Bulletin

Vol. 81, No. 2

April 2018

RESERVE BANK
OF NEW ZEALAND
TE PŪTEA MATUA

Reserve Bank of New Zealand *Bulletin*

Subscribe online: http://www.rbnz.govt.nz/email-updates

For back issues visit: http://www.rbnz.govt.nz/research-and-publications/reserve-bank-*Bulletin*

ISSN 1177-8644

How does New Zealand stack up?

A comparison of labour supply across the OECD

Jamie Culling and Hayden Skilling[1]

Labour is the largest input to the productive capacity of the economy. The amount of labour available to be employed – labour supply – is therefore important to understand when gauging inflationary pressure in the economy. However, labour market outcomes are complex. There are considerable differences in outcomes across age cohorts, gender and individuals more generally. In aggregate, New Zealand's labour force participation has grown since 2000 to a recent all-time high.

In this paper, we delve into the details of labour supply to understand what has been driving New Zealand's historically unusual outcomes. Furthermore, we put the New Zealand experience into context by comparing post-2000 developments in labour supply across OECD economies.

Labour supply has grown rapidly in New Zealand since 2000. This growth reflects strong population growth and increased aggregate labour force participation. The latter has occurred despite an ageing population, which would have been expected to reduce the aggregate participation rate. The increase in labour force participation has been driven by increases in participation among individuals aged 55 years and above, and women aged between 25 and 54.

New Zealand's labour force growth rate has been more than twice the OECD average since 2000, due to higher growth in the working-age population growth and a greater increase in participation. Higher population growth relative to the OECD reflects strong migration flows into New Zealand. The higher aggregate participation relative to the OECD is largely due to increased participation amongst older cohorts. The United States, a typical international comparator, is an outlier in its labour force experience. The US has experienced a decline in labour force participation due to population ageing and broad-based weakness in within-cohort participation rates.

Average hours worked per person has fallen in New Zealand and across OECD countries. However, the decline in New Zealand has been less pronounced than the OECD average. New Zealand's increase in overall labour supply relative to the OECD has thus been even larger than that suggested by changes in the size of the working-age population and labour force participation.

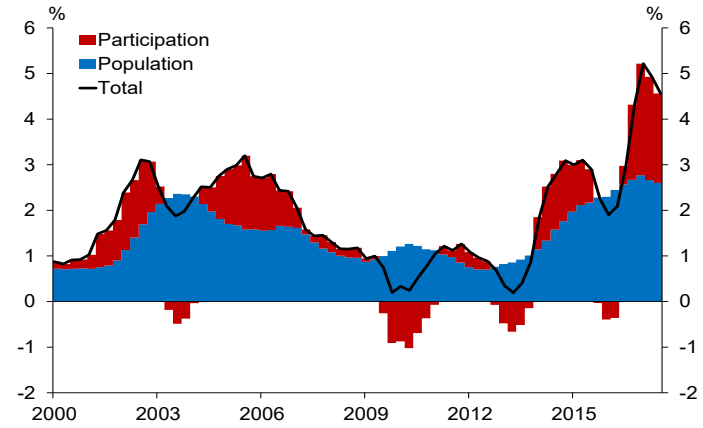
1 Since writing this article, Hayden Skilling has left the Reserve Bank of New Zealand. The authors would like to thank Christie Smith, Gael Price, Tugrul Vehbi, Chris McDonald, Adam Richardson, and colleagues at the RBNZ for their feedback and discussion.

1 Introduction

New Zealand's labour force has grown rapidly since 2000 (figure 1).[2] This growth partly reflects strength in the aggregate labour force participation rate (LFPR), which has surprised on the upside relative to Reserve Bank forecasts over recent years (figure 2).[3] The upward trend in participation has occurred despite an ageing population, which ordinarily would have been expected to lead to a decline in the aggregate participation rate.

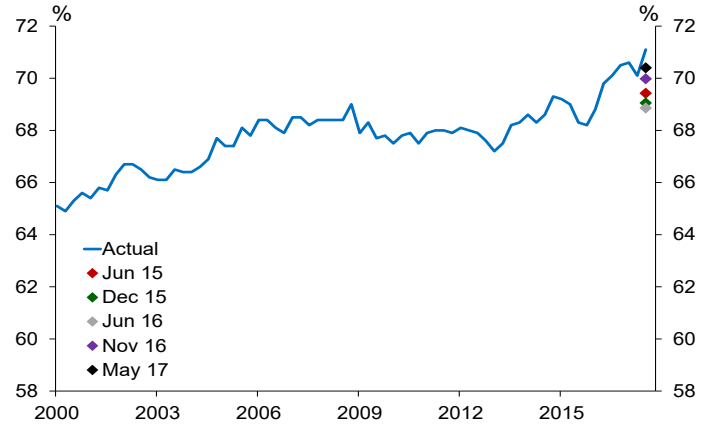
Recent international research, aimed at understanding developments in the labour force, has not shown whether New Zealand's labour force developments are atypical, or representative of the international context.[4, 5] This paper seeks to put the recent experience in New Zealand into context, by comparing post-2000 developments in labour supply across OECD countries.[6]

Figure 1
Contributions to labour force growth
(four-quarter moving average, apc)



Source: Stats NZ, RBNZ estimates.

Figure 2
Labour force participation rate and Reserve Bank forecasts
(s.a.)



Source: Stats NZ, RBNZ estimates.

Note: Forecasts are provided for the September 2017 quarter for selected *Monetary Policy Statements*. The *Household Labour Force Survey* (HLFS) redevelopment precludes longer-term comparisons.

2 Statistics New Zealand defines the labour force as those aged 15 years and above who are employed or both actively seeking and available for work; the labour force participation rate as the total labour force, as a percentage of the working-age population; and, the working-age population as the number of individuals aged 15 years and above.

3 Population growth has also surprised on the upside, due to stronger-than-expected net immigration (Vehbi, 2016; Armstrong and McDonald, 2016). Discussion of developments in New Zealand's LFPR, population, and migration are contained in recent *Monetary Policy Statements*. See, for example, RBNZ (2015).

4 See, for example: Connolly, Davis, and Spence (2011) in the case of Australia; Ketcheson, Kyui, and Vincent (2017) for Canada; Balleer, Gòmez-Salvador, and Turunen (2014) for Europe; Aaronson et al. (2014) for the US; and Dvorkin and Shell (2015) for a comparison of several countries.

5 A recent article by Brown and Guttmann (2017) provides some perspective on where New Zealand fits in the international context. This article provides more context in terms of both New Zealand's relative level of participation, and factors underpinning changes in labour supply in recent years

6 Conway and Orr (2000) discuss New Zealand's LFPR trends over the pre-2000 period. Drew (2007) also discusses LFPR in New Zealand and the OECD.

Changes in labour force participation, and the size of the labour force more broadly, have important macroeconomic implications.[7] For example, for a given rate of unemployment and labour productivity, growth in the labour force has a one-for-one impact on real output, and can thus significantly affect income, and consumption.[8] Moreover, for a given level of employment, changes in participation can affect the level of slack in the labour market, with consequences for unemployment, wages, and inflationary pressure.[9]

The remainder of the paper proceeds as follows. Section 2 provides an overview of recent developments in labour force participation in New Zealand. Section 3 places New Zealand into the international context by comparing post-2000 developments across the OECD, and examines whether similar trends are present across countries. Section 4 assess the current differences in labour force participation across the OECD. Section 5 discusses developments in New Zealand's hours worked per person, and compares this to the OECD. Section 6 offers concluding remarks.

2 Labour force developments in New Zealand

The LFPR in New Zealand has trended up in recent decades, and reached a record-high level of 71.1 percent in September 2017 (figure 2). Over this time, we have also seen an ageing population (figure 3). Individuals aged 55 years or above now represent 8 percentage points more of the working-age population than in 2000, with a similar reduction in the share of individuals aged between 30 and 49. As these older individuals tend to participate in the labour market to a lesser extent than their younger counterparts, population ageing, all else held constant, would be expected to drag on the aggregate participation rate.[10] Given the increase in aggregate participation, labour force participation within particular cohorts must have increased materially since 2000, to generate the upward trend actually observed in the aggregate participation rate.

The upward trend in participation is primarily attributable to rising participation rates among individuals aged 55 years or above, and women aged between 25 and 54 years (figure 4).[11] By contrast, participation rates of younger individuals and males aged between 25 and 54 have remained broadly flat since 2000.[12]

7 Individuals outside of the labour force can also have an important role in determining labour market dynamics. These are discussed in Armstrong and Karagedikli (2017), who find that non-participation accounts for about two-thirds of the movement in the unemployment rate.

8 See McDermott (2014) for a discussion of the connection between labour force participation and potential output.

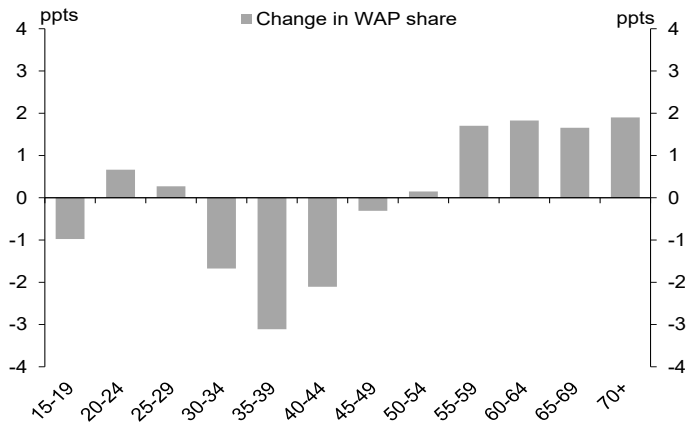
9 Forthcoming Reserve Bank work (Culling, Hyslop, Rice and Skilling; and Culling and Skilling) will outline the structural and cyclical factors affecting labour force participation, and how labour force participation fits into the broader labour market, respectively.

10 While the ageing population is an important structural factor influencing labour supply, other factors such as the trend towards greater educational attainment are also important, and may be at least partially offsetting.

11 For simplicity, individuals aged between 15 and 24 years will be referred to as 'younger'; individuals aged 55 or above will be referred to as 'older'; individuals aged between 25 and 54 will not be referred to by their age.

12 Despite being broadly flat for almost two decades, participation at more than 93 percent among male individuals remains high relative to other age-gender cohorts of the working-age population.

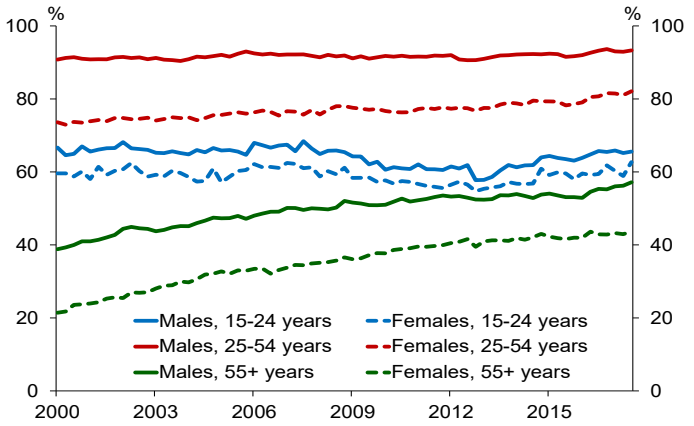
Figure 3
Change in working-age population share since 2000
(by age bracket)



Source: Stats NZ, RBNZ estimates.

Note: The grey bars show an increase in older individuals' share of working-age population (WAP).

Figure 4
Labour force participation rates by age-group and gender
(s.a.)



Source: Stats NZ, RBNZ estimates.

The LFPR of older individuals has increased by more than 20 percentage points since 2000, for both men and women. Factors that have likely affected the participation of older individuals include the raising of the age of NZ Superannuation eligibility from 60 years in 1992 to 65 years in 2001;[13] banning compulsory retirement in 1999; better health among older workers and improving longevity; and technological change reducing the manual intensity of some work. Given increased longevity, people may need to work and save more to maintain the same desired standard of living over the course of their now-longer lives.

Female participation has increased by more than 8 percentage points since 2000, recently surpassing 80 percent. Changes in female participation likely reflect several factors, including ongoing changes in social norms and attitudes towards women working, as well as policy changes such as the introduction of Working for Families in 2005.[14]

The change in aggregate participation since 2000 can be decomposed by combining information on participation rates and working-age population shares by age and gender (figure 5).[15] Increasing participation among older individuals accounts for the majority of the upward aggregate trend, representing 6.5 percentage points of the growth in the LFPR since 2000. Rising female participation has gradually boosted the LFPR, accounting for more than 2 percentage points of the aggregate increase. Population ageing has dragged on the LFPR by around 3 percentage points since 2000, while changing male participation and participation by younger individuals have had fairly minimal effects.[16]

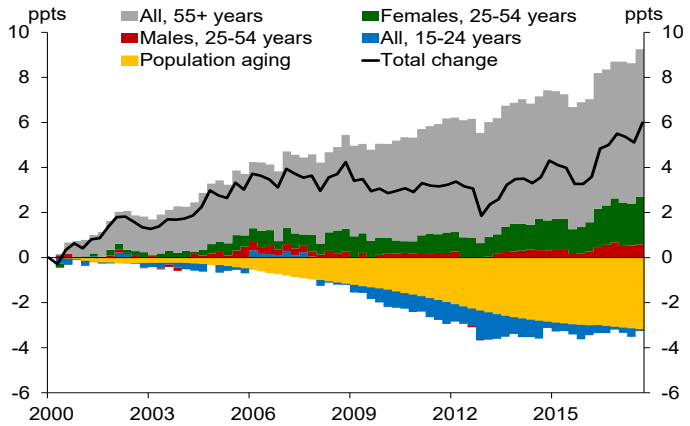
13 See Hurnard (2005).

14 See Johnson (2005).

15 We follow a similar methodology to Hotchkiss (2009) and Brown & Guttmann (2017). A technical appendix is available on request, providing details relating to the decompositions figure 5 and in sections 3 and 4.

16 As discussed in Aaronson et al. (2014), what we refer to as 'population ageing' technically reflects the effects of both the ageing population and shifts in gender composition. However, as the effects of ageing dominate those of changing gender composition, we adopt the more readily interpretable term.

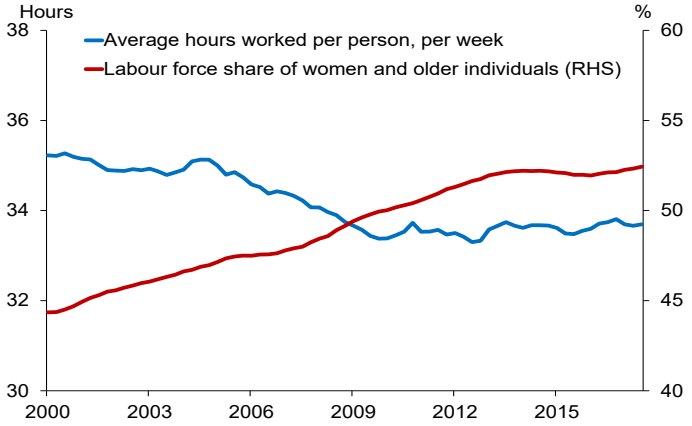
Figure 5
Contributions to the change in the LFPR since 2000
(s.a.)



Source: Stats NZ, RBNZ estimates.

Note: 'All 55+ years' includes all male and female individuals aged 55 years and above.

Figure 6
Average hours worked and changes in labour force composition
(four-quarter moving average)



Source: Stats NZ, RBNZ estimates.

Note: 'Older individuals' includes all male and female individuals aged 55 years and above.

Understanding the composition of the increase in the participation is important for several reasons. Firstly, it can help to assess policies that affect labour market outcomes. Secondly, it can help to inform the likely future path of labour force participation and thus aid in macroeconomic forecasting and the setting of economic policy. The composition of the LFPR also provides insights into the underlying determinants of the labour force, and can help identify important influences for aggregate outcomes. For example, we know that older participation is relatively low but increasing, and that we cannot rely on just demographic trends to forecast the aggregate LFPR.

In a similar vein, understanding the increase in participation can inform a more complete understanding of trends in overall labour supply. For example, with women and older individuals representing a larger share of the labour force, we would expect to see downward pressure on average hours worked, as individuals in these groups are more likely to work part-time.[17] Indeed, average hours worked has declined since 2000 (figure 6).

Overall, increasing participation from older individuals and increasing female participation have contributed to the growth in New Zealand LFPR. These developments have been large enough to out-weigh the drag on aggregate participation from population ageing. However, given the change in hours worked, labour supply in New Zealand has not increased to the extent implied by the growth in participation and population alone.

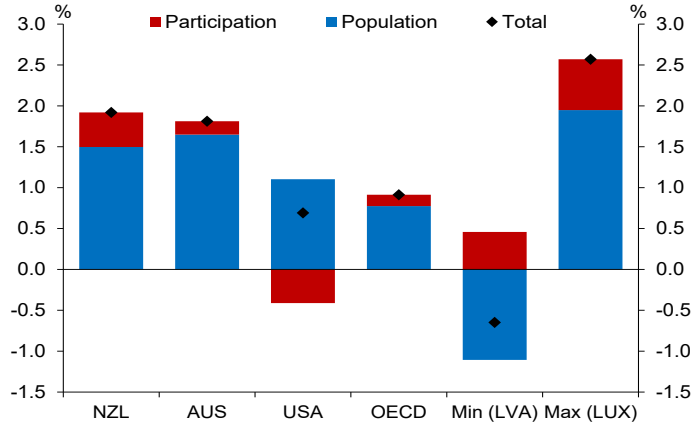
17 The Department of Labour (2009) and the Ministry for Women (2017) find that older workers and women, respectively, are more likely to work part-time.

3 Labour force participation developments across the OECD

Further insight into the New Zealand labour supply experience can be gained through a comparison with other OECD countries.[18, 19] Growth in New Zealand's labour force averaged 1.9 percent per annum between 2000 and 2016 (figure 7). This growth is more than twice that of the average OECD nation. It is also above that of Australia and the United States, which respectively represent New Zealand's most relevant comparator and a common international benchmark.[20]

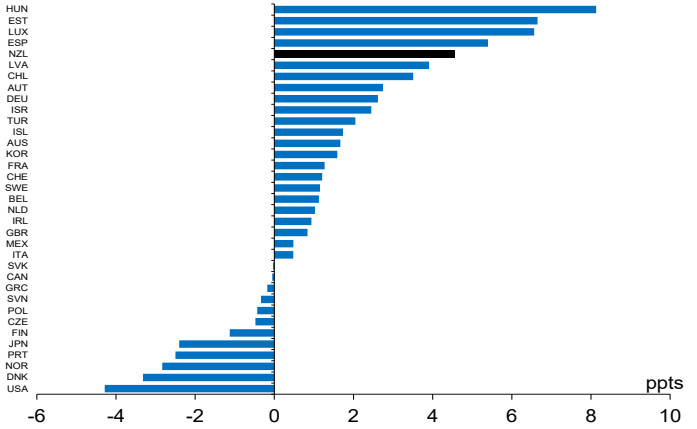
The growth in New Zealand's labour force partly reflects higher-than-average population growth driven to a large extent by record-high levels of net immigration.[21] However, roughly one-third of the excess labour force growth over the OECD average is attributable to changes in participation.

Figure 7
Contributions to average annual labour force growth across the OECD
(2000-16 average)



Source: OECD, RBNZ estimates.

Figure 8
Change in OECD LFPRs since 2000



Source: OECD, RBNZ estimates.

The changes in aggregate LFPRs across the OECD since 2000 suggest varied trends amongst OECD countries. Almost one-third of OECD

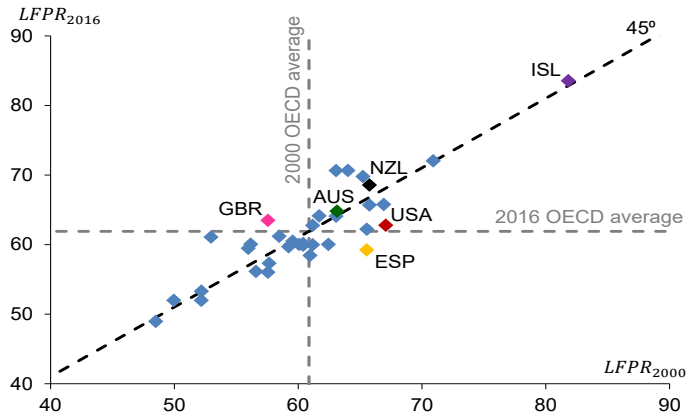
18 For comparability, we use the OECD data for all countries, including New Zealand. As these data are only available up to year-end 2016, there are some minor differences between the numbers quoted in section 2 and those in sections 3 onwards.

19 Our comparison should be interpreted with some caution due to differences in the age coverage of each country's labour force survey (see appendix 1). The differences appear to be relatively small and are unlikely to significantly affect our results. The relative LFPR ranking of most countries does not change significantly when restricting to individuals aged between 15 and 64 years. In addition to differences in age coverage, countries' data also differ with respect to the reference period (for a given year) and their inclusion of individuals residing in non-private dwellings and members of the military. OECD (2017) has further information.

20 See figure A2.1 for a comparison of average annual labour force growth across all OECD countries.

21 See figure A2.2 for a comparison of population growth across all OECD countries. Bascand (2016) discusses the role of net immigration in New Zealand.

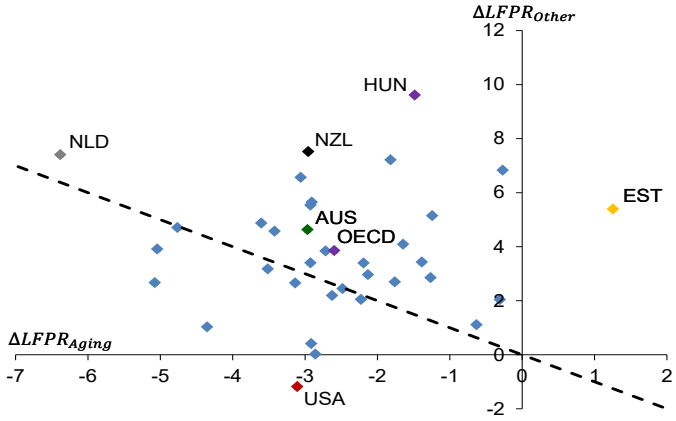
Figure 9
Comparison of OECD LFPRs between 2000 and 2016



Source: OECD.

Note: The vertical grey dotted line shows the average OECD LFPR in 2000. The horizontal grey dotted line shows the average OECD LFPR in 2016. The black dotted line is a 45 degree angle through the OECD averages. Convergence would have shown countries in the upper left and lower right quadrants.

Figure 10
Contributions to change in OECD LFPRs since 2000



Source: OECD, RBNZ estimates.

Note: Points above (below) the dashed line represent countries that have experienced an increase (decrease) in the LFPR since 2000.

countries exhibit a decline in the aggregate LFPR over the period (figure 8).[22]

Despite the wide variation in LFPR changes since 2000, the OECD has experienced little convergence in the LFPR between countries (figure 9). Most countries with an above-average LFPR in 2000 also had an above-average LFPR in 2016, vice versa for countries with a below-average LFPR in 2000. Spain is one outlier, having had an above-average LFPR in 2000, but below-average in 2016. Great Britain exhibited the opposite trend. The United States' large decline in the LFPR has bought it from above average in 2000, to on-par with the OECD average in 2016.

To examine the extent to which population ageing – a global phenomenon – has dragged on LFPRs further, we decompose the change in the LFPR in each country over the 2000-2016 period, analogously to the decomposition applied to New Zealand (see figure 5). We decompose the total change in the LFPR into two main components: ageing and 'other'. The ageing component reflects individuals moving into older age-groups, with a reduced propensity to participate in the labour market, while the 'other' component captures within-group changes in participation.

New Zealand's experience with ageing population appears to be fairly typical (figure 10). Population ageing has dragged significantly on advanced-economy participation rates since 2000, with an average contribution across OECD countries of -2.6 percentage points. This compares with a contribution of ageing in New Zealand of -3.0 percentage points, and similar values in Australia and the United States.

22 Much of the recent literature on labour force participation focuses on changes following the global financial crisis. We consider the post-2000 period as it allows us to focus more on longer-term structural changes. Analysis has also been undertaken for changes since 2007, and demonstrates that our subsequent discussion is not specific to our chosen time period.

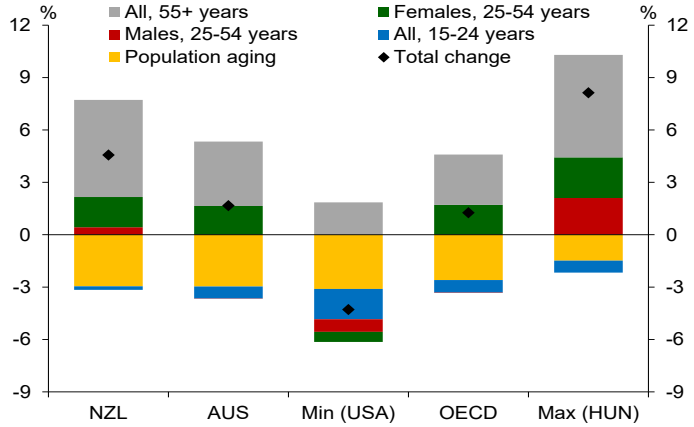
The contribution of ageing has been negative in all countries except Estonia.

However, the contribution from 'other' factors has been much more positive in New Zealand than in most OECD countries. Changes in within-cohort participation rates boosted the aggregate LFPR by 7.5 percentage points in New Zealand between 2000 and 2016, second only to Hungary (9.6 percentage points). This is much higher than in Australia and the OECD, which have an average of 4.6 and 3.9 percentage points respectively. The United States is a noticeable outlier, being the only country where changes in cohort-level participation rates contributed negatively to the change in the aggregate LFPR over the same period.[23]

To analyse these trends further, we decompose the change in LFPR since 2000 for selected countries (figure 11).[24] New Zealand's strong in participation growth relative to other OECD countries has been broad-based, except with regard to changes in female participation and population ageing. Increased participation among older individuals accounts for around three-quarters of New Zealand's relatively strong growth. The Australian experience has been representative of the average OECD country, while the relative performances of Hungary and the United States reflect broad-based strength and weakness, respectively.

Overall, New Zealand has experienced larger labour force growth than the OECD, in part due to a greater increase in the aggregate LFPR. New Zealand's outperformance in the LFPR has been due to increased participation from older individuals, while the drag from population ageing is similar to that of the OECD. In contrast, the United States has experienced a decline in the aggregate LFPR, due to broad-based weakness in within-cohort participation rates and population ageing. Given the large amount of literature analysing the United States labour market, the stark difference in trends to New Zealand implies that some caution should be maintained when using the United States as a comparator.

Figure 11
Decomposition of changes in OECD LFPRs since 2000



Source: OECD, RBNZ estimates.

Note: 'Min' ('Max') refers to the country with the most negative (positive) change in aggregate LFPR between 2000 and 2016.

23 The issues of declining LFPR in the US, and how temporary or permanent this may be, has been a topic of much debate by policymakers. For example, see Federal Reserve Bank of Atlanta (2017), who summarise the demographic and behavioural factors contributing to changes in US LFPR.

24 Comparable decompositions for all OECD countries are provided in figure A2.3.

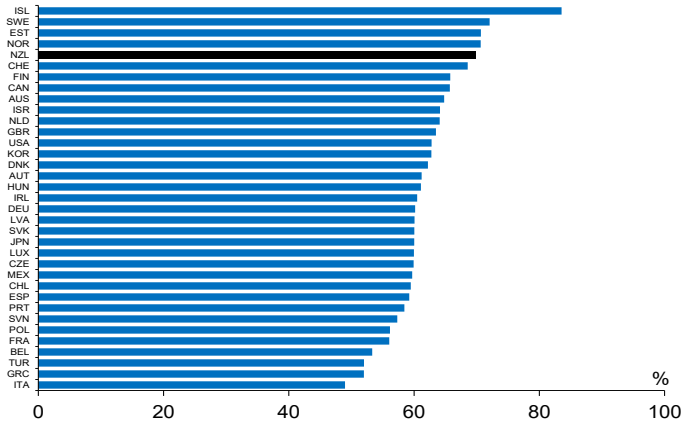
4 Differences between OECD participation rates in 2016

As of 2016, New Zealand has the fifth-highest aggregate LFPR in the OECD (figure 12). Iceland is the outlier at the upper end, with an aggregate participation rate well in excess of 80 percent. Estonia, Norway, and Sweden also have higher LFPRs than New Zealand, but the differences are fairly small. At the lower end, Italy is somewhat of an outlier, with an aggregate LFPR below 50 percent.

The relative levels of participation across age-gender cohorts are broadly similar across the OECD (figure 13). Participation is lowest among older individuals,[25] while male participation is the highest. Male participation rates are also similar across countries, ranging from 87 to 96 percent, while those for women and younger individuals vary to a much greater extent. Iceland's higher LFPR in 2016, and Italy's lower LFPR in 2016, appear to be fairly broad-based across cohorts.

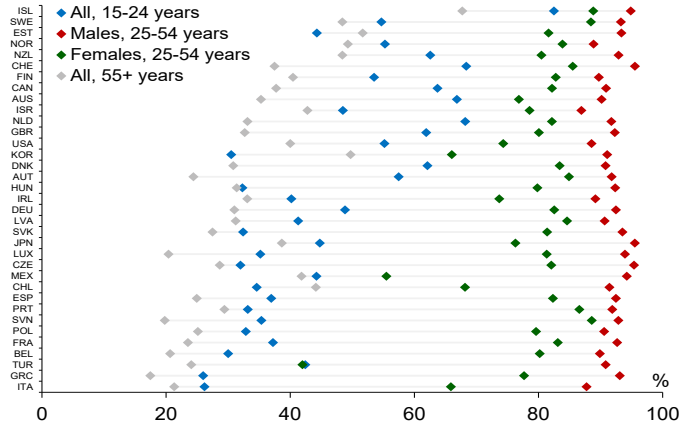
However, the breakdown above does not consider the relative size of each of the cohorts, nor does it show any differences attributable to dissimilar age profiles across countries. To gauge the relative importance of these factors, we decompose the difference between each country's

Figure 12
OECD LFPRs in 2016



Source: OECD.

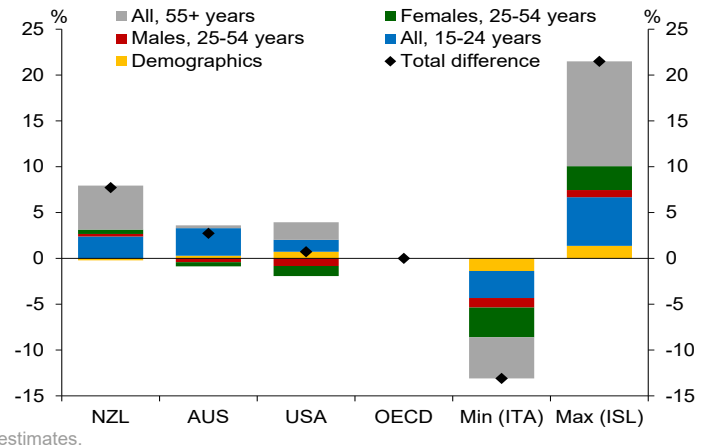
Figure 13
OECD LFPRs by group in 2016



Source: OECD, RBNZ estimates.

25 This holds in all countries except Chile, Estonia, and South Korea, where individuals above the age of 55 participate to a greater extent than those aged between 15 and 24.

Figure 14
Decomposition of difference in LFPR relative to OECD average in 2016



Source: OECD, RBNZ estimates.

participation rate in 2016 and the OECD average into two main components: demographics and participation.[26]

New Zealand's comparatively high LFPR in 2016 largely reflects elevated participation among younger individuals and older individuals (figure 14). Australia and the United States also have relatively high rates of participation among younger and older cohorts.[27] However, below-average male and female participation drags on the LFPR in both countries.[28] Iceland's participation rates are relatively high for all age-cohorts and gender-groups, and it receives a slight boost from demographics. In contrast, Italy has below-average LFPRs across all cohorts, as well as showing that cohorts with low participation rates are populated more heavily than the OECD average.

5 Hours worked developments across the OECD

Hours worked is another key component of labour supply.[29] Workers have a choice of whether to participate in the labour force or not. They also have some influence on how many hours to work if they are in the labour force. For example, a younger individual might decide to participate in the labour force, but also decide to work part-time, leading to lower labour supply growth than if they worked full-time.[30]

Average *actual* hours worked declined across all OECD countries between 2000 and 2016 (figure 15). This is in line with women and older workers now representing a larger share of the labour force in most OECD countries. For average actual hours worked, New Zealand's experience was broadly in line with the OECD average.[31]

However, *usual* hours worked per week depict a different story, with New Zealand's decline being around half as large as the OECD average

26 All calculations are conducted at the five-year age-gender group level, and then aggregated. A technical appendix is available on request. The component attributable to demographics reflects differences between the age-gender-structure of a country's population and the OECD average. A positive value indicates that a country has a disproportionate share of individuals within groups with relatively high participation rates, and a negative value indicates that cohorts with low participation rates are populated more heavily than the OECD average. The participation component represents within-group differences in labour force participation (grouped analogously to figure 11). A positive value implies that a country has a higher-than-average LFPR within the given cohort.

27 Differences across countries in older cohort participation may be influenced by differences in retirement ages and life expectancy. Figures A2.4 and A2.5 show retirement ages and life expectancy, respectively, across the OECD.

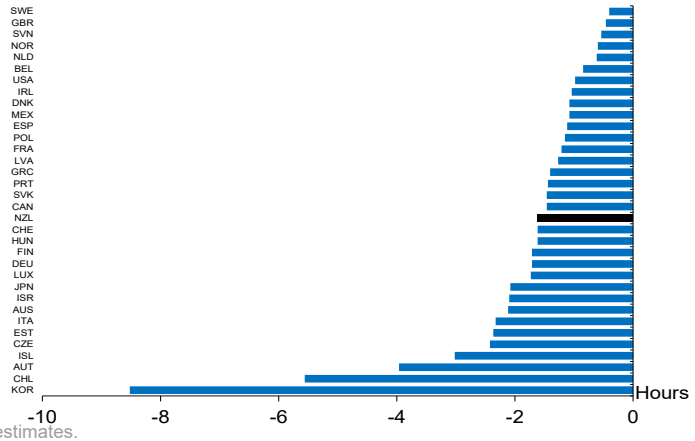
28 While demographic effects are relatively small for the countries in figure 14, they are material for some OECD countries, ranging from -3.6 (Japan) to 3.6 (Turkey) percentage points. Decompositions for all OECD countries are provided in figure A2.6.

29 See figure A2.7 for hours worked as of 2016. New Zealand and the United States are currently around the OECD average for average actual hours worked per week.

30 Statistics New Zealand define full-time employment as individuals working 30 hours or more per week.

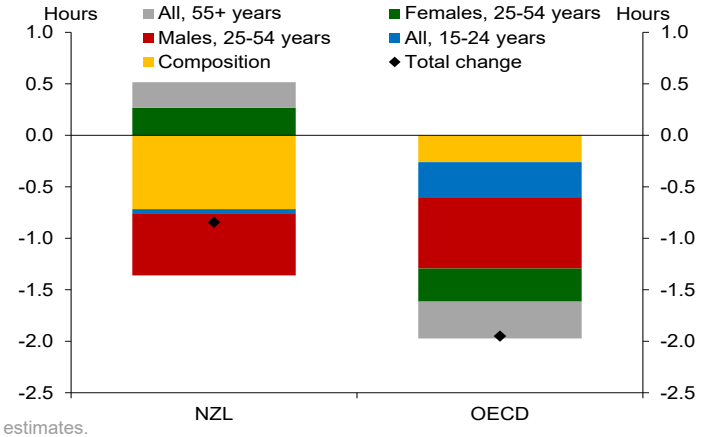
31 See Craigie, Gillmore, and Groshenny (2012), who discuss hours worked in both New Zealand and the United States

Figure 15
Change in average actual hours worked per week since 2000



Source: OECD, RBNZ estimates.

Figure 16
Decomposition of change in usual hours worked per week since 2000



Source: OECD, RBNZ estimates.

Note: 'OECD' represents the (unweighted) average of 23 OECD countries with disaggregated data on employment and usual hours worked available in both 2000 and 2016.

(figure 16).[32] This difference across countries primarily reflects increases in average hours worked among women and older individuals in New Zealand that have not occurred elsewhere. This suggests that growth in labour supply between 2000 and 2016 in New Zealand has out-stripped that in the average OECD economy by more than implied by changes in the working-age population and labour force participation.

Conclusion

In this article, we examine how New Zealand's labour supply has changed over time. We also compare the changes experienced in New Zealand to other OECD countries.

New Zealand has experienced strong labour force growth since 2000. This is due to both strong population growth, and increasing labour force participation. The growth in population has been largely due to migration. Growth in the LFPR has been driven by increased participation among older individuals, as well as a modest contribution from rising female participation. These changes have been large enough to outweigh the drag on the aggregate LFPR from population ageing.

Between 2000 and 2016, New Zealand experienced larger labour force growth than the OECD average, in part due to a greater increase in the aggregate LFPR. New Zealand's high level of participation relative to the

32 We refer here to usual hours worked, rather than actual hours. Unfortunately, disaggregated data on actual hours worked by age and gender are not available across all OECD countries, precluding a detailed assessment of overall differences in labour supply across countries. According to the UK Office for National Statistics (Clegg, 2012, pg. 1) "Usual hours worked measure how many hours people usually work per week. Compared with actual hours worked, they are not affected by absences and so can provide a better measure of normal working patterns".

OECD has been due to increased participation from older individuals. Population ageing seems to have had a similar drag on participation rates across the OECD.

A large amount of international literature focuses on understanding participation developments in the United States. In contrast to New Zealand, the United States has experienced a decline in the aggregate LFPR, due to broad-based weakness in within-cohort participation rates and population ageing.

While all OECD countries have experienced a reduction in average hours worked per person, the decline in hours worked in New Zealand has been less pronounced than in the rest of the OECD. New Zealand's overall increase in labour supply relative to the OECD has thus been even larger than that suggested by changes in working-age population and participation alone.

References

Aaronson, S., T. Cajner, B. Fallick, F. Galbris-Reig, C. Smith, and W. Wascher (2014), 'Labor force participation: Recent developments and future prospects', *Brookings Papers on Economic Activity*, Fall, 2014(2), 197-255.

Armstrong, J., and C. McDonald, (2016), 'Why the drivers of migration matter for the labour market', *Reserve Bank of New Zealand Analytical Note*, AN2016/02.

Armstrong, J., and O. Karagedikli, (2017), 'The role of non-participants in labour market dynamics', *Reserve Bank of New Zealand Analytical Note*, AN2017/02.

Balleer, A., R. Gòmez-Salvador, and J. Turunen (2014), 'Labour force participation across Europe: A cohort based analysis', *Empirical Economics*, 46(4), 1385-1415.

Bascand, G, (2016), 'Inflation pressure through the lens of the labour market', April, A speech delivered to Otago University in Dunedin, Reserve Bank of New Zealand.

Brown, A. and R. Guttmann (2017), 'Ageing and labour supply in advanced economies', Reserve Bank of Australia *Bulletin*, December, 37-46.

Clegg, G. (2012), 'Guide to hours worked', November, Office for National Statistics, available at https://www.ons.gov.uk/ons/dcp171766_359687.pdf

Connolly, E., K. Davis, and G. Spence (2011), 'Trends in labour supply', *Reserve Bank of Australia Bulletin*, June, 1-8.

Conway, P., and A., Orr, (2000), 'The process of economic growth in New Zealand', March, *Reserve Bank of New Zealand Bulletin*, 60(1).

Craigie, R., Gillmore, D., and N. Groshenny, (2012), 'Not a jobless recovery, just a slow one', Reserve Bank of New Zealand Analytical Note, AN2012/06.

Culling, J., D. Hyslop, A. Rice, and H. Skilling, 'Understanding labour force participation in New Zealand', *Reserve Bank of New Zealand Discussion Paper*, forthcoming.

Culling, J. and H. Skilling, 'Developments in New Zealand's labour market, *Reserve Bank of New Zealand Bulletin*, forthcoming.

Department of Labour (2009), 'The working patterns of older workers', December, available at http://www.mbie.govt.nz/publications-research/research/labour-market-and-skills/working-patterns-older-workers-key-findings.pdf

Drew, A., (2007), 'New Zealand's productivity performance and prospects', March, *Reserve Bank of New Zealand Bulletin,* 70(1), 19-33.

Dvorkin, M. and H. Shell (2015), 'A cross-country comparison of labor force participation', Federal Reserve Bank of St. Louis *Economic Synopses*, 17.

Federal Reserve Bank of Atlanta (2017), 'Labor Force Participation Dynamics', January, available at https://www.frbatlanta.org/chcs/labor-force-participation-dynamics.aspx.

Hurnard, R., (2005), 'The effect of New Zealand Superannuation eligibility age on the labour force participation of older people', New Zealand Treasury Working Paper 05/09.

Hotchkiss, J, (2009), Decomposing changes in the aggregate labor force participation rate, *Federal Reserve Bank of Atlanta Working Paper,* 2009-6a.

Johnson, N., (2005), ''Working for Families' in New Zealand: Some early lessons', Fullbright New Zealand, July.

Ketcheson, J., N. Kyui, and B. Vincent (2017), 'Labour force participation: A comparison of the United States and Canada', *Bank of Canada Staff Analytical Note*, 2017-9, July.

McDermott, J., (2014), 'Realising our potential: Potential output and the monetary policy framework', a speech delivered to the Wellington Chamber of Commerce, Reserve Bank of New Zealand.

Ministry for Women (2017), 'Labour force participation', December, available at http://women.govt.nz/work-skills/paid-and-unpaid-work/labour-force-participation

OECD (2017), 'Labour force statistics in OECD countries: Sources, coverage and definitions', June, available at http://www.oecd.org/els/emp/LFSNOTES_SOURCES.pdf.

Reserve Bank of New Zealand, (2015), *Monetary Policy Statement*, June, available at https://www.rbnz.govt.nz/media/ReserveBank/Files/Publications/Monetary%20policy%20statements/2015/mpsjun15.pdf

Vehbi, T. (2016), 'The macroeconomic impact of the age composition of migration', April, *Reserve Bank of New Zealand Analytical Note*, AN2016/03.

Appendix 1

Labour force survey age coverage by country

Table A1.1
Country codes and age coverage of labour force surveys

Country	Country code	Coverage (ages)
Australia	AUS	15+
Austria	AUT	15+
Belgium	BEL	15+
Canada	CAN	15+
Chile	CHL	15+
Czech Republic	CZE	15+
Denmark	DNK	15+
Estonia	EST	15-74
Finland	FIN	15-74
France	FRA	15+
Germany	DEU	15+
Greece	GRC	15+
Hungary	HUN	15-74
Iceland	ISL	16-74
Ireland	IRL	15+
Israel	ISR	15+
Italy	ITA	15+
Japan	JPN	15+
South Korea	KOR	15+
Latvia	LVA	15-74
Luxembourg	LUX	15+

Mexico	MEX	15+
Netherlands	NLD	15+
New Zealand	NZL	15+
Norway	NOR	16-74
Poland	POL	15+
Portugal	PRT	15+
Slovak Republic	SVK	15+
Slovenia	SVN	15+
Spain	ESP	16+
Sweden	SWE	15-74
Switzerland	CHE	15+
Turkey	TUR	15+
United Kingdom	GBR	16+
United States	USA	16+

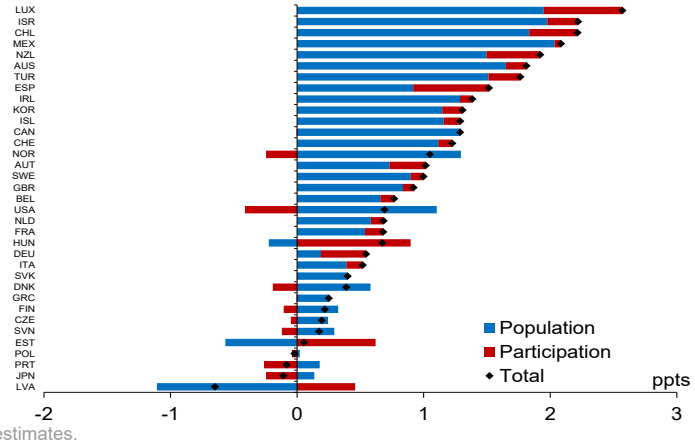
Source: Central Statistical Bureau of Latvia, OECD, Statistics Portugal.

Note: Data for Sweden include those aged 16-74 years prior to 2009.

Appendix 2

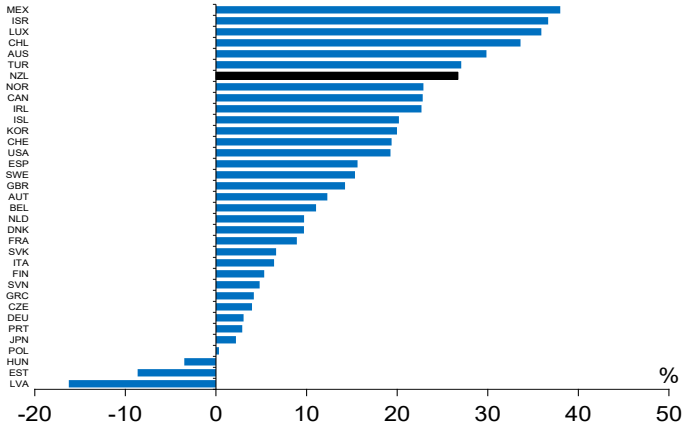
Supplementary figures

Figure A2.1 Contributions to annual labour force growth *(2000-16 average)*



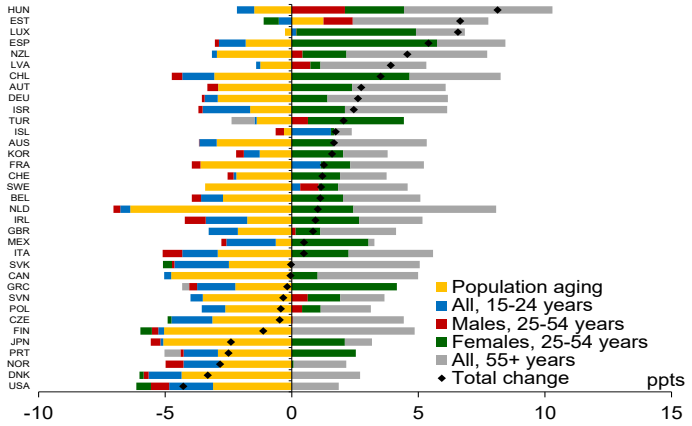
Source: OECD, RBNZ estimates.

Figure A2.2 OECD population growth *(percent change from 2000-16)*



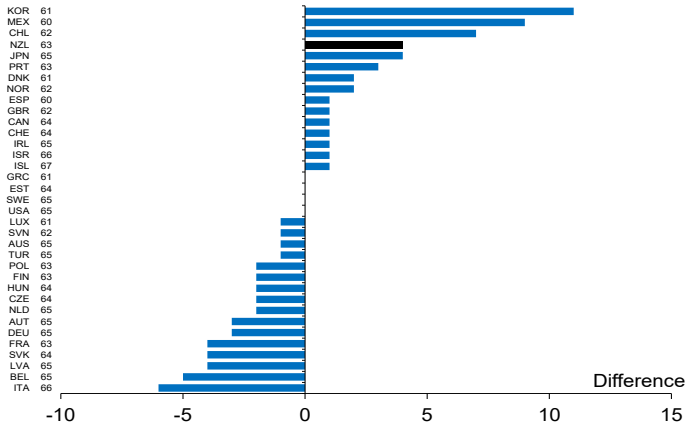
Source: OECD, RBNZ estimates.

Figure A2.3 Decomposition of changes in LFPR since 2000



Source: OECD, RBNZ estimates.

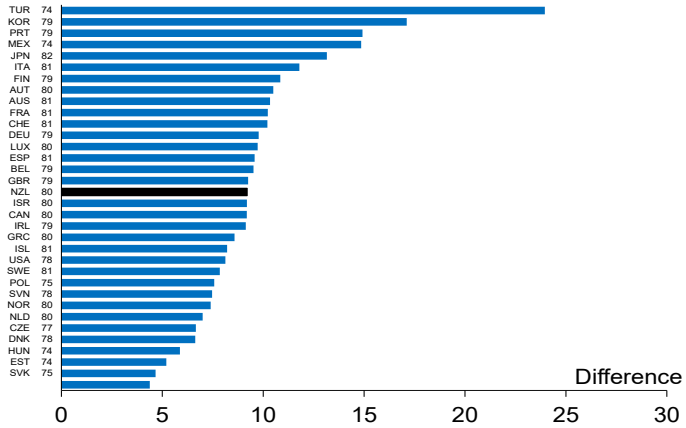
Figure A2.4 Difference between average effective and normal retirement age *(2011-2016)*



Source: OECD, RBNZ estimates.

Note: The normal retirement age is defined as the age at which an individual can retire in 2014 without any reduction to their pension, having had a full career from age 20. The effective retirement age is defined as the average age of exit from the labour force between 2011 and 2016. Beside each country code is the normal retirement age. The blue bars show the difference between normal and effective retirement ages; a positive value indicates that, on average, the labour force works longer than required to receive a full pension, vice versa for a negative value.

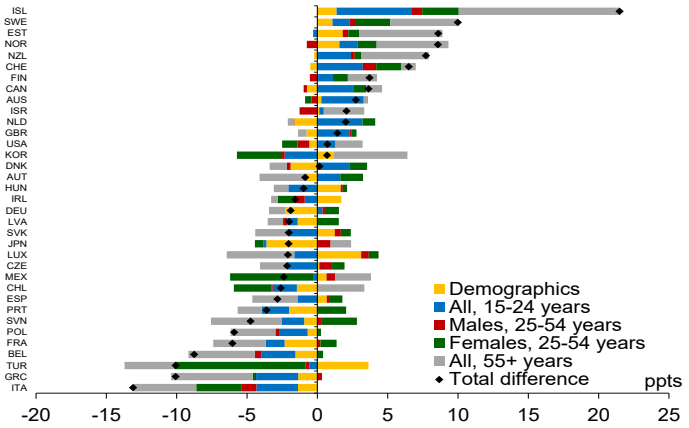
Figure A2.5
Difference in life expectancy at birth of 0-14 year olds and life expectancy at birth of 50+
(at 2015)



Source: OECD, RBNZ estimates.

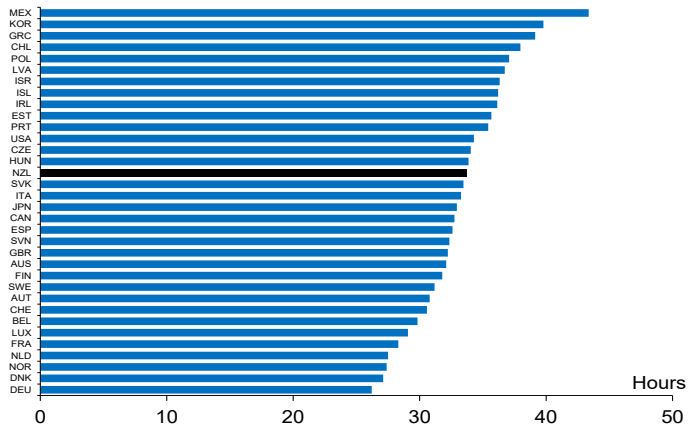
Note: The bars show the difference in life expectancy of someone born today, compared to someone born in 1960's (aged 50+ today). Beside each country code is the current life expectancy at birth.

Figure A2.6
Decomposition of difference in LFPR relative to OECD average
(2016)



Source: OECD, RBNZ estimates.

Figure A2.7
Average actual hours worked per week in 2016



Source: OECD, RBNZ estimates.

Note: 2015 data are used when 2016 data are unavailable.