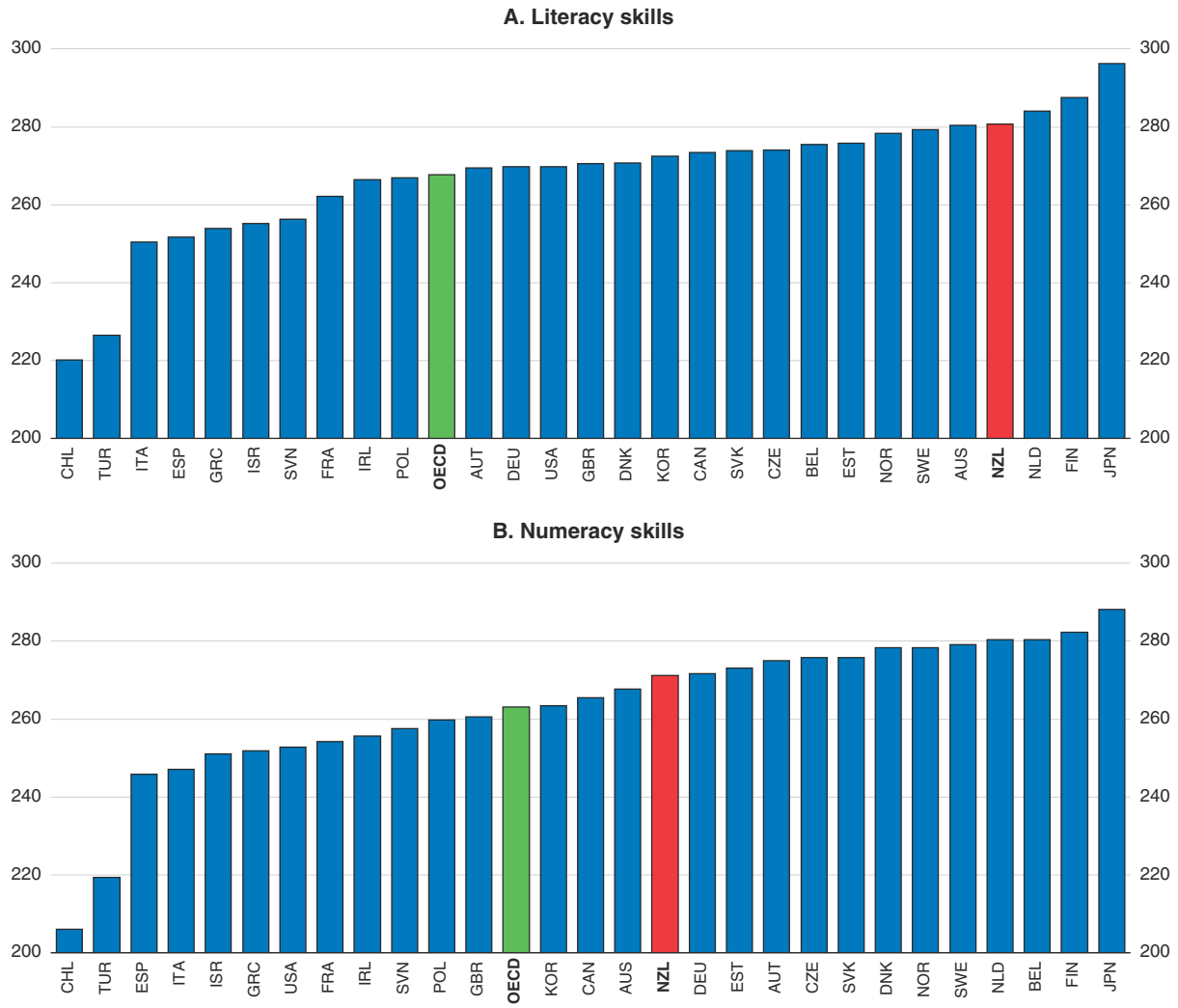
New Zealand workers have strong information-processing skills, especially in literacy and problem solving in a technologically rich environment (Figures 2.12 and 2.13), putting them in good stead to adapt to change, such as workplace reorganisation to use digital technologies more productively. According to the PIAAC study (OECD, 2016b), NZ adults' (aged 25-64) average literacy score was the fourth highest among the 29 participating OECD countries or regions, while their average problem-solving score was fifth highest. Moreover, the share of the population with medium to high problem-solving skills (44%) was equal highest with Sweden. NZ workers' numeracy skills were less outstanding, but still above average, ranking 13th.

Workers with stronger information-processing skills are better able to adapt to change. Using past average growth in real GDP per capita as a measure of the pace of economic change, Hanushek et al. (2016) find that returns to information-processing skills (represented by numeracy skills) are higher when there is more rapid economic change. They estimate that a one standard deviation increase in numeracy skills is associated with 19% higher earnings in New Zealand, slightly below the pooled estimate for the 32 countries in PIAAC (Figure 2.14). They undertake numerous tests to reject the hypothesis that the result reflects higher per capita growth when the returns to skills are higher rather than the other way around.

As in most other countries, information-processing skills rise to a peak early in workers' careers and decline subsequently (Figure 2.15). In New Zealand the peak occurs for the 35-44 year-old age group, which is somewhat later than the OECD average, and the subsequent decline is smaller than average. As a result, the shortfall in older workers' (aged 55-64 years) proficiency levels relative to those of younger workers is smaller than in most other OECD countries. Older workers' proficiency levels rank more highly by international comparison than younger workers' (aged 16-24 years): for example, older workers' average literacy score is second highest among OECD countries, whereas younger workers' average score is only 12th highest. Unfortunately, as these data are a snapshot of proficiency of different age groups at a point in time rather than tracking proficiency of the same age cohort over time, it is not possible to disentangle age effects (i.e., the consequences of growing older), cohort effects (the consequences of being born at different times) and period effects (the consequences of influences that vary through time, such as economic recessions) (OECD, 2016b). New Zealand's stronger relative performance by the older age group in international comparison could reflect environmental factors that are more effective in nurturing skills as

Figure 2.12. **Information-processing skills**

2012 or 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; the United Kingdom is an average of England and Northern Ireland.

Source: OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

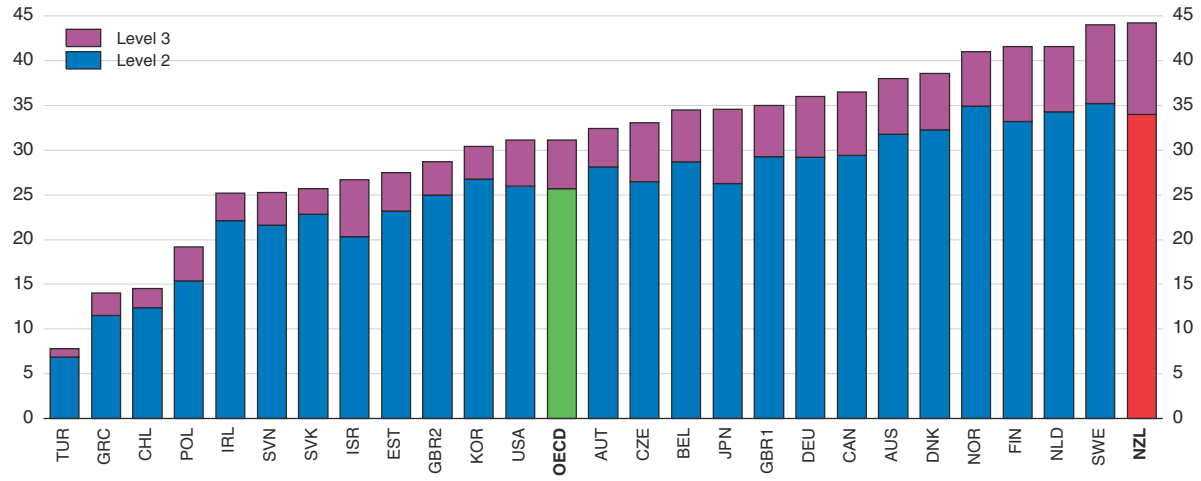
StatLink http://dx.doi.org/10.1787/888933497364

people age in New Zealand than in most other countries. Alternatively, these outcomes could reflect faster improvements in education in other countries than in New Zealand.

A factor that may contribute to older workers' relatively high proficiency levels in New Zealand is the heavy use of skills used in the workplace in everyday life as well (Figure 2.16). In the workplace New Zealand adults make extensive use of almost all information-processing skills (OECD, 2016b). Use of the five skills surveyed – reading, writing, numeracy, ICT and problem-solving – ranges from the highest among countries that participated in PIAAC for reading to fifth highest for writing. Skills used in everyday life are also the highest on average among PIAAC countries and again rank highly in each of the four skills surveyed (reading, writing, numeracy and ICT). Workers who use their skills more frequently are also likely to have higher wages, even after accounting for differences in educational attainment, skills proficiency and occupation (OECD, 2016b), and

Figure 2.13. **Proficiency in problem solving in technology-rich environments among adults**

Percentage of 16-65 year-olds scoring at each proficiency level, 2012 or 2015[1]



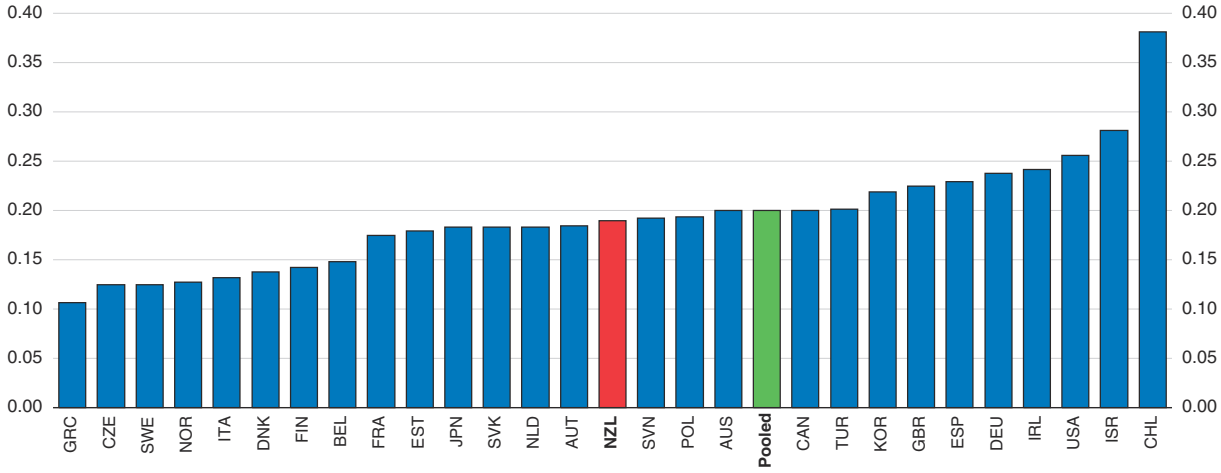
1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, Table A2.6; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497372

Figure 2.14. **Return to numeracy skills across PIAAC countries**[1]

2012 and 2015[2]



1. Coefficient estimates on numeracy scores (standardised to unit standard deviation within each country) in a regression of log gross hourly wages on numeracy, gender and a quadratic polynomial in actual work experience using a sample of full-time employees aged 35-54. Regressions weighted by sampling weights. The pooled specification includes country fixed effects and gives the same weight to each country.
2. For the exact year of reference of the data, see footnote 2 in Figure 2.8.

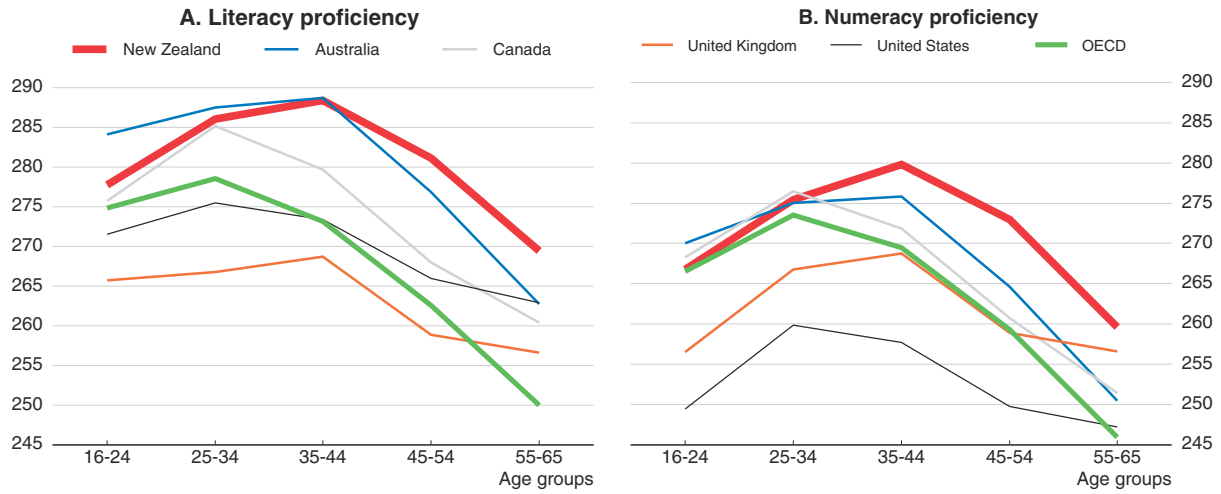
Source: E. Hanushek et al. (2016), "Coping with Change: International Differences in the Returns to Skills", *NBER Working Paper Series*, No. 22657, Figure 1; *OECD Survey of Adult Skills (PIAAC) Database* (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497700

to be more satisfied with their jobs than other workers (OECD, 2016c). Controlling for proficiency, greater use of reading, writing and ICT skills is associated with higher hourly labour productivity (ibid). Analysis at the industry level confirms these results, except for writing, and shows that problem-solving skills are also associated with higher productivity.

Figure 2.15. **The age profile of information-processing skills**

2012 or 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. The UK data is composed of England and Northern Ireland.
Source: OECD (2016), *Skills Matter – Further Results from the Survey of Adult Skills*, Annex A; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497710

High skills use in the workplace in New Zealand is partly attributable to the prevalence of high-performance work practices, which include both aspects of work organisation – such as team work, autonomy, task discretion, mentoring, job rotation and applying new learning – and management practices – such as employee participation, incentive pay, training practices and flexibility in working hours (Figure 2.17, Panel A). High-performance work practices are prevalent in New Zealand in work organisation (Panel B) and, with the exception of incentive-pay schemes, such as bonuses, in management practices (Panel C). Such work practices increase skills use at work. OECD (2016c) finds that, controlling for age, gender, years of education, skills proficiency, industry, firm size and country fixed effects, a one standard deviation increase in the index of high-performance work practices used in the PIAAC study would result in an increase in the various indices of skills use by between 0.58 point for numeracy and 0.68 point for writing and problem-solving at work – approximately half a standard deviation of the dependent variables.

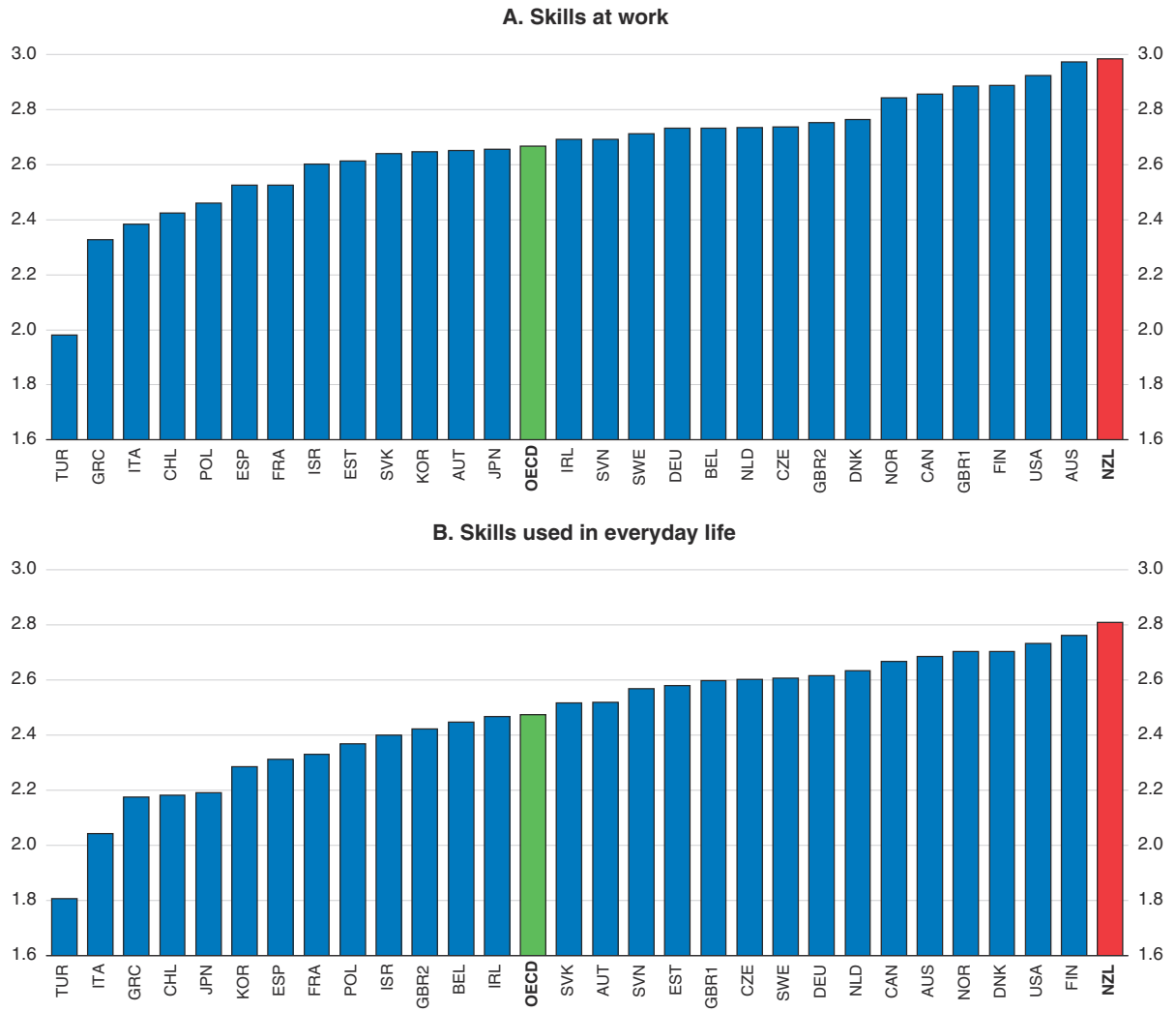
The New Zealand government, like many others, is promoting better skills utilisation through workplace innovation. The High-Performance Working Initiative (HPWI) provides business coaching for small- to medium-sized businesses to help improve work practices so as to enhance performance as well as increase employee engagement and satisfaction (OECD, 2016c). While this initiative is very useful for disseminating good practices, it may need to be complemented by management skill development programmes with wider reach, as such skills in New Zealand lag behind best practice (see Chapter 1), potentially inhibiting the diffusion of high-performance work practices. Incorporating some management elements in non-management tertiary programmes could also help to improve managerial skills.

Increasing educational attainment

For more young people to be able to succeed in post-secondary education, achievement by the secondary level will need to improve – performance at the secondary level is a strong predictor of success at the tertiary level (OECD, 2016a). The OECD PISA study shows that

Figure 2.16. **Use of information-processing skills**

2012 or 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

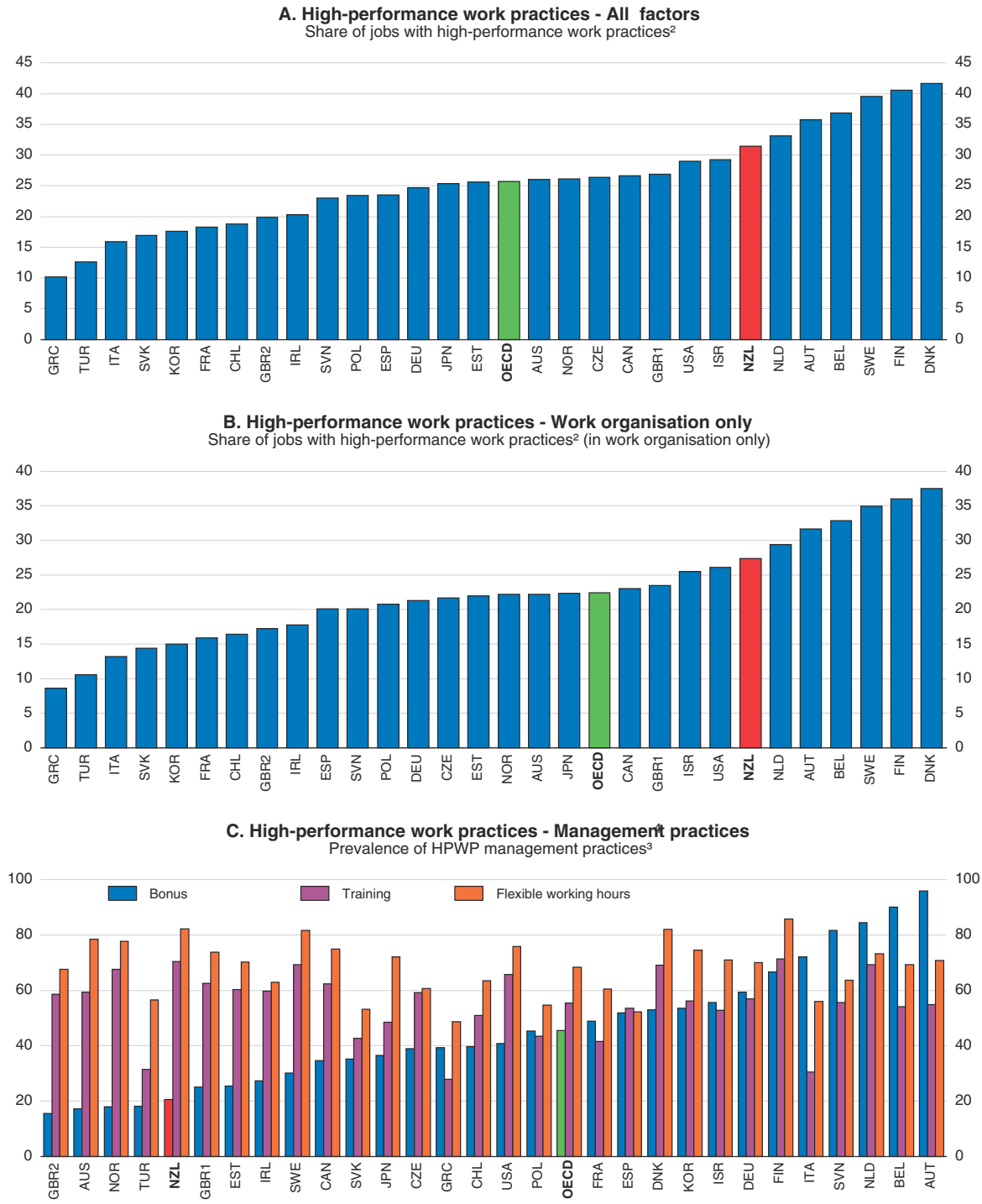
Source: OECD (2016), *Skills Matter – Further Results from the Survey of Adult Skills, Annex A*; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497724

while achievement stabilised between 2012 and 2015 at levels above the OECD average, it had declined markedly in earlier years (Figure 2.18). The decline reflects an increased share of low performers (below Level 2) and a reduced share of high performers (levels 5 and 6) (Figure 2.19). It is not clear why these changes have occurred. Possible explanatory factors include significant changes in the curriculum and qualifications framework, changes in teacher training and development and other factors affecting teaching and learning, such as increases in the use of ability grouping. Māori and Pasifika achievement lags well behind that of the rest of the population (Figures 2.18 and 2.20), and the influence of socio-economic background on outcomes, both within and between schools, remains higher than in many countries (Figure 2.21). Achievement issues are most pronounced in mathematics, where

Figure 2.17. **High-performance work practices**

2012 or 2015[1]

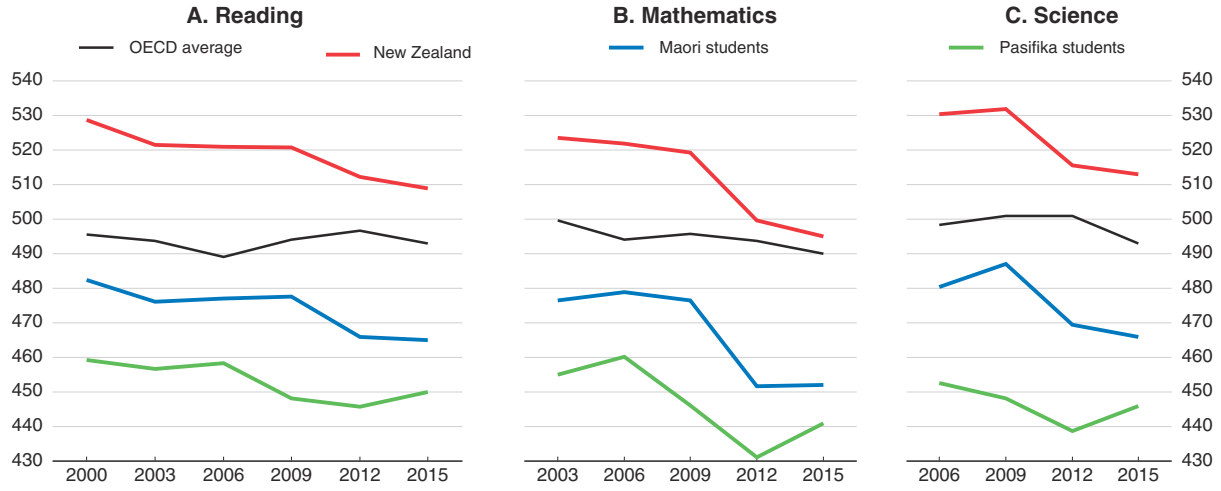


1. For exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.
2. Share of workers in jobs where the summary HPWP is above the top 25th percentile of the pooled distribution.
3. Share of workers receiving bonuses (bonus), having participated in training over the previous year (training) or enjoying flexibility in working hours (flexible working hours).

Source: OECD (2016), *Employment Outlook 2016*, Figure 2.10; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497732

Figure 2.18. **New Zealand's average PISA scores have fallen**

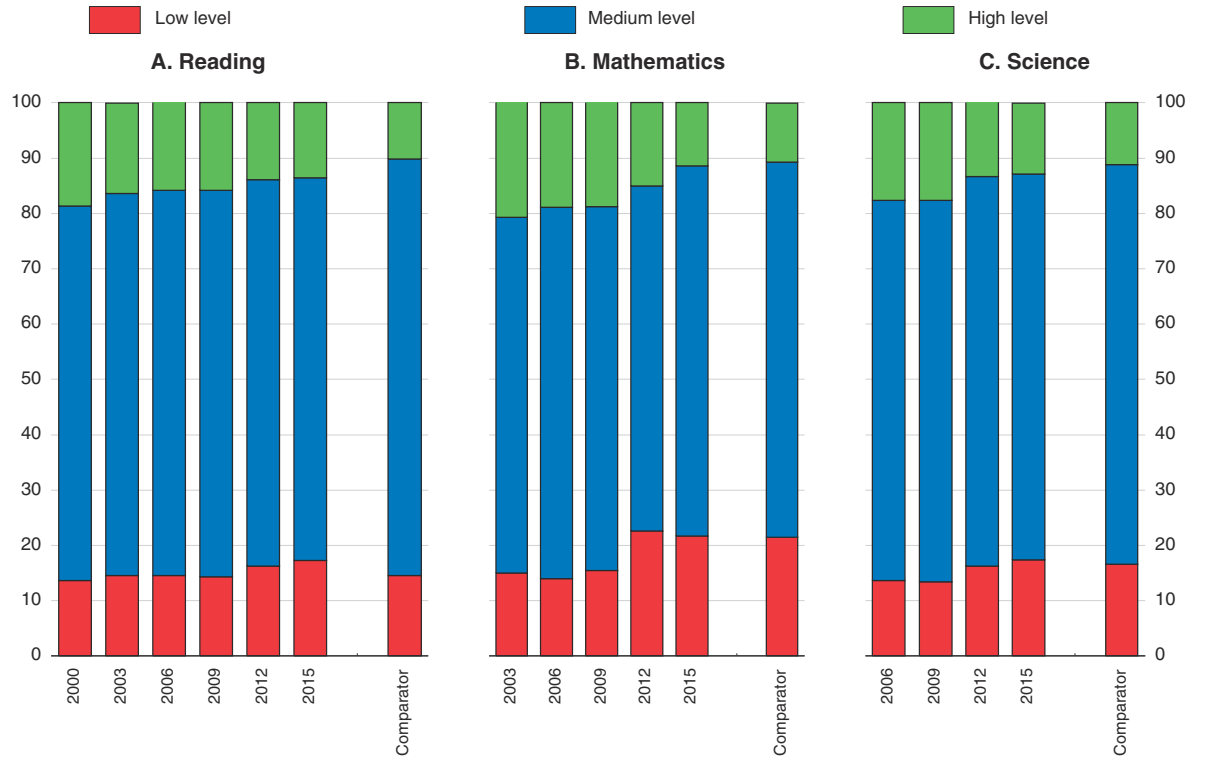


Source: OECD, *PISA Results*, various years; S. May, J. Flockton and S. Kirkham (2016), *PISA 2015 – New Zealand Summary Report*, Ministry of Education.

StatLink http://dx.doi.org/10.1787/888933497384

Figure 2.19. **Percentage of students at each proficiency level**[1]

Trends in New Zealand over time and 2015 comparison with the average of countries with similar performance[2]

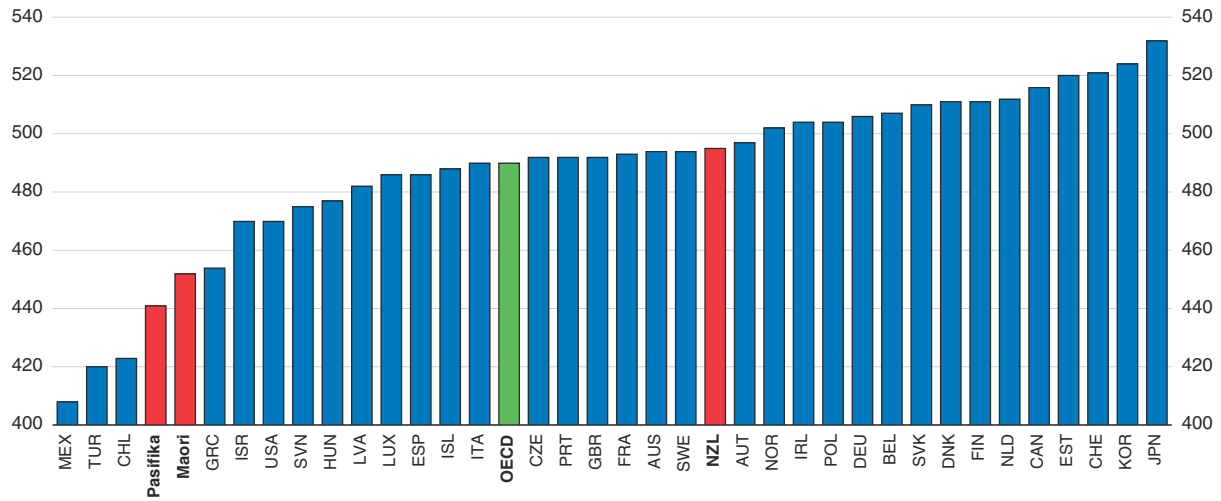


1. Low level is defined as the combination of below level 1/1b, level 1b/1a/1; medium level as the sum of level 2, level 3 and level 4; and high level as level 5 plus level 6.
2. Countries for which scores are not significantly different from New Zealand's are for reading, Germany, Japan, Korea, Macao (China), Netherlands, Norway, Poland and Slovenia; for mathematics, Australia, Austria, Czech Republic, France, Portugal, Russian Federation, Sweden, United Kingdom and Viet Nam; and for science, Australia, Germany, Korea, Netherlands, Slovenia, United Kingdom and Beijing-Shanghai-Jiangsu-Guangdong (China).

Source: OECD, *PISA Results*, various years.

StatLink http://dx.doi.org/10.1787/888933497395

Figure 2.20. **PISA performance in mathematics, 2015**

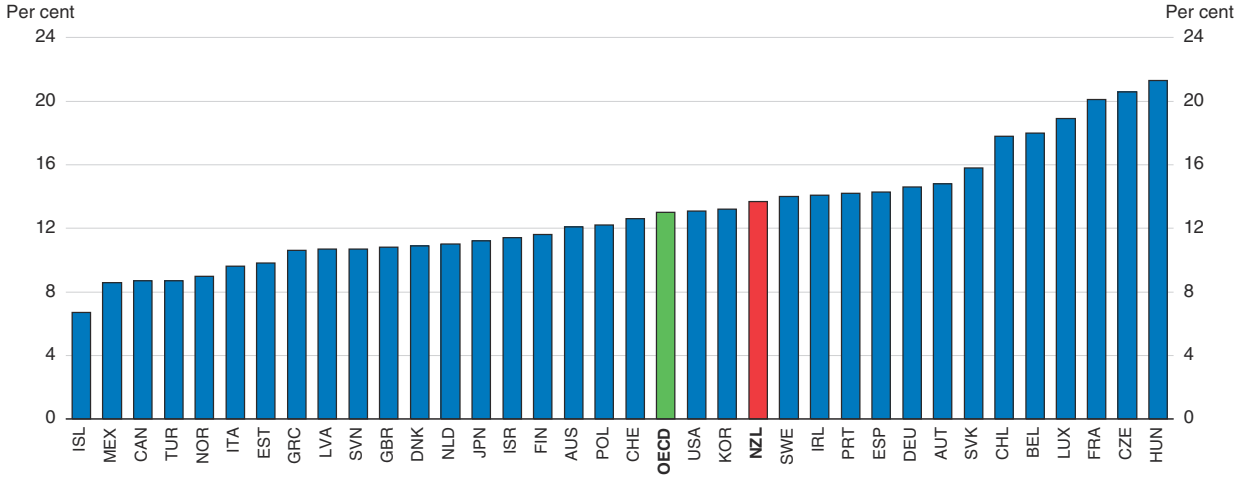


Source: OECD (2016), *PISA 2015 Results: Excellence and Equity in Education*, Annex B1, Chapter 5; S. May, J. Flockton and S. Kirkham (2016), *PISA 2015 – New Zealand Summary Report*, Ministry of Education.

StatLink http://dx.doi.org/10.1787/888933497403

Figure 2.21. **Influence of socio-economic background on PISA scores in mathematics**

Variation in student performance explained by socio-economic background,[1] 2015



1. PISA index of economic, social and cultural status.

Source: *Source*: OECD (2016), *PISA 2015 Results: Excellence and Equity in Education*, Vol. I, Table I.6.3c.

StatLink http://dx.doi.org/10.1787/888933497411

PISA scores are only just above the OECD average and there is a larger tail of poor performers than in the other subjects. Weakness in mathematics achievement is corroborated in the TIMMS study (Mullis et al., 2016), for which the NZ score is below average. Only 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.

A cornerstone of successive governments' strategies for accelerating the progress of Māori and Pasifika students and those from low socio-economic backgrounds, is to ensure that all pre-school children have access to high-quality early childhood education. Progress has been made in reducing non-participation rates for Pasifika and Māori children, from 24%

and 17%, respectively, in 2000, to 9% and 6% in 2016. Nevertheless, these non-participation rates and those for children from lower socio-economic backgrounds more generally remain significantly higher than for other children. New Zealand's early childhood education regulations ensure the structural foundations for quality. Regulations include high ratios of adults to children and requirements for qualified teachers. As discussed in the last *Survey* (OECD, 2015a), the government needs to monitor outcomes for all disadvantaged children and, if necessary, move to ensure that increased participation is improving their educational outcomes. Subject to evaluation results, programmes targeting children from lower socio-economic, Māori or Pasifika families that combine good quality early childhood education with parenting support and education should be expanded. There have also been improvements in the rates of students, including Māori and Pasifika, obtaining a National Certificate of Educational Achievement (NCEA) Level 2 or above qualification (an NCEA Level 2 qualification is normally gained in upper secondary school by the end of Year 12 and is considered to be the minimum necessary to give people reasonable opportunities in terms of further education and employment).

Raising teaching effectiveness is the most important in-school lever for enhancing learning (OECD, 2015b; Schleicher, 2016; Hattie, 2008). Enhancing the quality of school leadership is also important (Pont et al., 2008; Robinson et al., 2009; Branch et al., 2012). A range of initiatives is underway to improve teaching effectiveness, including the creation of Communities of Learning in 2014. These are intended to enhance collaboration between schools and improve teaching and leadership expertise in New Zealand's highly devolved school system. Communities of Learning identify their priority achievement challenges; draw on new teaching and leadership roles to lift teaching effectiveness in response to these challenges; and build more coherent student pathways through the education system. As discussed in the last *Survey*, better use should be made of student achievement data to ensure that all students are performing well. Communities of Learning, recent reforms to professional learning and development, and an ongoing review of initial teacher education should enable further progress in this area. More generally, school funding should fully reflect the additional costs of delivering the curriculum to children from disadvantaged backgrounds and/or with behavioural problems or disabilities. As part of an early learning and school funding review, the New Zealand government is currently exploring the mechanism for funding children at greater risk of educational underachievement because of disadvantage.

Communities of Learning should help to ease achievement problems by lifting primary school teachers' capability and confidence in mathematics. By encouraging teachers to work across both primary and secondary settings, Communities of Learning allow specialist secondary school teachers to lead and support effective teaching of mathematics across all the schools in a Community of Learning. Arrangements within Communities of Learning for early intervention to help students falling behind in mathematics should also help.

To lift outcomes in the long term, a systemic approach is necessary to improve the effectiveness of mathematics teaching in primary and intermediate schools. Key elements of such an approach include: raising initial teacher education quality and entry standards (current minimum entry standards for teaching programmes are relatively low); supporting professional learning and development that lifts the capability of current teachers in mathematics; and supporting school leaders to lead a collaborative, data- and evidence-informed teaching culture that emphasises all aspects of the mathematics curriculum.

Options should also be explored to ensure that every pathway through the schooling system enables students to gain at least the minimum skill level needed to support further study and labour market participation in higher-skilled occupations. One of the unintended consequences of a highly devolved education system may be that it is less likely to consistently deliver a core set of skills to each student. In this respect, options should be investigated to reduce over-reliance on same ability grouping (i.e. the streaming of students for all classes, some subjects, or different forms of a subject) and variability in students' levels of exposure to the mathematics curriculum. This could include reviewing minimum numeracy requirements for school qualifications and the minimum education required by all school leavers as well as examining options for schools to access guidance and professional learning and development on the effective use of mixed ability grouping strategies.

Reducing qualifications and field-of-study mismatches

Adapting to technical change entails not just acquiring higher levels of education and skills, but obtaining those that are in demand in the labour market. New Zealand may have some problems in this regard. Qualifications and field-of-study mismatches, which occur when workers have qualifications that are greater or less than required for their jobs or in a different field, are more common than for any other participant country in the PIAAC study (Box 2.1; Figure 2.22). Most qualifications mismatch is over-qualification, and most over-qualified workers are also field-of-study mismatched. In New Zealand, the proportion of overqualified workers who are also field mismatched is higher (8th highest) than in most other OECD countries that participated in the PIAAC study (Figure 2.23, Panel A). Workers who are field-of-study mismatched often hold qualifications in fields where the labour market is oversupplied, obliging them to settle for a job outside their field of study that requires a lower qualification than they hold (Montt, 2015). In New Zealand, the proportion of field mismatched workers who are also overqualified is the third highest among OECD countries that participated in the PIAAC study (Panel B).

In a dynamic economy, some level of mismatch is inevitable (just as is some unemployment). Skills and qualification requirements for jobs are constantly evolving. Job tasks change in response to technological and organisational change, the demands of customers and the evolution of the labour supply (OECD, 2016b). Young people leaving education and people moving from unemployment into employment, for example, may take jobs that do not fully match their qualifications and qualifications and skills. As mismatches can reduce productivity and wages as well as worker satisfaction (OECD, 2016b; see below), the public policy objective is to ensure that policies are not inimical to efficient matching.

It should be emphasised that the measures of mismatch discussed in this chapter are at the individual level, *i.e.,* on the outcomes of allocating individuals to jobs and adapting job tasks to workers' skills or qualifications. These measures do not address imbalances in the aggregate supply of and demand for individuals with particular skills or qualifications. For example, a high degree of over-qualification does not mean that there must be an oversupply of highly qualified workers in the labour market. While labour-market imbalances have an effect on the prevalence and type of mismatches observed at the individual level (Montt, 2015), it is not automatic (OECD, 2016b). It is possible, for example, for a high degree of over-qualification to co-exist with shortages of highly qualified workers in the labour market.

Over-qualified workers in New Zealand earn 14% less than well-matched workers with the same qualifications and skills proficiency, the same hourly earnings penalty as the average for OECD countries (OECD, 2016b). As in other countries, this wage penalty is greater

Box 2.1. **Measuring qualifications, field-of-study and skills mismatches**

Mismatches in the OECD PIAAC study (OECD, 2016b) are measured as follows:

Qualifications mismatch arises when workers have an educational attainment that is higher or lower than that required for their job. This is assessed in relation to workers' answer to the question about the usual qualifications, if any, "that someone would need to get (their) type of job if applying today". The answer to this question is used as each worker's qualifications requirement and compared to their actual qualifications to identify mismatch.

Field-of-study mismatch occurs when workers are employed in a different field from that in which they have specialised. The matching is based on a list of occupations (at the 3-digit ISCO classification) that are considered as an appropriate match for each field of study.

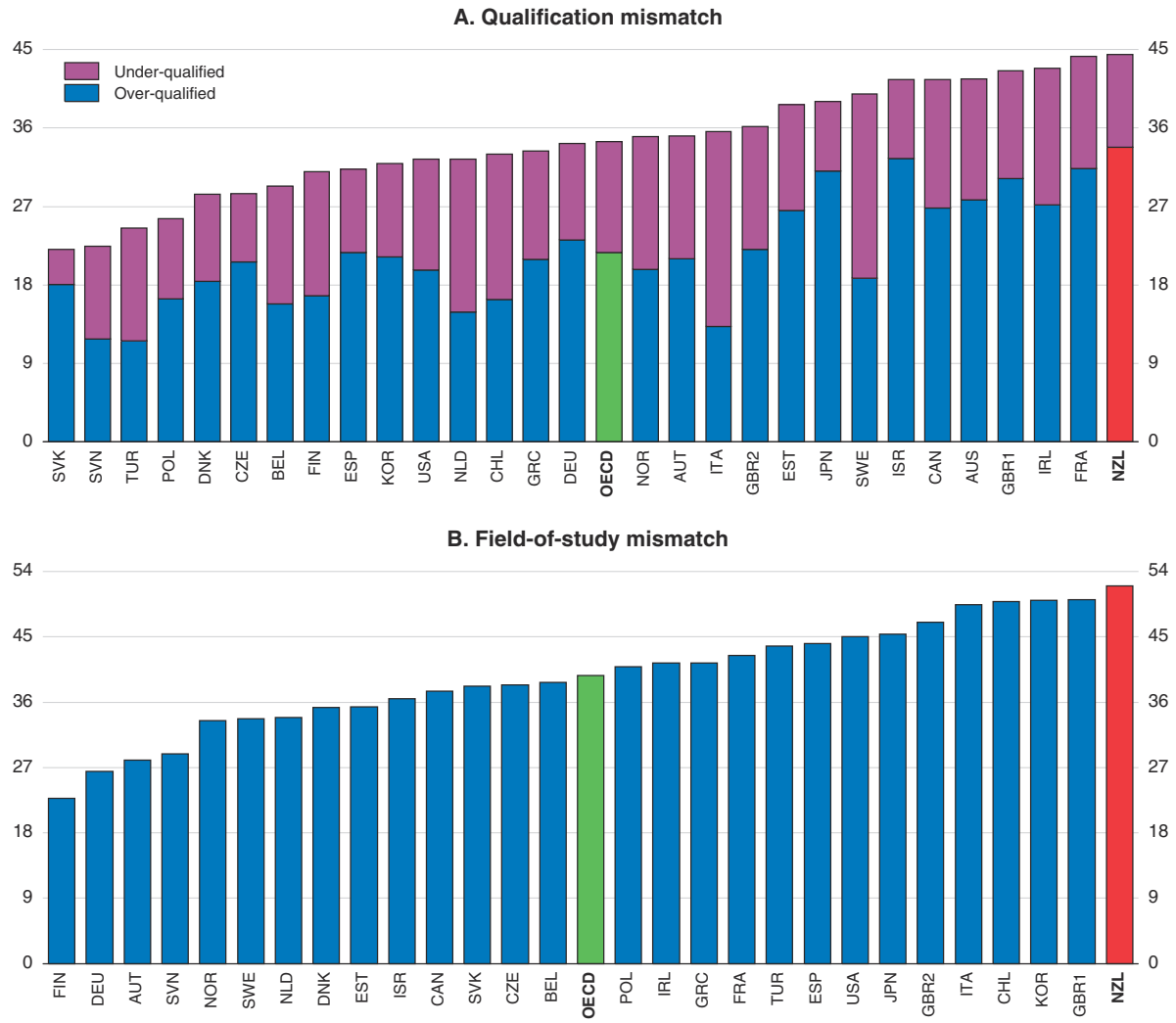
Skills mismatch arises when workers have higher or lower information processing skills proficiency (such as in literacy or numeracy) than required for their job. To assess skill proficiency requirements for a job, workers were asked whether they feel that they "have the skills to cope with more demanding duties than those they are required to perform in their current job" and whether they feel they "need further training to cope well with their present duties". Workers are classified as well matched in a domain if their proficiency score is between some minimum and maximum score observed among workers who answered "no" to both questions in the same occupation and country. In the PIAAC study, workers are over-skilled in a domain if their score is higher than the 95th percentile of self-reported well-matched workers; they are under-skilled in a domain if their score is lower than the 5th percentile of self-reported well-matched workers. It should be noted that the PIAAC study does not measure all forms of skills mismatch – it focuses on information processing skills in the domains assessed but, for example, leaves out mismatch related to job-specific skills or that involve generic skills.

than for the other forms of mismatch (i.e. field of study and information processing skills). After controlling for over-qualification and over-skilling, field-of-study mismatch does not have a significant further effect on wages in New Zealand (and reduces wages by only 3% on average across OECD countries). NZ workers employed outside their field only suffer a significant wage penalty when they are also overqualified, as almost half of them are.

According to econometric evidence presented in OECD (2016b), by far the most important factor that contributes to the relatively high incidence of over-qualification in New Zealand is the preponderance of very small firms (1-10 employees). Firm size may have this effect, because it is a proxy for the quality of human-resource policies: larger companies are better at screening candidates and at understanding how over-qualification may affect job satisfaction and productivity (OECD, 2016b). Larger firms may also have larger internal labour markets through which workers can be transferred to better matched jobs inside the firm. The next most important factor contributing to the high rate of NZ over-qualification is the greater incidence of part-time work than in most other OECD countries, which also increases field-of-study mismatch and over-skilling. Part-time jobs, which often have lower skill requirements, may attract over-qualified, field-of-study mismatched and/or over-skilled candidates because these jobs are more compatible with family responsibilities or are preferred over unemployment. OECD (2016b) also found that part-time employees are more likely to be field-of-study mismatched in New Zealand than full-time employees, but that small-firm employment is not a significant explanatory factor of field mismatch.

Figure 2.22. **Qualifications and field-of-study mismatch**[1]

Percentage of mismatched workers, by type of mismatch, 2012 and 2015[2]



1. Qualifications mismatch occurs when a worker has a higher or lower level of qualification than is required for his/her job. Field-of-study mismatch occurs when a worker has a qualification in a different field than required for his/her job.
2. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

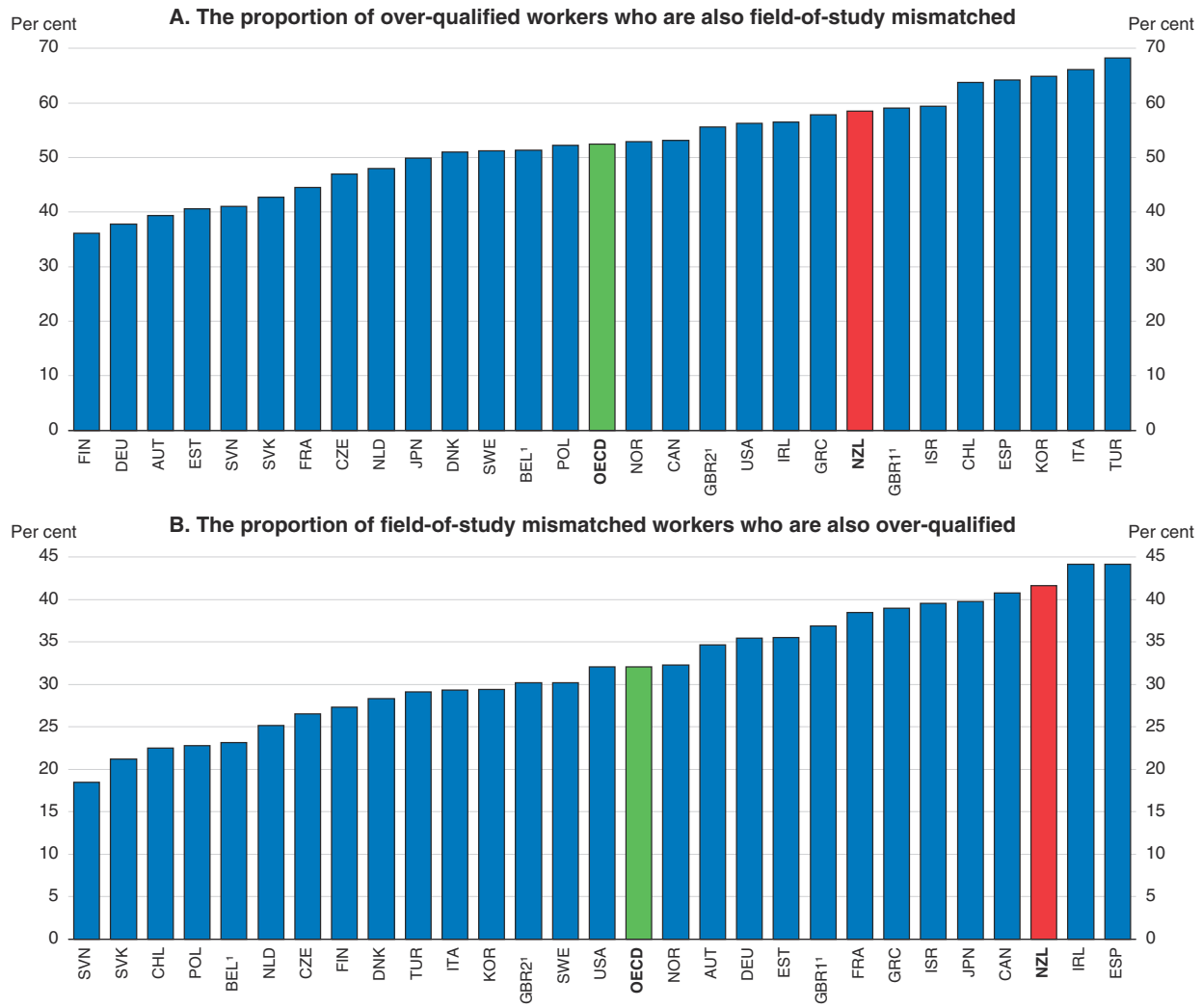
Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, Figure 5.7; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497420

While New Zealand is always likely to have a high incidence of over-qualified workers owing to its small economy and the associated preponderance of employment in very small firms, steps could be taken to reduce such mismatch. Given that most over-qualified workers are field-of-study mismatched, reducing field mismatches could help to reduce over-qualification mismatches. New Zealand's comparatively high overall rate of field-of-study mismatch reflects some combination of qualification shares being tilted towards fields in which mismatch tends to be high internationally and mismatches in specific fields being high. As in most other countries, field mismatch is highest for "humanities, languages and arts" and lowest for "social sciences, business and law" (Table 2.6). Relative to the OECD average, NZ mismatches are particularly high in "teacher training and education science"

Figure 2.23. **Overlap of over-qualification and field-of-study mismatch**

2012 and 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

Source: OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, Figures 5.8a & 5.8b; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497740

and in "humanities, languages and arts", and especially low in "agriculture and veterinary". This could be a sign that, relative to other countries, more workers in New Zealand have qualifications in the former two fields and not enough have qualifications in the latter field in relation to labour market demand. The fact that in New Zealand the overall mismatch rate (52.0%) which is a weighted average of field mismatches, is close to the simple average of field mismatches (52.7%), whereas the overall mismatch rate for the OECD average (41.9%) is well below the average of field mismatches (48.2%) indicates that the distribution of workers across fields in New Zealand is more weighted towards those with high mismatch rates than is the case in most other countries.

Field mismatches could be lower if more NZ students sought qualifications in less crowded fields, where job prospects are better. The NZ government has recently created

Table 2.6. **Prevalence of field-of-study mismatch by field**

	Field-of-study mismatch by field of study, per cent								
	Overall rate	Teacher training and education science	Humanities, languages and arts	Social sciences, business and law	Science, mathematics and computing	Engineering, manufacturing and construction	Agriculture and veterinary	Health and welfare	Services
New Zealand	**52.0**	**56.3**	**90.7**	**27.3**	**79.5**	**36.2**	**55.8**	**32.8**	**43.9**
England (UK)	50.1	40.6	87.3	27.3	76.7	37.5	83.4	24.7	57.9
Korea	50.1	33.7	72.9	26.3	84.0	44.1	85.9	39.4	22.9
Chile	49.9	40.9	83.6	22.0	73.9	41.7	39.9	43.4	42.7
Italy	49.4	48.2	75.6	18.8	76.9	34.0	82.2	25.1	47.3
Northern Ireland (UK)	47.0	40.5	87.4	20.3	74.5	41.6	90.7	22.3	63.1
Japan	45.3	72.1	85.8	27.0	59.5	38.2	79.6	24.1	32.1
United States	45.0	49.7	73.6	24.5	71.7	33.2	71.4	35.1	46.1
Spain	44.1	40.1	80.7	26.8	71.3	37.6	43.2	30.4	35.1
Turkey	43.8	24.3	76.4	33.6	80.8	41.5	48.8	32.6	40.5
France	42.5	37.6	68.5	25.6	72.9	35.9	64.6	35.0	40.9
Country average	**41.9**	**46.3**	**76.5**	**23.5**	**71.2**	**34.4**	**70.9**	**30.5**	**38.6**
Greece	41.4	36.1	75.0	16.8	68.6	44.4	78.1	37.8	16.6
Ireland	41.4	29.1	76.5	23.1	79.5	31.0	83.1	28.6	34.3
Poland	40.9	38.2	65.6	19.0	79.6	34.4	65.6	24.8	47.0
Flanders (Belgium)	38.7	28.5	76.3	20.8	68.1	32.1	90.2	31.1	25.1
Czech Republic	38.3	35.9	77.9	22.5	69.7	32.2	77.4	39.4	52.2
Slovak Republic	38.2	26.9	80.1	21.0	66.0	28.3	84.1	22.8	36.3
Canada	37.5	30.0	77.1	19.2	62.6	26.0	57.3	32.2	41.3
Israel	36.5	34.9	69.2	23.6	46.0	35.7	55.9	30.2	60.0
Estonia	35.3	30.9	61.5	23.7	47.5	32.4	75.8	23.5	40.7
Denmark	35.2	40.0	71.7	19.9	51.0	29.0	63.7	19.8	41.8
Netherlands	33.9	30.0	72.7	17.4	59.1	39.2	69.4	32.6	37.1
Sweden	33.7	27.7	71.1	30.8	54.7	30.6	64.9	23.8	27.2
Norway	33.5	21.6	71.0	19.6	66.1	35.2	91.9	21.7	27.4
Slovenia	28.8	19.2	44.3	20.0	51.6	29.6	63.9	16.3	32.8
Austria	28.0	25.9	60.8	21.8	49.3	28.6	76.5	14.7	25.6
Germany	26.4	31.9	55.6	17.4	51.6	29.2	54.5	23.2	18.0
Finland	22.8	31.2	52.7	16.7	41.5	21.1	55.0	14.7	18.1

Source: OECD calculations based on the Survey of Adult Skills, PIAAC (2012 and 2015).

Internet sites (e.g., Compare Study Options) to help students and their parents become better informed about labour market prospects in different fields of study, although this information would be more easily accessible if the sites were consolidated (NZPC, 2017). These services need to be complemented by better careers education and guidance in schools. The New Zealand Productivity Commission (2017, p. 360) concludes that "…careers education and guidance in schools is highly variable, frequently delivered far too late, and at its worst appears not to reach some students. Schools tend to provide information to students rather than ensuring that students develop the skills to manage their own career pathways." The approach to schools-based career education should be reformed, as recommended by the Commission (p. 304), so that students develop the skills and knowledge to make effective decisions about their study options and careers pathways. Following a comprehensive review, the government is proposing to transfer Careers New Zealand's functions into the Tertiary Education Commission (TEC) to exploit the TEC's ability to work with tertiary providers and employers so that they can provide better careers information to

schools regarding the skills needs of the labour market. In this context, the authorities are also exploring how to make it easier to share careers resources and expertise across schools and Communities of Learning.

NZ students' capacity to choose less crowded fields would be augmented if more had obtained the skills needed to enter these fields by the end of secondary school. As noted above, weak mathematics skills limit students' choices, which may encourage more of them to enter crowded fields such as "teacher training and education science" or "humanities, languages and arts", where mathematics prerequisites are most often limited or non-existent.

It may also be worth reviewing New Zealand's career-focused education, as is happening in many other countries, to ensure that it is in tune with the changing labour-market demands resulting from digitalisation. In the United States, for example, the manufacturing sector requires many more workers who know how to use robotics equipment and can navigate across a variety of technologies than are in the education pipeline (Giffi et al., 2015). To help to bridge these skills gaps, career-focused education is being developed. An example is the six-year high school-community college programme founded by IBM in 2011 in which 300 partner companies work with 60 local schools to shape curricula that will educate students up to a two-year associate's degree. More generally, having the skills to work with new technologies is likely to be critical to access good jobs. Increasingly, students will need to graduate with a mix of soft skills, such as problem solving and communication, and basic technical skills such as technology and mathematics.

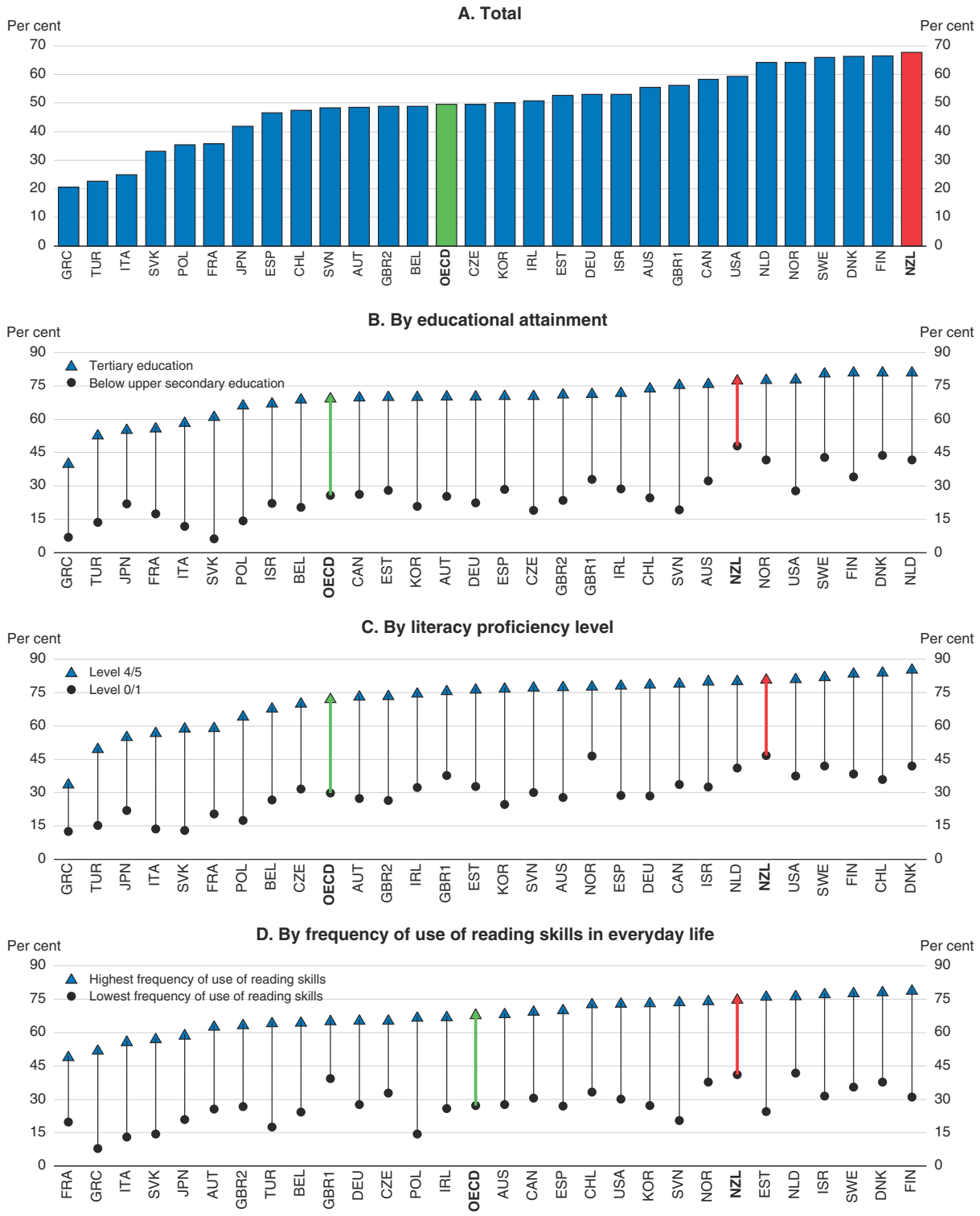
Bolstering lifelong learning

People need to acquire new skills throughout their working lives to meet evolving labour market demands. This may entail moderate educational investments to remain productive in an occupation as its skill requirements evolve or more substantial investments to train for a different occupation, sometimes necessitated by the demise of a worker's current occupation. Most often, these educational investments will involve part-time formal education (i.e., planned education provided in formal educational institutions that normally constitutes a continuous ladder of full-time education for children and young people) and/or non-formal education (i.e., sustained educational activity that does not correspond exactly to the definition of formal education). Formal and/or non-formal education can play an important role in helping to develop and maintain key information processing skills and to acquire other knowledge and skills throughout life. It is crucial to provide and ensure access to organised learning opportunities for adults beyond initial formal education, especially for workers who need to adapt to changes throughout their careers and have difficulty succeeding in the labour market (OECD, 2013).

New Zealand is starting from a good position in terms of adult (aged 25-64) participation in formal and non-formal education, which is the highest among the countries that participated in the PIAAC study (Figure 2.24, Panel A). This performance reflects high participation in both the formal and non-formal components (OECD, 2016a). As in most other countries, men and women participate at roughly equal rates. Participation in New Zealand and other countries is correlated with educational attainment, information-processing skills (literacy, numeracy and problem solving in a technology-rich environment) and the frequency of their use (Panels B, C and D). Yet, the gaps in participation rates between those with high educational attainment, reading skills and/or use of reading skills in everyday life and those with the opposite characteristics is smaller in New Zealand than in most other

Figure 2.24. **Participation in formal/non-formal education**

25-64 year-olds, 2012 or 2015[1]



1. For the exact year of reference of the data, see footnote 2 in Figure 2.8. Data indicated as Belgium correspond to Flanders; GBR1 = England and GBR2 = Northern Ireland.

Source: OECD (2016), *Education at a Glance 2016: OECD Indicators*, Indicators C6; OECD Survey of Adult Skills (PIAAC) Database (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497758

countries, reflecting high participation rates by international comparison for people with low attainment, literacy skills and/or use of reading skills. As in other countries, proficiency levels and educational attainment have a mutually reinforcing effect on participation. While those with high literacy skills or high tertiary attainment in New Zealand are 1.6-1.7 times more likely to participate than people with the opposite characteristics, this ratio rises to 2.2 for those with high literacy skills and education attainment relative to those with the opposite characteristics, which is far below the OECD average ratio of 4.0. Despite relatively below average hours of participation in non-formal education in New Zealand, overall time invested in such education is above the OECD average owing to the high participation rates (OECD, 2016a). Factors that contribute to high participation in formal education include open access to tertiary education for those aged over 20, highly subsidised courses, student support (loans and income-tested allowances) and low income tax rates, which boost after-tax returns on education investments.

Access to part-time formal education is important for workers beyond the typical age of enrolment to be able to upgrade or re-orientate their qualifications, as such workers usually have family responsibilities that rule out full-time study. For example, 68-78% (depending on the level of studies) of tertiary enrolments at ages above typical enrolment ages (20-29) are part time in New Zealand, compared with part-time enrolments rates of 37-64% for all age groups (OECD, 2016a). These part-time enrolment shares at ages above typical enrolment ages are well above the OECD average (38-47%). They should facilitate further education for workers who need to upgrade their skills to perform more tasks that are complementary to machines or to move into new fields, some of which may not have existed before. For people in middle-skilled jobs, this will often involve upgrading to tertiary qualifications to move into other middle-skilled occupations that digitalisation has made more productive, such as health technicians and paralegals, as is occurring in the United States (Holzer, 2015).

Increasing online delivery of tertiary education could help to increase the number of people obtaining tertiary qualifications, especially mid-career workers. Goodman et al. (2016) find that the introduction of the Georgia Institute of Technology's Online Masters in Computer Science increased its overall formal enrolment, expanding the pool of students. This degree programme is of the same quality as the in-person equivalent, leads to the same qualification and costs less than one-sixth of the price for out-of-state students. These authors find that demand for this online degree is driven by mid-career Americans, most of whom would not otherwise pursue further education. There are a number of programmes taught online in New Zealand, however for them to develop more, the government would need to make tertiary institution funding arrangements more flexible. While such programmes are not explicitly discouraged at the moment, they are likely financially unattractive to providers facing an Effective Full-time Tertiary Student (EFTS) quantity cap, as they would displace existing courses that attract higher fees (NZPC, 2017). Existing rules make it difficult to introduce a new course at a low fee, and financially risky to lower the price of an existing course (ibid). Failure to make it more attractive for NZ universities to offer online courses could result in foreign universities' prestigious courses, such as the one studied by Goodman et al., crowding out local institutions' programmes (ibid).

While the provision of training is high on average, it is uneven across different professions, with those in lower skilled jobs less likely to receive learning and development opportunities. Employers (particularly of lower skilled workers) may underinvest in training that builds transferable skills for fear that their employees leave before training investments have been amortised. This problem is likely to be more so in small firms, which have smaller

internal labour markets, are more credit constrained and less well-managed than larger companies. While training bonds, which require workers to reimburse their employer for part of the costs of training that they received if they quit or are fired before a certain date, may be an effective solution for higher-paid employees, such bonds are less likely to be effective for lower-paid employees as their more limited financial resources could make contract enforcement challenging. If training investments enhance lower skilled workers' labour market prospects, the government will benefit through lower social benefit costs and higher tax revenues. In these circumstances, there may be a role for government subsidies or regulatory interventions to increase such investments in lower skilled workers towards the socially optimal level. This will be all the more so if faster rates of technical change result in more people having to upgrade skills to remain in employment. Among best practices for such incentives, OECD (2017a) recommends that they should minimise administrative burdens, focus on the least skilled and SMEs, be flexible, result in certified learning outcomes and be regularly monitored and evaluated.

Reducing information-processing skills mismatch

Technical change is likely to result in increasingly rapid changes in job-skill requirements, aggravating information-processing skills mismatches (as well as the qualification and field-of-study mismatches discussed above). This would reduce labour productivity. Controlling for the overlap between components of qualification and (literacy) skills mismatch and for product market competition, Adalet McGowan and Andrews (2015a) find that a higher share of over-skilled workers who are well-matched in terms of their qualification is negatively correlated with labour productivity, reflecting a negative impact on allocative efficiency – over-skilling reduces the extent to which higher-skilled workers are employed by the most productive firms (Table 2.7, row 7). This negative impact on allocative efficiency also occurs when over-skilled workers are also over-qualified, offsetting the benefit to within-firm productivity on industry productivity (row 2). Their results also suggest that being over-skilled but well-matched by qualifications may have a more adverse effect on productivity than being over-qualified but well matched by skills, for which there is no significant effect (row 3). They also find that there is a negative effect on productivity of under-qualification and that it is mainly driven by under-qualified workers who are well-matched in terms of skills (row 6). The main channel for this effect is resource misallocation. Finally, they find that there is a negative relationship between under-qualification and within-firm productivity that is entirely driven by workers who are both under-qualified and under-skilled (row 4).

As Adalet McGowan and Andrews conduct their analysis using industry-level labour productivity indicators constructed from firm-level data, they are obliged to use a wider measure of skills mismatch (their cut-off points for workers with well-matched literacy skills are the 90th and 10th percentiles of skills of self-reported well-matched workers) than OECD (2016b), where analysis is conducted at the country level. Literacy skills mismatch on this measure is 28% in New Zealand, compared with an OECD average of 26% (Figure 2.25). Most mismatch entails over-skilling, as in other countries, but there is also a relatively high share of under-skilling mismatch in New Zealand by international comparison.

Adalet McGowan and Andrews (2017) estimates that reducing literacy skills mismatch in New Zealand to the best practice minimum could increase industry labour productivity by 7% through gains in allocative efficiency (Figure 2.26; Box 2.2). This is one of the larger potential gains among OECD countries (7th out of 28 countries), reflecting the fact that skills mismatches in New Zealand are relatively large.

Table 2.7. **Mismatch and labour productivity in OECD countries: controlling for the overlap between the components of qualification and skills mismatch**

	(1)	(2)	(3)
	Weighted productivity	Allocative efficiency	Within-firm productivity
1.Over-qualified and under-skilled	**-0.0322***	-0.0263	-0.0059
	(0.017)	(0.023)	(0.022)
2. Over-qualified and over-skilled	0.0157	**-0.0126*****	**0.0282****
	(0.010)	(0.004)	(0.011)
3. Over-qualified and well-matched (skill)	-0.0032	-0.0003	-0.0029
	(0.009)	(0.006)	(0.005)
4. Under-qualified and under-skilled	-0.0166	0.0151	**-0.0317****
	(0.020)	(0.015)	(0.014)
5. Under-qualified and over-skilled	0.0093	0.0044	0.0048
	(0.018)	(0.017)	(0.023)
6. Under-qualified and well-matched (skill)	**-0.0200*****	**-0.0191*****	-0.0009
	(0.004)	(0.005)	(0.006)
7. Over-skilled and well-matched (qualification)	**-0.0207*****	**-0.0129*****	-0.0078
	(0.004)	(0.004)	(0.005)
8. Under-skilled and well-matched (qualification)	0.0046	-0.0040	0.0086
	(0.004)	(0.003)	(0.005)
Herfindahl index	**-3.3932*****	**-2.8125*****	-0.5807
	(1.067)	(0.677)	(0.513)
Adjusted R^2 Observations	0.916	0.704	0.936
	205	205	205

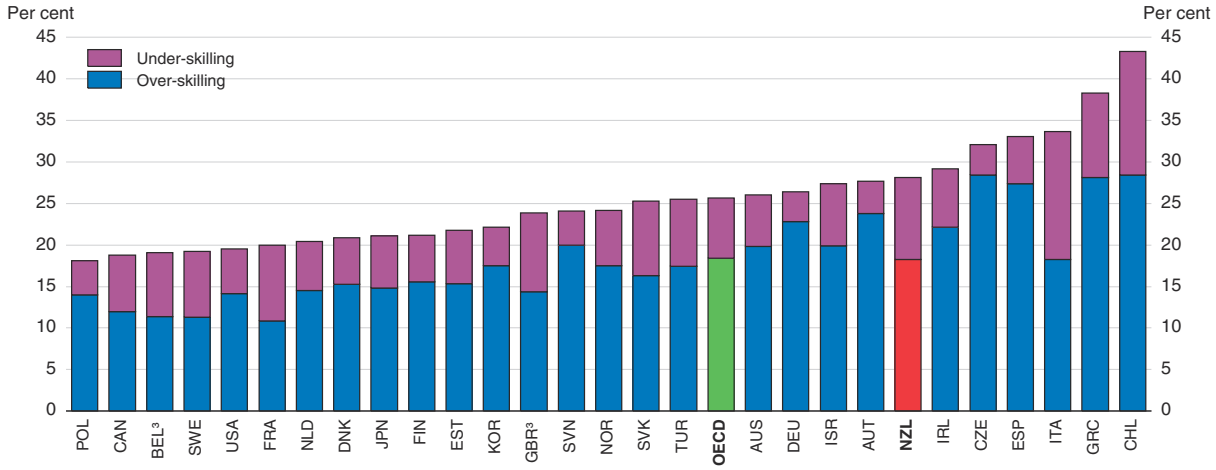
1. The dependent variables are as defined in (1) of Adalet McGowan and Andrews (2015), computed for 2007. All specifications include country and industry fixed effects and are clustered by country. Observations are weighted by industry size-number of firms. Robust standard errors in parentheses. *** denotes statistical significance at the 1% level, ** significance at the 5% level, * significance at the 10% level.
2. Under- (over-) qualified workers refer to the percentage of workers whose highest qualification is lower (higher) than the qualification they think is necessary to get their job today. Under- (over-) skilled workers refer to the percentage of workers whose scores are higher than that of the minimum (maximum) skills required to do the job, defined as the 10th (90th) percentile of the scores of the well-matched workers in each occupation and country.

Source: Adalet McGowan, M. and D. Andrews (2015), "Labour Market Mismatch and Labour Productivity; Evidence from PIAAC Data", *OECD Economics Department Working Papers*, No. 1209, OECD Publishing, Paris.

In New Zealand most public policies that affect the probability of skills mismatch are near best-practice, but there are some areas with room for improvement, notably housing policies (Figure 2.27). The biggest problem in this area is the relatively low long-run price elasticity of new housing supply, which is only one third of the best practice level in the United States (Andrews et al., 2011). This has had a clear impact on house prices in recent years, making it more difficult for workers to move to a better matched job where they would be more productive. While geographical factors influence supply responsiveness, these are not as important in New Zealand as in more densely populated countries. In terms of policy influences, land-use regulations (zoning) have severely limited densification and expansion of the urban area, notably in Auckland, New Zealand's largest and fastest growing city, and approval processes for making land available for residential construction are cumbersome. Another important constraint on the supply of new housing is the availability of necessary infrastructure, such as roads, water reticulation and sewage and storm water drainage. In Auckland, where excess demand pressures are greatest, investments in such infrastructure to service higher-density developments have lagged behind demand, with the result that some densification authorised in the new Urban Plan may not be possible until the necessary infrastructure becomes available, which could be many years away. Land-use regulations that restrict where certain types of firms may be located may also make it more difficult for workers to find a well-matched job.

Figure 2.25. **Percentage of workers with literacy skills mismatch**[1]

2012 and 2015[2]



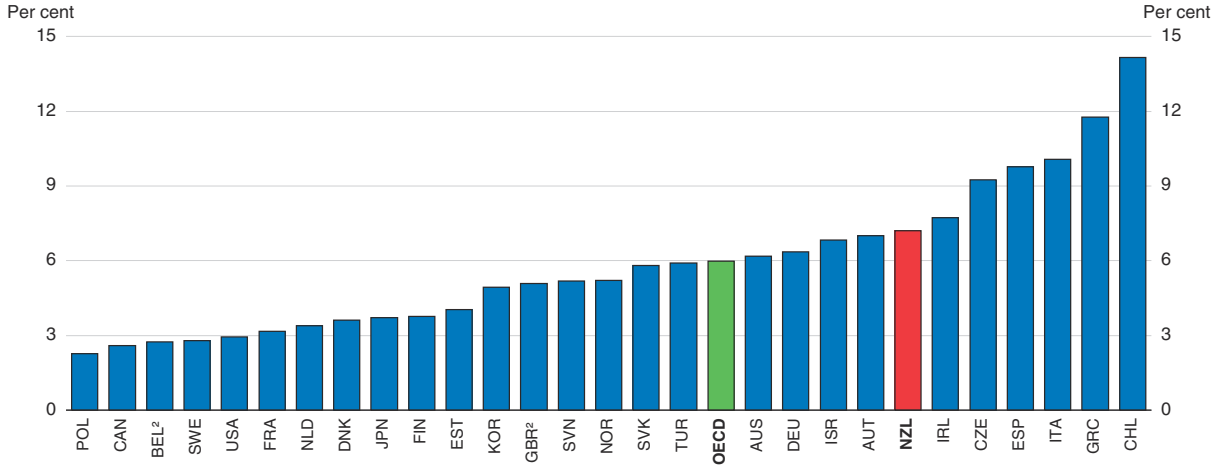
1. The figure shows the percentage of workers who are either over- or under- skilled, for a sample of 11 market industries: manufacturing; electricity, gas, steam and air conditioning supply; water supply; construction; wholesale and retail trade; transportation and storage; accommodation and food service activities; information and communication; real estate activities; professional, scientific and technical activities, and administrative and support service activities. In order to abstract from differences in industrial structures across countries, the 1-digit industry level mismatch indicators are aggregated using a common set of weights based on industry employment shares for the United States. Skills mismatch occurs when a worker's skills are higher than the 90th percentile or lower than the 10th percentile of workers with self-reported well-matched skills.
2. For the exact year of reference, see footnote 2 in Figure 2.8.
3. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497430

Figure 2.26. **Counterfactual productivity gains from reducing skills mismatch**[1]

Simulated gains to allocative efficiency from lowering skills mismatch to the best practice



1. The chart shows the difference between the actual allocative efficiency and a counterfactual allocative efficiency based on lowering the skills mismatch in each country to the best practice. 1-digit industry level mismatch indicators are aggregated using a common set of weights based on the industry employment shares for the United States. The estimated coefficient of impact of mismatch on productivity is based on a sample of 19 countries for which both firm level productivity and mismatch data are available. The estimated gains to allocative efficiency for the other countries should be interpreted with caution to the extent that they are not included in the econometric analysis due to insufficient productivity data.
2. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch,, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

StatLink http://dx.doi.org/10.1787/888933497444

Box 2.2. **Skills mismatch, productivity and policies in New Zealand: Evidence from PIAAC**

Adalet McGowan and Andrews (2017) extends the authors' earlier analysis (Adalet McGowan and Andrews, 2015a and 2015b) to New Zealand. They use industry-level productivity data and define skills mismatch as occurring when an individual has literacy skills above the 90th percentile or below the 10th percentile of the distribution of skills for people in the same occupation (defined at the one-digit level) who say that they are well matched. The strategy for extending the analysis to New Zealand is to apply the coefficient estimates from the cross-country analysis linking mismatch to productivity. It is not possible, however, to calculate to what extent skills mismatch can explain cross-country productivity gaps for New Zealand due to a lack of publically available firm-level productivity data.

The main criticism of the skills mismatch indicator used in this analysis is that it uses one-digit occupation codes because of sample size, thus assuming that all jobs with the same occupation code have the same skill requirements. Another potential criticism concerns the validity of workers' self-assessment of whether they are over-skilled, under-skilled or well matched. However, the OECD measure partially addresses this criticism by correcting false mismatches through the use of proficiency scores as described above.

Table 2.8. **The effect of policy-related factors on skills mismatch**

Marginal effects

	(1)	(2)	(3)	(4)	(5)
Dependent variable: 1 if the individual is mismatched, 0 otherwise					
Panel A: **Framework policies**	Employment protection legislation for permanent workers	Employment protection legislation for temporary workers	Product market regulation	Cost of closing a business	
Policy-related factors	0.043**	0.021**	0.042**	0.006**	
	(0.008)	(0.003)	(0.010)	(0.001)	
Number of observations	76 183	76 183	74 224	76 183	
pseudo-R2	0.012	0.012	0.01	0.013	
Panel B: **Housing policies**	Transaction costs	Rent control	Tenant-landlord regulations	Cost of obtaining a building permit	Responsiveness of housing supply
Policy-related factors	0.007***	0.017**	0.021**	0.001**	-0.051**
	(0.001)	(0.003)	(0.003)	(0.000)	(0.010)
Number of observations	66 863	66 529	69 002	76 183	58 390
pseudo-R2	0.011	0.011	0.012	0.009	0.014
Panel C: **Other policies**	Coverage rate of collective bargaining agreements	Participation in lifelong learning (PIAAC data)	Managerial quality		
Policy-related factors	0.001**	-0.002**	-0.002**		
	(0.000)	(0.000)	(0.000)		
Number of observations	71 819	76 183	76 183		
pseudo-R2	0.011	0.012	0.015		

Notes: See Table A1 of Adalet McGowan and Andrews (2017) for detailed explanations of the policy variables. Estimates from logit regressions. Values are marginal effects. The coefficients correspond to the impact of a change in the explanatory variable on the probability of mismatch at the mean of the independent variables. Each column in each panel includes one policy-related variable at a time. Regressions include as controls age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector. Robust standard errors in parentheses. *** denotes statistical significance at the 1% level, ** significance at the 5% level, * significance at the 10% level.
Source: OECD calculations based on the *Survey of Adult Skills* (2012 and 2015).

Box 2.2. **Skills mismatch, productivity and policies in New Zealand: Evidence from PIAAC** *(cont.)*

To assess the role of policy settings in explaining skills mismatch, the following cross-country specification is estimated:

$$SMM_{i,c} = \Phi(\delta_1 + \delta_2 I_{i,c} + \delta_3 P_c + \delta_4 C_c + \varepsilon_{i,c})$$

where SMM is a measure of whether individual i in country c is over- or under-skilled, I denotes a vector of individual characteristics, P denotes country-specific policies and C denotes country-specific control variables, including total national income (for more information on I and P, see Adalet McGowan and Andrews [2017]).

The estimation of this equation treats policies as exogenous factors affecting mismatch, but there may be reason to be concerned about endogeneity. Causation is difficult to establish given data limitations: i) the data are available only at one point in time; and ii) due to high correlations between the policy variables, the baseline analysis includes the policy variables one at a time. Nevertheless, a number of robust correlations between policy variables and skills mismatch emerge.

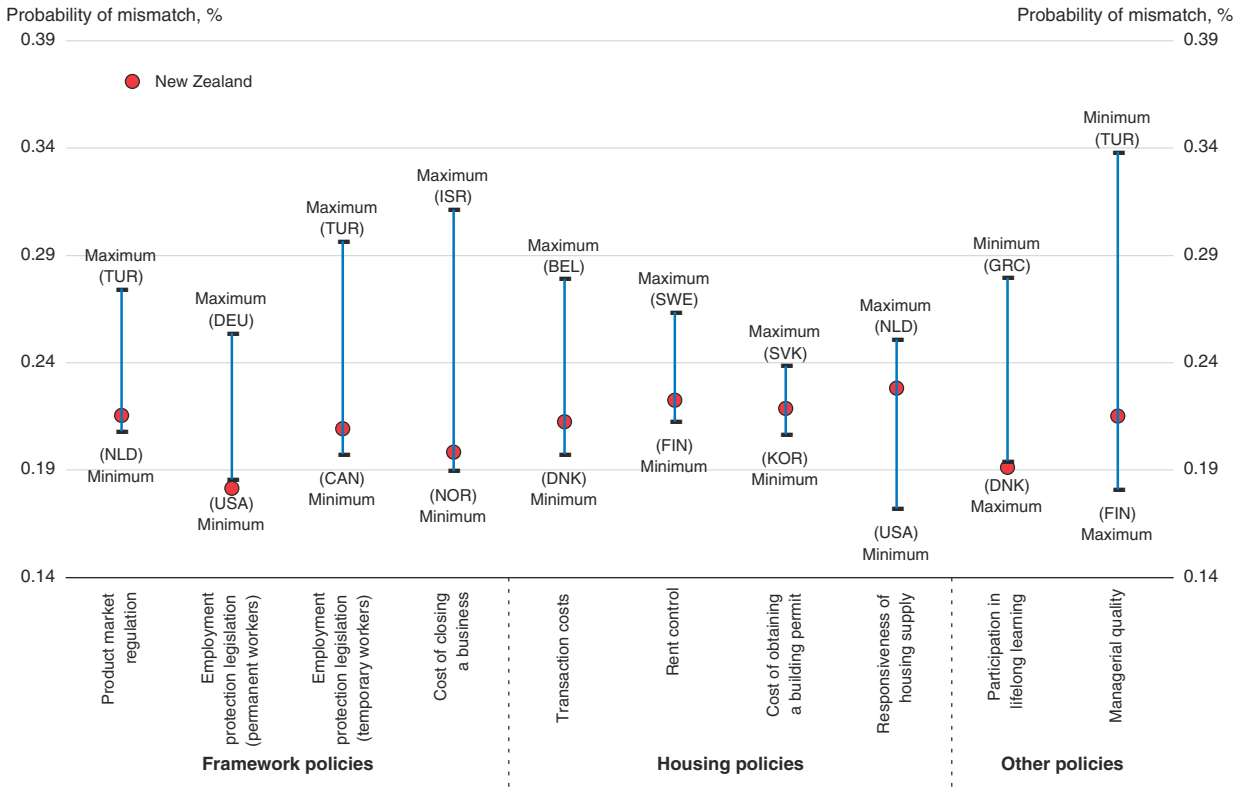
Table 2.8 (above) reports the baseline results of the pooled regressions that explore the effects of different policy-related factors on skills mismatch obtained from the estimation of the above equation. The different specifications control for a similar set of individual and job characteristics, but the estimated coefficients are not reported for the sake of brevity. To the extent that skills mismatch is related to productivity through both within-firm and between-firm factors (see Adalet McGowan and Andrews, 2015a), it is important to consider policies and factors that impose frictions to the efficient reallocation of labour, restrict the entry of more productive firms and prevent the exit of less productive firms as potential determinants of skills mismatch. While education policies clearly matter, these links between mismatch and productivity through the reallocation channel suggest that a wider range of policies could affect mismatch.

These coefficients are then used to calculate the probability of mismatch evaluated at the value of the policy setting in New Zealand and individual characteristics. Finally, the potential gains to productivity from policy reforms that reduce the probability of skills mismatch are calculated.

If land-use policies were reformed and housing-related infrastructure provision stepped up such that the price elasticity of new housing supply increased to the best practice levels (found on average in the United States), NZ labour productivity could rise by 2¼ per cent as a result of reduced mismatches (Figure 2.28). This is the largest impact of any policy area. It could also be worth considering what public policy can do efficiently to enhance matching without people having to move from their current location. The roll-out of high-speed broadband (fibre optic cable) in New Zealand is likely to increase possibilities for teleworking, potentially making for better matches without the need to move house (as well as helping workers, most often women, to better reconcile work and family responsibilities).

Another factor that contributes to the determination of skills mismatch is management quality. Better managed firms may be less susceptible to mismatch by being more effective at: screening potential job applicants; developing new work practices to more effectively integrate new technologies; internally reallocating over-skilled/qualified workers to more productive uses within the firm; and/or taking remedial measures and/or removing under-skilled/qualified workers from the firm. Adalet McGowan and Andrews (2015b) find that better managerial quality, measured by managers' average literacy skills score, can account for the negative relationship between under-skilling and within-firm productivity, and that larger firms are more likely to be better managed, suggesting that under-skilling could be less likely in larger firms. While NZ managers have high literacy skills on average, they lag

Figure 2.27. **The probability of skills mismatch and policies**[1]



1. The red circle is the probability to have mismatch evaluated at the level of the policy in New Zealand and individual characteristics, which include age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector. The distance between the Min/Max and the red circle is the change in the probability of skills mismatch associated with the respective policy change.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch,, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

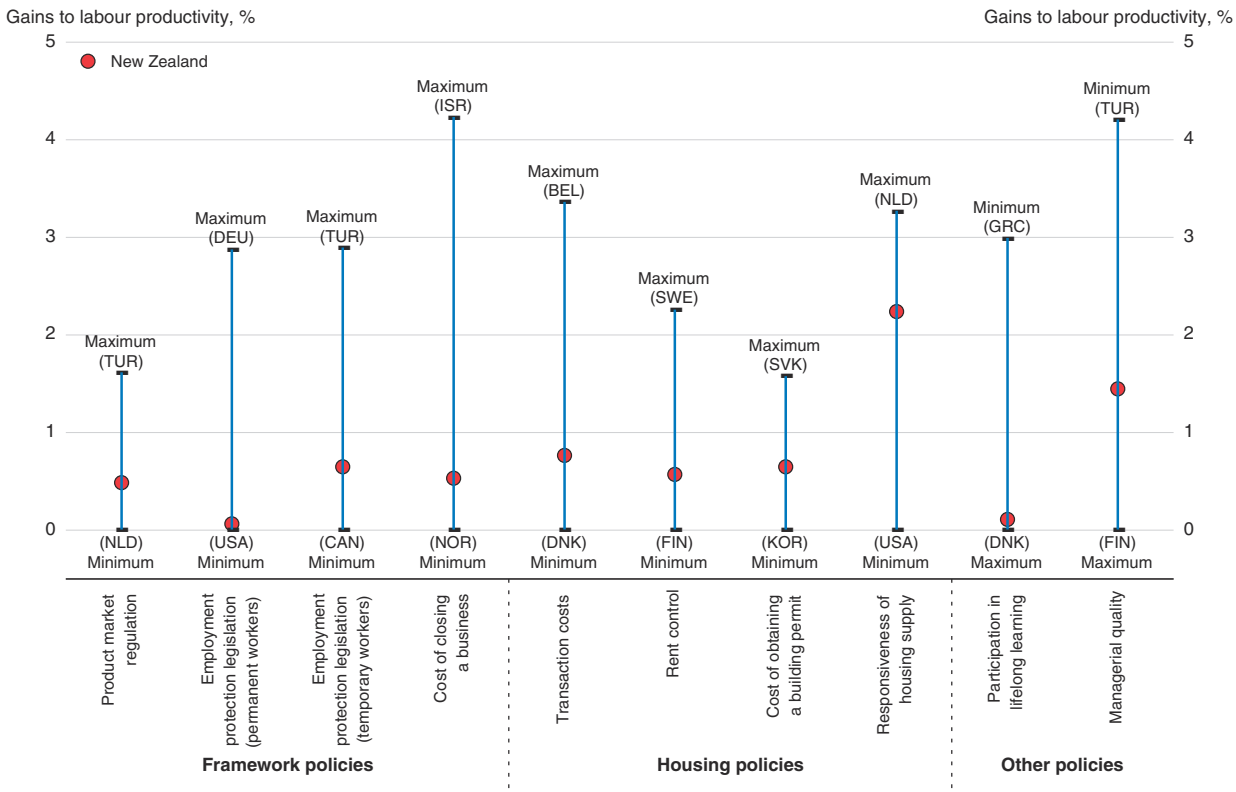
StatLink *http://dx.doi.org/10.1787/888933497766*

somewhat behind best practice (Finland). Increasing managers' literacy skills to best practice is estimated to increase productivity by 1½ per cent (Adalet McGowan and Andrews, 2017). Doing so would most likely entail attracting more highly-skilled people into management. This could be achieved by reducing impediments to the development of large firms, such as foreign direct investment restrictions, and barriers to competition, so that low-productivity poorly managed firms do not survive, releasing resources for better managed more productive firms. It should be borne in mind that managers' literacy skills are only a proxy for management quality, which depends on many other factors. It should be noted that the effects presented in Figure 2.28 cannot be cumulated as they reflect bivariate correlations rather than causal links.

Helping displaced workers get back into work

More rapid technological change may also increase the risk of workers being displaced, although there is no strong evidence of such changes having a greater effect in the New Zealand labour market now than in the past. In New Zealand the stock of displaced workers (i.e., those who report being displaced due to structural and technological change) is about 1.1% of the total workforce, which is comparable to the scale in other countries but higher than the pre-global financial crisis level (OECD, 2017b).

Figure 2.28. **Estimated gains to labour productivity from adopting best practice policies to reduce skills mismatch**[1]



1. The red circle is the probability to have mismatch evaluated at the level of the policy in New Zealand and individual characteristics, which include age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector. The distance between the minimum/maximum and the red circle is the change in the probability of skills mismatch associated with the respective policy change. Estimates are based on logit regressions of probability of mismatch controlling for age, marital and migrant status, gender, level of education, firm size, contract type, a dummy for working full-time and working in the private sector and OLS regressions of labour productivity on skills mismatch.

Source: Adalet McGowan, M. and D. Andrews (2017), "Skills Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economics Department Working Papers* (forthcoming); OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015).

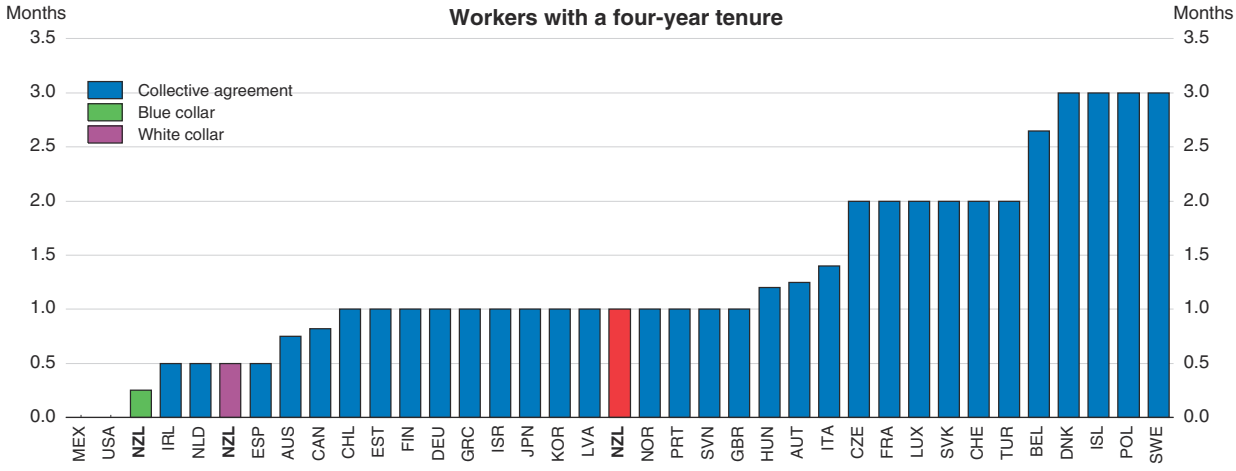
StatLink http://dx.doi.org/10.1787/888933497450

However, the re-employment rate after two years is high (84%), on a par with rates in the Nordic countries and higher than in many other OECD countries – concomitantly, only 0.18% of the workforce are displaced workers who have not been re-employed after two years. The share of displaced workers with low education attainment is much higher than the share of workers with low attainment in the population, as in other countries (ibid).

Although small in proportion to the overall workforce, the effects of displacement may be significant for some households. Displaced workers and their families in New Zealand bear the bulk of costs of being laid off. Average notice periods are short by international comparison, at around one week for blue collar workers, two weeks for white collar workers and one month for the 20% of workers covered by a collective agreement (Figure 2.29). This reduces costs for employers but leaves little time for dismissed workers to find a new job while still employed, which can harm their re-employment prospects by reducing the extent to which they can benefit from their professional network to find a new job and exposing them to the stigma that is sometimes attached to being unemployed. Only around one-half of displaced workers receive a redundancy payment from their

Figure 2.29. **The notice period for individual dismissals in New Zealand is among the shortest**

Notice period for individual dismissals in months, by type of contract, 2013



Source: OECD (2017), *Back to Work: New Zealand – Improving the Re-employment Prospects of Displaced Workers*, Figure 2.2.

StatLink http://dx.doi.org/10.1787/888933497770

employer, with an average payment equal to about 34 weeks of wages (Dixon and Maré, 2013; OECD, 2017b). This level and coverage of redundancy pay are comparable to those in other OECD countries but may lead to inequalities between workers as arrangements tend to be less favourable for low-skilled workers than for high-skilled workers.

The biggest difference in comparison with most other countries is that there is no public unemployment insurance. Instead, New Zealand has a means-tested unemployment benefit, which few (30%) displaced workers receive because most have household incomes that are too high (usually because they have a working partner). There are options for private unemployment insurance, but few workers are covered because it is expensive owing to information failures: as coverage is not compulsory, insurers suspect that only individuals with a relatively high risk of becoming unemployed will apply (adverse selection); and people with insurance may behave in ways that increase their claims (moral hazard). For those who do qualify for the benefit, net replacement rates initially tend to be below the OECD average but are higher after long periods of unemployment, when the unemployed in most other countries are no longer eligible for insurance benefits and instead receive lower (means-tested) social assistance benefits; for example, for a single-earner couple with two children previously earning the average wage the net replacement rate in New Zealand is 58% compared with an OECD average that is initially 69% but falls to 55% for the long-term unemployed (OECD Tax-Benefit model). Moreover, the authorities generally do not assist displaced workers to find a new job unless they are eligible for social welfare benefits. With the exception of redundancy pay arrangements, which are comparable to those in other countries, all of the factors mentioned in this and the preceding paragraph contribute to displaced workers incurring larger earnings losses when re-employed than in most other OECD countries (OECD, 2017b): wage losses for re-employed dismissed workers in New Zealand are 12% in the first year, compared with negligible wage effects in Germany and the United Kingdom and around 6% in the United States and Portugal. While on average these losses are offset by redundancy payments in the first year after job loss, the annual average income for displaced workers in New Zealand (including government income transfers and redundancy pay) is about 20% lower in the second and third year than for non-displaced

workers with similar characteristics (Dixon and Maré, 2013). These factors may also contribute to the poor job matching observed in the labour market despite flexible labour market regulations, which improve matching.

As there is no mandatory notification requirement for redundancies, early intervention largely depends on voluntary initiatives of employers and employees. Local offices of Work and Income, New Zealand's public employment service, are often informed and involved ahead of large-scale redundancies, although this is *ad hoc*, and may respond proactively. However, this tends not to be the case for individual and multiple small-scale redundancies. Moreover, short notice periods make it difficult for Work and Income to organise the support needed for these workers to find a new job.

Few displaced workers contact Work and Income, at least shortly after losing their job. There may be a number of reasons for this, including that they are not eligible for income support because their household income exceeds the means-tested ceiling or that they are not looking for work. Work and Income's services are typically targeted at assisting disadvantaged jobseekers, with little to offer or any suitable vacancies for better-skilled displaced workers. Under the investment approach, Work and Income has no incentive to help workers not eligible for welfare benefits as doing so would entail costs but not generate any long-term savings on payments to current welfare beneficiaries.

A solution to reduce the burden on displaced workers would be to introduce public unemployment insurance, as in all other OECD countries except Australia and Mexico (excluding Mexico city, which has unemployment insurance), and expand the coverage of active labour market policies to those qualifying for unemployment insurance benefits to help this group to transition quickly to good (well-matched) new jobs. In most cases, this would just entail expanding the coverage of public employment services, such as enforcing job-search obligations, counselling and providing labour exchanges. In some cases, where individuals have greater difficulty finding a new job, it might entail active labour market programmes, such as training schemes or short-term employment subsidies. Such arrangements would help displaced workers search for better job matches than currently, both by giving them the wherewithal to prolong search to find a better job and providing them with services that facilitate job search and, where necessary, enhance their skills and employability, thereby reducing their earnings losses in re-employment. These arrangements would also preserve the advantages of flexible labour market regulations. As in other countries, unemployment insurance entitlements (to income-related benefits) would only be for a short period (e.g., 6-12 months, possibly towards the lower end of this range in normal times but towards the higher end during periods of high unemployment) for people with the necessary contributions record, after which time the unemployed would fall back on the current means-tested benefit. Under the investment approach, Work and Income would have an incentive to help displaced workers eligible for unemployment insurance benefits as their speedy re-employment would reduce fiscal outlays. Careful study would be required before embarking on such a reform to ensure that its design is such as to enhance social well-being, not reduce it. Ideally, unemployment insurance should be experience rated, so that it does not subsidise employers and industries with high lay-off rates at the expense of others.

If a public unemployment insurance scheme cannot be introduced in New Zealand, the next best solution to ease the financial burden on displaced workers and help them to transition to better jobs would be to introduce a minimum statutory notice period and

mandatory notification of redundancies, as recommended in OECD (2017b). These reforms would reduce the loss of earnings for displaced workers and give them more time to search for a job while still in work. Work and Income would also have more time to organise support. At the same time, Work and Income's objectives could be expanded to include helping displaced workers not eligible for welfare benefits transition to a new job. The lack of appropriate services for skilled workers could also be addressed, including through more extensive collaboration with private employment services. The major drawback of mandatory notice periods is that they could reduce labour market turnover, which would adversely affect skill matching in the labour market. Careful study would be required before embarking on such a reform to ensure that it delivers more benefits than costs.

Careers advice and training guidance for adult workers, which is limited, also needs to be improved. Counselling would help people to understand which training options are best for them, helping to increase post-training employment rates. Rapidly changing skills needs in the economy require a continuous effort to guide adult workers to upskill and re-skill throughout their working lives (ibid). It would also be helpful to strengthen the framework for recognising skills acquired on the job before workers embark on new training.

Getting the disabled into jobs

To improve social integration of the disabled, general measures to increase education attainment and skills will need to be complemented by others directed specifically at people with disabilities and chronic health problems. The cornerstone of such measures should be to transform disability benefit (called "Supported Living Allowance" in New Zealand) into an employment instrument (OECD, 2010). Instead of assessing workers applying for the disability benefit on whether or not they can regularly work 15 hours or more per week in open (as opposed to sheltered) employment and granting a full benefit if they cannot, their remaining work capacity could be assessed, with partial benefits available subject to job-search requirements for beneficiaries with unused work capacity. A number of OECD countries have used partial disability benefits as a way to encourage people to remain in work or to return to some degree of employment. Most offer a full benefit for those more or less fully unable to work and various degrees of partial benefits in line with reduced work capacity. Incentives for the partially disabled to work can be sharpened further by making their benefit dependent on actually using their remaining work capacity, as in the Netherlands since 2006. In the current Dutch system workers with assessed earnings incapacity of 35-79% receive a wage supplement that depends on the amount of remaining work capacity actually used (at least half the actual remaining capacity needs to be used). If not working or not working enough, a flat-rate benefit is paid instead, which is considerably lower than the disability benefit used to be. Dutch reforms reduced the number of new disability benefit claims. However, the work-incentive features were not that effective for people with lower incomes, as the threat of a benefit cut was often effectively compensated by higher housing benefit entitlements (OECD, 2008).

Such a reorientation of policy, even if it does not entail moving towards a unique working-age benefit, would need to be complemented by other measures to increase employment of the partially disabled. One approach to consider is to give employers greater incentives to retain sick employees. Employers are in a good position to judge what work their employees can still do and what work or workplace adjustments might be needed to

accommodate the health problem that has arisen. Such early intervention could be facilitated with the assistance of an employment-oriented occupational health service, as in Finland, to help people with health issues get the help they need quickly, increasing their chances of remaining in employment (OECD, 2010). In the Netherlands, employers and their employees are now obliged to develop, follow and update a reintegration plan. Incentives could be strengthened by making employers responsible for paying sickness benefit for a longer period than currently, although such a measure would need to be balanced against the risk that employers may avoid hiring people with disabilities or health problems to reduce such costs. To limit these effects, employers would need compensation in some form (including through wage subsidies) for employing workers with reduced work capacity or productivity. These subsidies, which are common in Nordic countries, would need to be targeted at the lost work capacity of the worker and may be needed for a long period. Care would be needed, however, to limit moral hazard, especially in a system that allowed existing jobs to be transformed into subsidised jobs. Gatekeeping by doctors would also need to be refocused on assessing remaining work capacity.

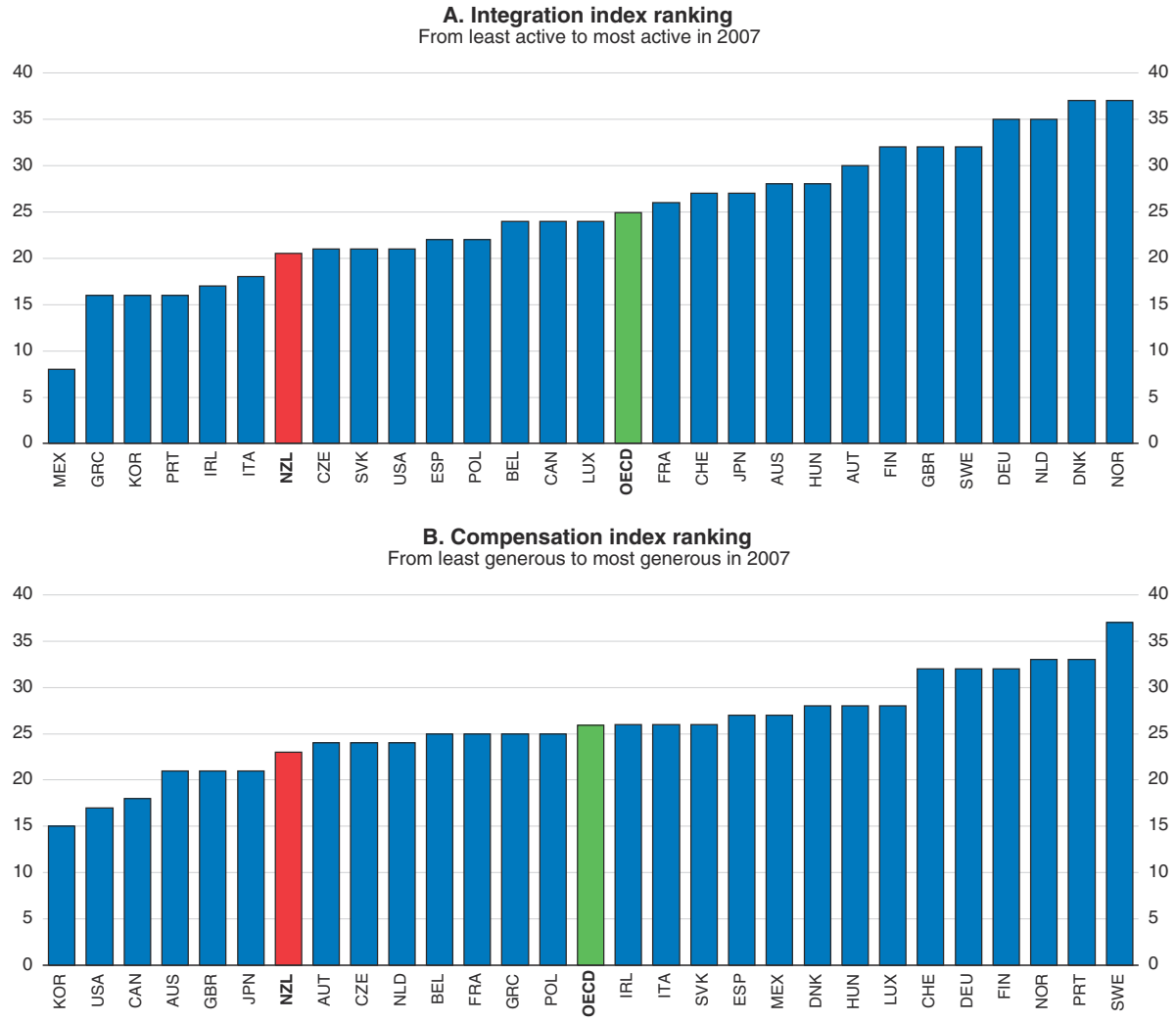
Reorienting disability policy along these lines would entail putting much more emphasis on integration measures (Figure 2.30, Panel A) relative to compensation measures (Panel B), as in the Netherlands. The NZ government's "investment approach" could be used to help to identify clients for whom activation measures would be most valuable. It would be important to evaluate the effectiveness of measures. In addition, organisations providing activation programmes should be subject to performance-based contracts.

Further activating sole parents

The activation measures taken in New Zealand to increase sole-parent employment rates are similar to those taken in other countries to achieve the same objective – subjecting sole parents to requirements to participate in employment services and labour market programmes when they have very young children (work preparation obligation for one-three years old), to search for at least a part-time job (at least 20 hours per week) when children are young (3-13 years old) and a full-time job when children are older (14 years or more). As noted above, active measures are taken to assist those who cannot get sustainable employment without further help. The child's age at which the parent is subject to work-availability and job-search requirements is lower in New Zealand than in the most culturally similar countries that undertook similar reforms (six in Australia and five in the United Kingdom) but higher than in Norway (one year), which has also reformed sole-parent benefits. Australia also reduced the rate at which benefits are withdrawn (known as benefit taper rates) to increase incentives to work, an option that should also be considered in New Zealand. An alternative approach is to set benefits so low that lone parents have to work to survive, as in Japan. This factor, together with preferential access to highly subsidised child care has resulted in Japan having almost the highest sole-parent employment rate in the OECD, with a very high proportion of sole parents working full time. "Unfortunately, the high lone-parent employment rate does not translate into low levels of child poverty, and many single mothers report that their lives, working full time with still relatively low net incomes, are difficult" (OECD, 2013, p. 150).

Part-time employment is considered to be the norm for sole parents with young children in New Zealand and a number of countries, including Australia, the United Kingdom, Ireland and the Netherlands. Accordingly, assistance is structured around this norm.

Figure 2.30. **Disability policy in OECD countries**



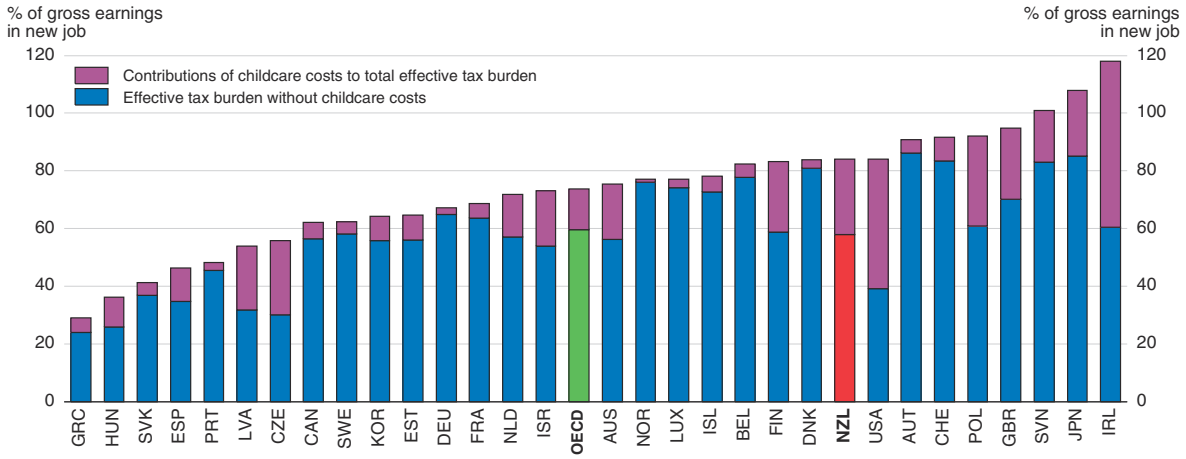
Source: OECD (2010), *Sickness, Disability and Work – Breaking the Barriers*, Figure 3.2.

StatLink http://dx.doi.org/10.1787/888933497780

However, in many European countries, full-time employment is considered to be the norm. If the NZ authorities wanted to move towards a full-time working model to increase sole parent incomes significantly, not only would the job-availability and job-search requirements need to be amended, but also the very high marginal effective tax rates for working more than 20 hours per week faced by people on low incomes would need to be reduced, as discussed in the 2015 *Survey*. A sole parent taking up full-time, low-wage employment faced an effective tax rate of over 80% on the extra income in 2015, a third of which reflected additional childcare costs (Figure 2.31). These costs were higher than the OECD average for sole parents, accounting for New Zealand's higher overall effective tax rate. To encourage those on low incomes to work more than 20 hours per week, *Working For Families* abatement rates would need to be reduced as would childcare costs beyond 20 hours per week. The government took a step in this direction in April 2016, when it increased childcare assistance for low-income families from NZD 4 per hour to NZD 5 per hour for up to 50 hours per week for each child.

Figure 2.31. **Effective tax rate for a sole parent moving to low-paid full-time work**

Moving into full-time employment with earnings of 67% of average earnings, including childcare costs, 2015[1]



1. Effect of childcare costs for a sole parent with two children, aged two and three. 2012 data for Chile, Italy and Turkey.

Source: OECD, *Tax-Benefit Models Database*, *www.oecd.org/els/social/workincentives*.

StatLink http://dx.doi.org/10.1787/888933497797

Recommendations to enhance adaptation to the changing labour market

(Key recommendations are in bolded italics)

Upgrading skills

- ***Improve competence to teach mathematics by supporting professional development and evidence-informed teaching and raising initial teacher education quality and entry standards.***
- ***Review minimum numeracy requirements for school qualifications and the minimum education required by all school leavers. Help schools to make more effective use of ability grouping strategies.***
- ***Merge Careers New Zealand into the Tertiary Education Commission, as the government has proposed, to increase the extent to which young people choose study fields in demand and tertiary institutions adapt their programmes to employer requirements.***

Reducing skills mismatches

- ***Increase infrastructure investment needed to support better housing. Allow greater urban densification.***

Adjusting to the development of non-standard work arrangements

- Collect more data on non-standard working arrangements.
- Consider how, if at all, laws and regulations governing the world of paid work should be adapted to manage the social and economic impacts of future changes in the scale and nature of non-standard working arrangements.

Helping displaced workers

- ***Consider introducing unemployment insurance or, alternatively, longer notice periods and mandatory notification of layoffs. Also consider expanding training, guidance and counselling for displaced workers.***

Activating the disabled

- Transform disability benefit into an employment instrument by assessing eligibility on the basis of remaining work capacity and paying partial benefits to those with unused work capacity subject to satisfying job-search requirements.

Recommendations to enhance adaptation to the changing labour market *(cont.)*

(Key recommendations are in bolded italics)

- Reorient disability policy toward employment integration measures relative to compensation measures, as is occurring under the investment approach to social expenditures.

Activating sole parents

- Amend job-availability and -search requirements to move towards a full-time working model for sole parents that increases their incomes significantly, and reduce childcare costs for low-income people working more than 20 hours per week.

Bibliography

Adalet McGowan, M. and D. Andrews (2015a), "Labour Market Mismatch and Labour Productivity: Evidence from PIAAC Data", *OECD Economics Department Working Papers*, No. 1209, OECD Publishing, Paris.

Adalet McGowan, M. and D. Andrews (2015b), "Skill Mismatch and Public Policy in OECD Countries", *OECD Economics Department Working Papers*, No. 1210, OECD Publishing, Paris.

Adalet McGowan, M. and D. Andrews (2017), "Skill Mismatch, Productivity and Policies in New Zealand: Evidence from PIAAC", *OECD Economic Department Working Papers*, OECD Publishing, Paris (forthcoming).

Alton-Lee, A. (2003), *Quality teaching for diverse students in schooling: Best evidence synthesis*, Ministry of Education, Wellington, June.

Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris.

Andrews, D., A. Caldera Sánchez and A. Johansson (2011), "Housing Markets and Structural Policies in OECD Countries", *OECD Economics Department Working Papers*, No. 836, OECD Publishing, Paris.

Auckland Co-Design Lab (2016), *The Attitude Gap Challenge: A South Auckland Employment and Skills Challenge*, Sponsored by the Ministry of Business, Innovation and Employment and the Ministry of Social Development.

Autor, D. (2015), "Why Are There Still So Many Jobs? The History and Future of Workplace Automation", *Journal of Economic Perspectives*, Vol. 29, No. 3, Summer, pp. 3-30.

Autor, D., F. Levy and R. Murnane (2003), "The Skill Content of Recent Technological Change: An Empirical Exploration", *Quarterly Journal of Economics,* Vol. 118, No. 4, pp. 1279-1333.

Bessen, J. (2016), "How Computer Automation Affects Occupations: Technology, Jobs, and Skills", *Boston University Law and Economics Working Paper*, No. 15-49.

Branch, G., E. Hanushek, and S. Rivkin (2012), "Estimating the Effect of Leaders on Public Sector Productivity: The Case of School Principals", *NBER Working Paper,* No. 17803, February.

Coase, R. (1937), "The Nature of the Firm", *Economica*, Vol. 4, No. 16, pp. 386-405.

Deloitte (2015), *From brawn to brains. The impact of technology on jobs in the UK*, London.

Dixon, S. and D. Maré (2013), "The Costs of Involuntary Job Loss: Impacts on Workers' Employment and Earnings", *Motu Working Paper 13-03*, Motu Economic and Public Policy Research.

Farrell, D. and F. Greig (2016), "The Online Platform Economy: Has growth peaked?", JPMorgan Chase and Co. Institute, November, *www.jpmorganchase.com/corporate/institute/document/jpmc-institute-online-platform-econ-brief.pdf*.

Frey, C. and M. Osborne (2013), *The Future of Employment: How Susceptible are Jobs to Computerization?,* University of Oxford.

Giffi, C., B. Dollar, B. Gangula and M. Drew Rodriguez (2015), "American Manufacturing Competitiveness and the Looming Skills Gap", *Deloitte Review*, Issue 16, pp. 95-113.

Goodman, J., J. Melkers and A. Pallais (2016), "Can Online Delivery Increase Access to Education?", *NBER Working Paper*, No. 22754.

Goos, M., A. Manning and A. Salomans (2014), "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring", *American Economic Review*, Vol. 104, No. 8, pp. 2509-26.

Handel, M. (2012), "Trends in Job Skill Demands in OECD Countries", *OECD Social, Employment and Migration Working Papers,* No. 143, OECD Publishing, Paris.

Hanushek, E., G. Schwerdt, S. Wiederhold and L. Woessmann (2016), "Coping with Change: International Differences in the Returns to Skills", *NBER Working Papers,* No. 22657.

Hattie, J. (2008), *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*, Routledge, Oxford.

Holzer, H. (2015), "Job Market Polarization and U.S. Worker Skills: A Tale of Two Middles", *Economic Studies at Brookings*, The Brookings Institution, April, Washington, DC.

Katz, L. and A. Krueger (2016), "The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015", *NBER Working Paper*, No. 22667.

Kennedy, J. (2016), *Three Paths to Update Labor Law for the Gig Economy*, Information Technology and Innovation Foundation, April.

ManpowerGroup (2016), *Talent Shortage Survey*.

Manyika J., S. Lund, J. Bughin, K. Robinson, J. Mischke and D. Mahajan (2016), *Independent Work: Choice, Necessity, and the Gig Economy*, McKinsey Global Institute.

Ministry of Education (2015), *Education Counts*, Ministry of Education, Wellington.

Montt, G. (2015), "The Causes and Consequences of Field-of-Study Mismatch: An Analysis using PIAAC", *OECD Social, Employment and Migration Working Papers,* No. 143, OECD Publishing, Paris.

Mullis, I., M. Martin, P. Foy and M. Hooper (2016), "TIMMS 2015 International Results in Mathematics", Retrieved from Boston College, TIMMS and PIRLS International Student center website: http:// TIMSS 2015 and TIMSS Advanced 2015 International Results – TIMSS Reports.

NZIER (New Zealand Institute of Economic Research) (2015), "Robot Nation? The Impact of Disruptive Technologies on Kiwis", *NZIER Insight*, 55-2015.

NZPC (New Zealand Productivity Commission) (2017), *New Models of Tertiary Education, Inquiry Report*, Wellington.

OECD (2008), *Sickness, Disability and Work: Breaking the Barriers. Vol. 3: Denmark, Finland, Ireland and the Netherlands,* OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264049826-en*.

OECD (2010), *Sickness, Disability and Work: Breaking the Barriers. A Synthesis of Findings Across OECD Countries*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264088856-en*.

OECD (2013), *OECD Employment Outlook,* OECD Publishing, Paris, *http://dx.doi.org/ 10.1787/empl_outlook-2013-en*.

OECD (2015a), *OECD Economic Surveys: of New Zealand*, OECD Publishing, Paris, *http://dx.doi.org/ 10.1787/ eco_surveys-nzl-2015-en*.

OECD (2015b), *Education Policy Outlook 2015: Making Reforms Happen*, OECD Publishing, Paris, .*http:// dx.doi.org/10.1787/9789264225442-en*.

OECD (2016a), *OECD Education at a Glance, OECD Indicators,* OECD Publishing, Paris, *http://dx.doi.org/ 10.1787/eag-2016-en*

OECD (2016b), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264258051-en*.

OECD (2016c), *OECD Employment Outlook,* OECD Publishing, Paris, *http://dx.doi.org/10.1787/19991266*.

OECD (2017a), *Getting Skills Right: Financial Incentives for Steering Education and Training*, OECD Publishing, Paris, (forthcoming).

OECD (2017b), *Back to Work New Zealand – Improving the Re-Employment Prospects of Displaced Workers,* OECD Publishing, Paris.

Pont, B., D. Nusche and H. Moorman (2008), *Improving School Leadership, Volume 1: Policy and Practice*, OECD Publishing, Paris.

Robinson, V., M. Hohepa and C. Lloyd (2009), "School Leadership and Student Outcomes: Identifying What Works and Why", *Best Evidence Synthesis Iteration* [BES], Ministry of Education, New Zealand.

Schleicher, A. (ed.) (2016), *Teaching Excellence through Professional Learning and Policy Reform: Lessons from around the World*, *www.oecd-ilibrary.org/docserver/download/9116041e.pdf?expires=1489745907&id= id&accname=ocid84004878&checksum=59B951F68626D3D87801482D3A68BF72*.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Union takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

OECD PUBLISHING, 2, rue André-Pascal, 75775 PARIS CEDEX 16
(10 2017 12 1 P) ISBN 978-92-64-27711-3 – 2017

OECD Economic Surveys

NEW ZEALAND

OECD Economic Surveys are periodic reviews of member and non-member economies. Reviews of member and some non-member economies are on a two-year cycle; other selected non-member economies are also reviewed from time to time. Each Economic Survey provides a comprehensive analysis of economic developments, with chapters covering key economic challenges and policy recommendations addressing these challenges.

New Zealand is enjoying strong economic growth, driven by booming tourism, high net immigration, solid construction activity and supportive monetary policy. The fiscal position is sound, with low public debt and a balanced budget. The major economic vulnerability emanates from high levels of household debt associated with rapid increases in house prices, which have reached high levels relative to fundamentals. Barriers to expanding housing supply are being reduced, and macro-prudential measures have been taken to contain financial stability risks, but further measures may be needed. While the short-term economic outlook is strong, there are longer-term challenges from low productivity growth, a changing labour market and some growing environmental pressures. Addressing these challenges would secure sustainable improvements in well-being for all New Zealanders.

SPECIAL FEATURES: IMPROVING PRODUCTIVITY; THE CHANGING LABOUR MARKET

Consult this publication on line at ***http://dx.doi.org/10.1787/eco_surveys-nzl-2017-en***.

This work is published on the OECD iLibrary, which gathers all OECD books, periodicals and statistical databases. Visit ***www.oecd-ilibrary.org*** for more information.

Volume 2017/12
June 2017

OECD*publishing*
www.oecd.org/publishing

ISSN 0376-6438
2017 SUBSCRIPTION
(18 ISSUES)

ISBN 978-92-64-27711-3
10 2017 12 1 P

9 789264 277113