Labour Force Projections to 2024

by age, gender and highest qualification,

with a time-varying cohort method

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Abstract

The composition of the labour force shapes a nation's capacity to achieve desired levels of productivity and output and standards of living. By 2024, this composition or mix will be different from 2014 in many ways including by age, gender and qualification levels. This change will be shaped by the likely movement through the mix, due to ageing of cohorts of younger and older workers through the age groups. Such emerging cohorts bring different participation rates to older age groups than currently shown. Further, some are "baby-boomer" and "baby-blip" cohorts which have population bulges. In addition to these cohort effects, composition change will also be shaped by workers at some ages tending to remain in the labour force longer than before. This is an age-specific effect.

This study provides projections of labour supply by age, gender and highest qualification from projections of labour force participation rates and working age populations. Projections for 148 groups of labour supply are calculated using projections of labour force participation rates for 148 combinations of age, gender and highest qualification. For participation rates, a "time-varying exit rate dynamic cohort" method is used to account for both the cohort effect as well as the age-specific effects. Working age population scenarios are derived by estimating changes in the qualification composition of cohorts, sub-grouped by age, gender and highest qualification. These are derived from projections by age and gender made by Statistics New Zealand for 2014 that are sub-grouped by qualification composition based on qualification proportions shown in the 2013 Census of Population and Dwellings.

The projected labour force composition by age, gender and qualification is assessed and discussed. Aggregates of these projections are compared with labour force projections of Statistics New Zealand by age and gender. Insights are provided into the impact of qualification composition by gender and age groups on labour force projections from explicitly accounting for the time-variation of qualification composition in projections of both labour force participation rates and working age populations.

[1] The views expressed and any omissions or errors are those of the authors and do not reflect the official view of the Ministry

1.0 Introduction

The Ministry of Business, Innovation and Employment (2013), previously reported three-year ahead labour supply forecasts by age, gender and highest qualification. Those forecasts highlighted many interesting characteristics of time series of labour supply, labour force participation rates (LFPRs) and working age population (WAP). These included:

- cohort effects - two maxima in labour supply associated with the baby boomer and baby blip age cohorts, currently at about 50-54 years and 20-24 years, respectively
- age specific effects - a rising trend in labour supply associated with higher LFPRs for ages 45 years and higher with gender specific differences
- qualification effects - characteristic long-term levels of LFPRs associated with changes in each qualification level.

This paper reports labour supply projections with time horizons of five and ten years to 2019 and 2024 respectively. The aim of this work is to understand the impacts that different qualifications have on long-term labour supply. In achieving this aim, the work extends existing methods for long-term projections to include a qualification dimension. In doing so it also provides a prototype for projections in other dimensions.

With a ten year time horizon, each age cohort of workers can move over two age groups as they age. Consequently, labour force projections of each age group are shaped both by: (i) characteristics of the same cohort from younger ages and (ii) changes in these characteristics in the period of ageing. This means that projections of an age group based only on historic data for that age group are not reliable for long term projections.

This paper reports labour supply projections to 2019 and 2024 for labour supply changes in 148 groups of age by gender by highest qualification. The method used accounts for movement of cohorts across age groups (cohort effects) over time as well as changes in labour supply behaviour within age groups (age-specific effects).

The LFPRs of 148 combinations of 15 age, 2 gender and 5 highest qualification levels are projected using the “time varying exit rate dynamic cohort” method (2003, Australian Productivity Commission). These projections are then combined with two corresponding scenarios of WAP, by age, gender and highest qualification.

Section 2 of this paper shows the relationships of the present study to previous studies. It presents an outline of labour force projections by age and gender recently reported in New Zealand. It describes the main methods used globally and outlines the method adopted in this study. Section 2 also highlights the significance of labour force projections for economic growth projections. Presently, older age groups are particularly interesting as a key focus area for investigation, since they are showing rising LFPRs in the face of an overall downward trend due to higher retirement rates within older age groups.

Section 3 describes the data used for basing the projections. Household Labour Force Survey (HLFS) data of Statistics New Zealand are used to produce projections of LFPRs. Recently available data from the 2013 Census of Population and Dwellings are used to estimate the qualification composition of WAP in age by gender projections of Statistics New Zealand, WAP(a,g), to produce a 2014 scenario of WAP in age, gender and qualification groups, WAP(a,g,q). WAP(a,g,q) are then projected for 2019 and 2024, by simulating historic behaviour shown in HLFS data.

In summary, insights are provided on projections of labour supply growth, as baby boomers move into the 60-69 age group. This occurs in the face of falling overall LFPRs due to the retirement of older workers.

In particular, most workers increase their propensity to remain in the labour force over the period 2014 to 2024 as they enter the 60-64 age group. The exceptions are degree qualified males and non-qualified females. A scenario of future growth in the proportion of workers with qualifications of NCEA level 4 or higher, results in an increase in labour supply by 10,000 people by 2024. This study further shows the potential for labour supply growth of about 10,000 persons by 2024, with no change in WAP. Higher qualified people have higher LFPRs, and an increased proportion of them would raise overall LFPRS with no change in WAP.

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics New Zealand.

2.0 Background

Labour Supply Projections

Equation 1 shows how labour force (LF) projections are derived using: (i) WAP projections and (ii) LFPR projections.

This study includes highest qualification as a dimension in addition to age and gender.

The labour force projections for each time period, *t*, of each age by gender by qualification combination, are:

$$LF_t = WAP_t * LFPR_t \quad (1)$$

In New Zealand, recent labour supply projections have been reported by Statistics New Zealand (2012), the New Zealand Treasury (2012) and MBIE (2010, Department of Labour).

The Statistics New Zealand projections are the basis for the two other projections and are based on the 2006 Census, updated in August 2012. In addition to extending this previous work by adding a qualification dimension, this present study derives labour force participation rate (LFPR) results by age and gender and compares them with corresponding LFPRs used in the "median assumption" projections (2012 update) of Statistics New Zealand. Median assumption projections (2012 update) are equivalent to the medium labour force participation assumptions in previous updates, such as the series 5M in the 2006-base, May 2010 update. They are also consistent with Statistics New Zealand WAP projections by age and gender updated in 2011.

Importantly, compared with the 2010 update, the 2012 Statistics New Zealand LFPR assumptions show (at p21):

- significant increases in LFPRs for males aged 55+ years and females aged 50+ years
- small increases in LFPRs for females in main childbearing ages, 21-49 years
- small decreases in LFPRs for males and females aged 15-20 years
- static LFPRs for males at ages 21-54 years

The report notes (p36) that the largest growth in labour supply will occur between 2011 and 2031, as the baby boomers move into the 65+ age group. The profile of this change in the labour force is illustrated in Figure 36 of that report.

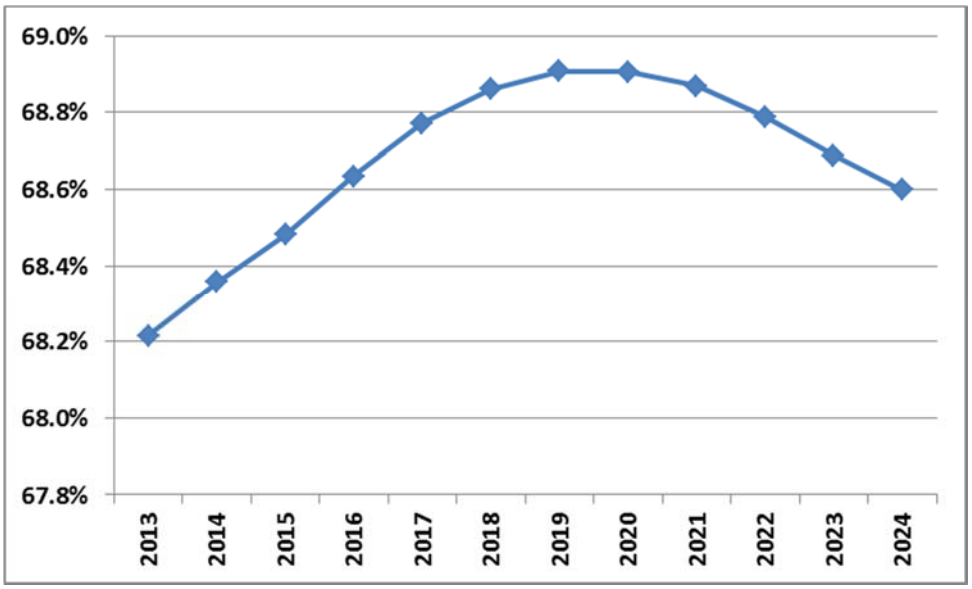
Interestingly, Statistics New Zealand notes that: growth in labour supply projections due to (i) rising trends in LFPRs from age-specific effects and from (ii) rising trends in working age populations (WAP) from baby boomer cohort effects, are together offset by an overall trend for LFPRs to decline as workers age. This latter trend dominates the Statistics New Zealand projections of labour supply from around 2020, after which time the overall LFPR is projected to decline to 67 per cent in 2036 and to 65 per cent in 2061 (refer Figure 1).

This decline in the overall LFPR from 2020, as shown in Figure 1, marks an important point for long-term economic growth projections since labour productivity growth must increase beyond this point to maintain and increase growth in GDP per capita of WAP (2010, Department of Labour).

The New Zealand Treasury reports a labour supply projection method where LFPRs for five year age groups are applied to WAP projections based on medium labour force projections updated in 2010. These LFPR projections are derived by combining Census-based projections with a projection baseline consistent with the Treasury's macroeconomic forecasts based in HLFS data of Statistics New Zealand. Thus business cycle effects shown in HLFS data are captured. Age-group participation measures are then used to drive forward the projections for 40 years.

The Department of Labour (2010), now part of MBIE, reports scenarios for LFPRs combined with WAP projections. The scenarios assume different migration scenarios to the medium

scenario of WAP in Statistics New Zealand's 2010 update projections and apply LFPRs to age groups 2 years and 5 years ahead to them, thereby boosting the participation rates of older workers.



Source: Statistics New Zealand National Projections updated 2011 and 2012

Fig 1: Projected LFPR implied from Statistics New Zealand labour force and WAP projections, showing maxima at 2020.

Working Age Population Projections

Working age population projections by age, and gender, WAP(a,g), are readily available from statistics agencies, such as Statistics New Zealand. WAP by age, gender and highest qualification, WAP(a,g,q), are not generally available, but are required for this study. In this study, WAP(a,g) projections for 2014 from Statistics New Zealand are used as a basis. Then estimates of the qualification composition of WAP(a,g) for 2019 and 2024 are made by applying a composition scenario shown from historic behaviour of cohorts of WAP(a,g,q) in HLFS data. For 2014, the qualification composition applied is the same as that observed in the 2013 Census of Population and Dwellings.

Labour Force Participation Rate Projection Methods

In previous studies, the LFPR projections are derived (2003, European Commission) by assumptions such as:

- LFPRs of age, gender groups are unchanged over time
- LFPRs of age, gender groups at future times follow a defined scenario
- future LFPRs of age, gender groups can be extrapolated from historic values

- LFPRs of age and gender cohorts follow time trends defined by entry to, and exit from, each cohort of workers over time, where the exit and entry rates in future are fixed at present rates. This is the “dynamic cohort method with fixed exit and entry rates”
- LFPRs of age, gender cohorts vary in time due to entry to, and exit from, each cohort of workers over time, where the exit and entry rates in future vary from one time period to the next. This time variation can be estimated from historic behaviour. This is the “dynamic cohort method with time varying exit and entry rates”.

This study projects LFPRs using the dynamic cohort method with time varying exit rates (DCMT). The method chosen is a variation of the method reported by the Australian Productivity Commission. It is explained further in section 4.1.

The DCMT method in that study first creates a smooth series of historic LFPRs. Then, corresponding historic entry and exit rates are calculated. Time-varying sigmoidal growth curves, defined by parametric formulas, are then fitted to these historic data. These curves are then extended to future periods by adjusting the time parameter so that exit and entry rates for future times are derived. Then, projections of LFPRs are obtained from these projected exit and entry rates.

Either entry rates or exit rates can be used to project LFPRs. The study of the Australian Productivity Commission (2005) notes that it is usually best to use models with exit rates when long-run exit rates are likely to be positive and to use models with entry rates when long-run entry rates are likely to be positive. This ensures that forecast participation rates are appropriately bounded.

3.0 Data

Historic LFPR data by age, gender and highest qualification, LFPR(a,g,q), were calculated from time series data for WAP and labour supply. These latter data are June year averages for 1993 to 2013 and the March year average for the 2014 year (as the June year data are not available), derived from quarterly unit record data of the HLFS of Statistics New Zealand for the period 1993 to 2014.

The LFPR data and the WAP data comprise 148 groups (with abbreviations used in this report) for:

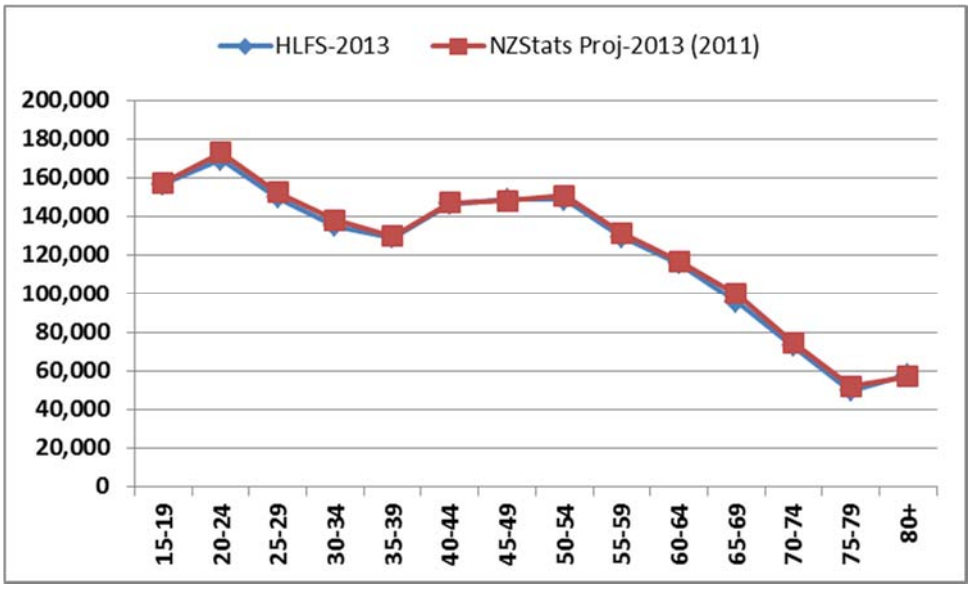
Age (15 age groups): 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+

Gender (two): male (m) and female (f)

Highest qualification (5 categories): none (n), school (s), post-school NCEA level 1-3 (p 1_3), post school NCEA level 4-6 (p 4_6), bachelor degree or higher (d). There is no "deg+" qualification category for the 15-19 ages for both genders.

Once LFPR(a,g,q) projections were obtained for 2014, 2019, and 2024, corresponding labour supply estimates were calculated using WAP(a,g,q) scenarios as described in section 4.2. The WAP(a,g) projections of Statistics New Zealand are 50th percentile projections, updated in 2012 with a 2006 base.

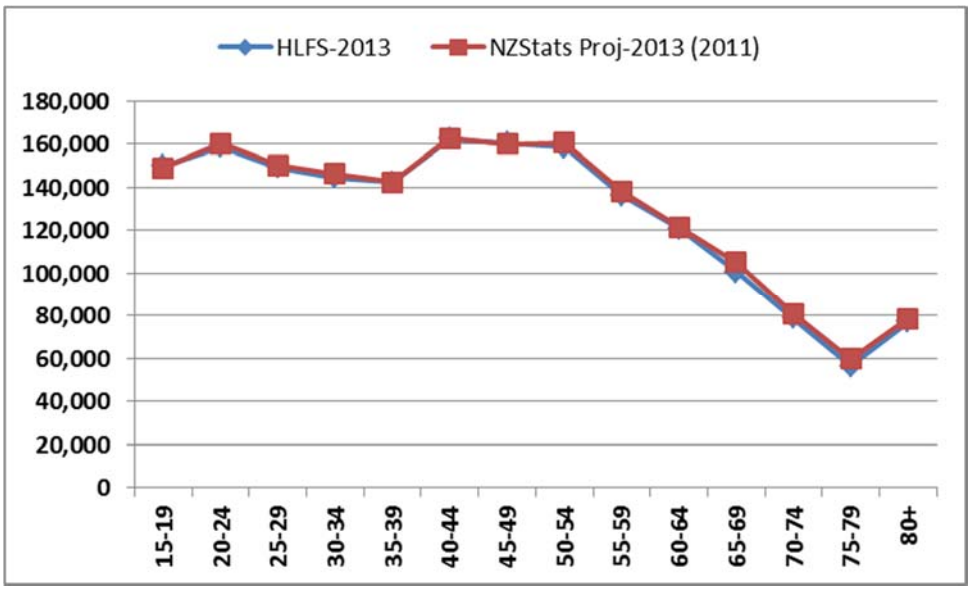
Labour force projections by age, gender and qualification are derived by applying projections of LFPR(a,g,q) to the WAP(a,g,q) estimates. The 2013 average WAP (a,g) data from HLFS are almost identical to Statistics New Zealand WAP (a,g) projections (updated in 2011) for 2013. This is shown in Figures 2a and 2b below for males and females respectively.



Source: Statistics New Zealand National Projections and Household Labour Force Survey

Fig 2a WAP, males: Statistics New Zealand projections for 2013 compared with 2013 HLFS

LFPR projections in this study have an HLFS basis and the similarity for 2013 suggests that it is reasonable to use Statistics New Zealand projections (updated in 2011) of WAP(a,g) for all years from 2013 as a reasonable proxy for HLFS-based WAP(a,g) projections, in order to prepare labour supply projections. Such use also aids comparisons of labour supply projections from this study with those of the Statistics New Zealand 2012 update, since differences between the two will be explained entirely by differences in LFPR projections.



Source: Statistics New Zealand National Projections and Household Labour Force Survey

Fig 2b WAP, females: Statistics New Zealand projections for 2013 compared with 2013 HLFS

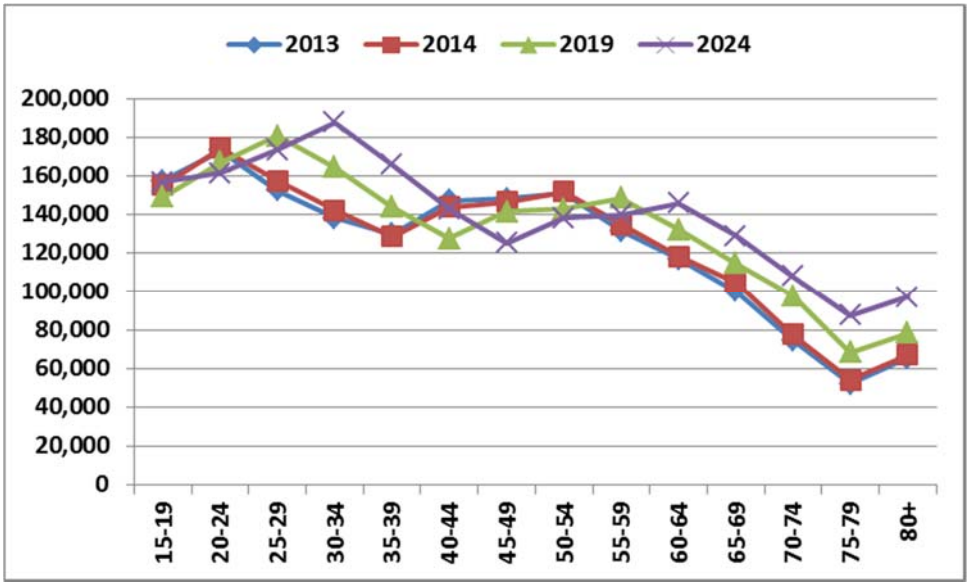
Typical Features of Working Age Population projections

Statistics New Zealand WAP(a,g) projections for 2014, 2019 and 2024 for males and females are shown in Figures 3a and 3b. They show typical age and gender features for New Zealand which are manifested in the labour force projections by age, gender and qualification derived in this study:

(i) a peak at ages 50-54 in 2014 due to the "baby boomer" cohort that moves to 55-59 in 2019 and to 60-64 in 2024. The WAP counts in the preceding two age groups are similar and together, the three form a plateau that precedes a sharp decline to older age groups

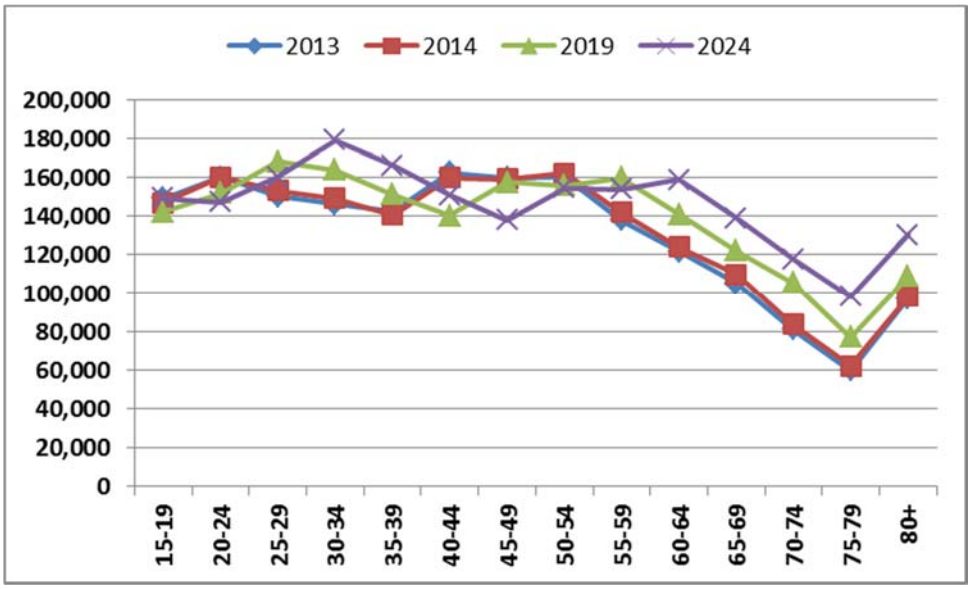
(ii) a peak at ages 20-24 in 2014 due to the "baby blip" (children of baby boomers) cohort that moves to 25-29 in 2019 and to 30-34 in 2024. The WAP counts in the preceding and following age groups are lower and the baby blip peak forms a local maximum.

The rise from the 75-79 age group to the 80+ age group is an artefact of aggregating the80-84, 85-89 and 90+ age groups and has no relevance in this study.



Source: Statistics New Zealand National Projections

Fig 3a Working age population for males in 2013 and projections for 2014, 2019, and 2024



Source: Statistics New Zealand National Projections

Fig 3b Working age population for females in 2013 and projections for 2014, 2019, and 2024

4.0 Method

The projection method used in this study has two parts:

(i) labour supply is projected by projecting LFPRs for 2019 and 2024 using the DCMT method and assuming a constant qualification composition in WAP(a,g,q) shown in 2014 Census data

(ii) the labour supply projection in (i) is augmented by assuming that WAP(a,g,q) in 2019 and 2024 has a qualification composition similar to one that would result from a five year change to 2019 that was the same as that observed in HLFS data for the five years to 2009.

The results obtained are presented to show changes in labour supply resulting from:

(i) LFPR projections (accounting for qualification effects over time) with WAP qualification composition set at 2014 proportions, then

(ii) changing the qualification composition of WAP in addition to (i).

4.1 Labour Force Participation Rates for 2014, 2019 and 2024

This study uses the DCMT method for projecting LFPR by age, gender and qualification, LFPR(a,g,q). It is a variation of that used by the Australian Productivity Commission (APC).

The APC method first derives a smooth series of historic LFPRs(a,g), using a Hodrick-Prescott filter. These LFPR(a,g) series are used as a basis to derive a smooth series of historic exit and entry rates for each age and gender level. These data are assumed to show a time-varying behaviour characterised by sigmoidal growth curves ("Richards curves") that are defined using a number of parameters, including time. Such curves are fitted to the historic data, by adjusting the parameters. Then, future values of exit and entry rates can be estimated from the future trajectory of the fitted curve, obtained by adjusting the time parameter accordingly. Consequently, projections of exit and entry rates are made by simply identifying future points along the fitted curve. Once projected exit and entry rates are derived, LFPRs are calculated from them using equations 2 and 3.

$$Entry_{x,x+4}^{t} = \frac{LFPR_{x+5,x+9}^{t} - LFPR_{x,x+4}^{t-5}}{LFPR^{*} - LFPR_{x,x+4}^{t-5}} \quad (2)$$

Where $LFPR^{*}$ is the maximum potential participation rate, and x are ages for five-year age groups.

$$Exit^{t}_{x,x+4} = \frac{LFPR^{t-5}_{x,x+4} - LFPR^{t}_{x+5,x+9}}{LFPR^{t-5}_{x,x+4}} \quad (3)$$

The main difference between the method in this study and the APC method is that, here, instead of using a fitted sigmoidal growth curve, future trajectories of exit and entry rates in 2019 are derived from trends of LFPRs from 2014 to 2019. These trends within each age, gender and qualification group are obtained as simple forecasts using the PROC FORECAST method in SAS Software.

As with the APC method, once the future trajectories of exit and entry rates are derived, projections of LFPRs are calculated from them using the same equations 2 and 3.

In this present study, a high level of detail is included in the projections due to including the 5 levels of qualifications. In the 5 and 10 year projection periods it is reasonable to assume that the resulting level of detail in the "a,g,q" basis will accurately canvas the diverse behaviour that would otherwise be modelled in the aggregate in a "a,g" basis with parameters of various sigmoidal growth curves. Overall, the approach used in this study is suitable for the required purpose. Further, it is simple and more transparent than would be the case were a Richards curve approach used.

The APC report notes that many combinations of exit and entry rates may correspond to a given change in participation rates and vice versa. Further, many of these combinations may violate appropriate bounds for these numbers. A pragmatic approach that is suggested is to model exit rates when long-run exit rates are likely to be positive and to model entry rates when long-run entry rates are likely to be positive.

In this study all LFPR projections were based on exit rates and reasonable results were obtained with limited scaling adjustments that are described below.

In this study the DCMT method accounts for both:

- changes of LFPR within a specific a,g,q group over time due to changes in behaviour of that a,g,q group (eg increase in LFPR of 25-39 year old females with higher qualifications, or increase in LFPR of 60-64 year olds). These are accounted for in the projections of the exit and entry rates in the method described
- changes in LFPRs over time, as cohorts such as the baby boomers with characteristic LFPRs, grow older and gradually move through the age groups replacing LFPRs in those age groups over time. These are cohort effects and they are accounted for by using equations 2 and 3.

In this study the DCMT method cannot be used to project LFPRs by qualification and gender for the 15-19 age group, since this requires using entry rates from 10-14 year cohorts. Such rates are non-existent, because people enter the working age population at age 15. As an approximation, LFPRs by age and qualification for the 15-19 age group are not derived using the DCMT method, but are assumed for 2014 and later years to be the same as those

observed in the 2014 year. This simplifying assumption enables LFPRs for the 20-24 and subsequent age groups to be estimated using the DCMT method.

LFPR projections for some of the older age groups were extremely high due to excessively low projections of exit rates. This resulted because forecasts of future LFPR trends on which the exit rates are based were too simplistic for these ages and continued recent high LFPR growth out to 5 and 10 year projections. To remedy these excesses, the following LFPR projections obtained were scaled as follows:

(i) 2019 : all qualifications, males and females, 60-64 and 65-69 age groups, projections multiplied by 0.88
(ii) 2024 : all qualifications, males, 60-64 and 65-69 age groups, projections multiplied by 0.85
(iii) 2024 : all qualifications, females, 55-59, 60-64, 65-69 age groups, projections multiplied by 0.95, 0.90 and 0.85 respectively.

This approach is transparent and proportional. It makes no change to the relativity between LFPRs of different qualification categories within the age groups shown.

4.2 Scenarios of Working Age Population for 2014, 2019 and 2024

Two scenarios of WAP(a,g,q) were used to illustrate labour force projections.

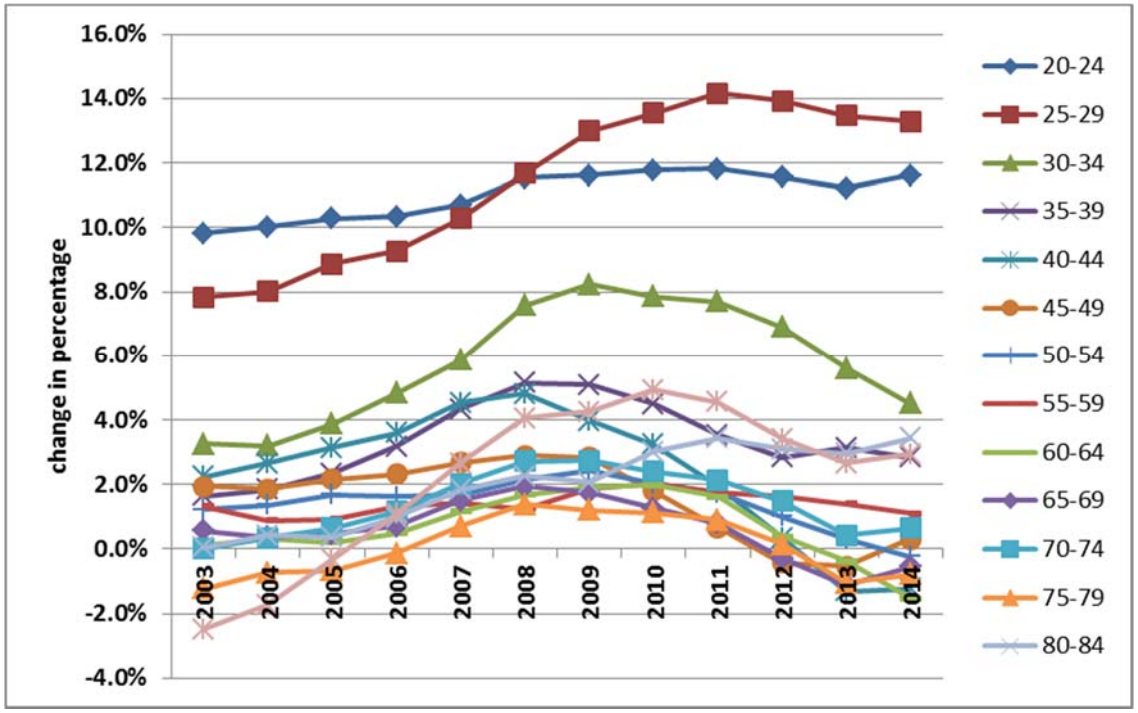
Scenario 1 assumes that WAPs(a,g,q), for 2014, 2019 and 2024, based on projections of WAP(a,g) of Statistics New Zealand (2011 update, 50th percentile, 2006 basis) , maintains the same qualification composition observed in the 2013 Census of Population and Dwellings.

Scenario 2 instead uses a cohort-based approach. It assumes that the proportions of qualifications for WAP(a,g,q) can be estimated using historic behaviour of changes in qualification composition shown by five-year age, gender and qualification cohorts. In particular, WAPs(a,g,q) for 2019, under Scenario 2, were estimated by assuming that five year age cohorts by age, gender and qualification in 2019 show a change in qualification composition from 2014 that is identical to the change observed from 2004 to 2009 in the HLFS data. WAP(a,g,q) for 2024, under Scenario 2, were estimated by assuming that cohorts by age, gender and qualification in 2024 show no change in composition from that derived for 2019.

Consequently, Scenario 2 can be seen as a “change” scenario for qualification composition in the period 2014 to 2019 that augments the “no change” Scenario 1. MBIE is currently investigating the historic cohort behaviour of qualification composition that underpins the characteristics of Scenario 2.

For example, Figure 4 shows the percentage point change in the proportion of degree qualified people for the age group shown, compared with the proportion shown by the same cohort of people five years prior, when they were five years younger. This is illustrative of the magnitude of change, in this cohort effect, from changing qualification composition. There is a peak in the percentage point gains over 5 years at about 2009 and these values and those for other qualifications are applied in this present study.

Importantly for this study, the assumption of a 2009-based model for estimating the qualification recognises local maxima in proportions of higher qualifications around 2009 and so represents a growth scenario for higher qualifications over a five year period to 2019. Overall, positive changes in the proportion of each age and gender group for certain qualifications are compensated by changes in proportions for corresponding groups with other qualifications.



Source: Statistics New Zealand Household Labour Force Survey

Figure 4: Cohort change in WAP, from 5 years prior, of proportion that possess deg+ qualification, by age, males

5.0 Projection Results

5.1 Labour Force Projections

Projected labour force numbers under WAP Scenario 2 for males and females by age, gender and highest qualification for 2014, 2019 and 2024 and actual 2013 data are shown in Annex 1. Corresponding WAP(a,g,q) and LFPR(a,g,q) projections are shown in Annexes 2 and 3 respectively. All Annexes are not included here but are available from the authors.

The overall labour force projection to 2024 is influenced by the cumulative impacts of corresponding WAP(a,g,q) and LFPR(a,g,q).

In summary, common patterns for age groups across gender and qualification types are:

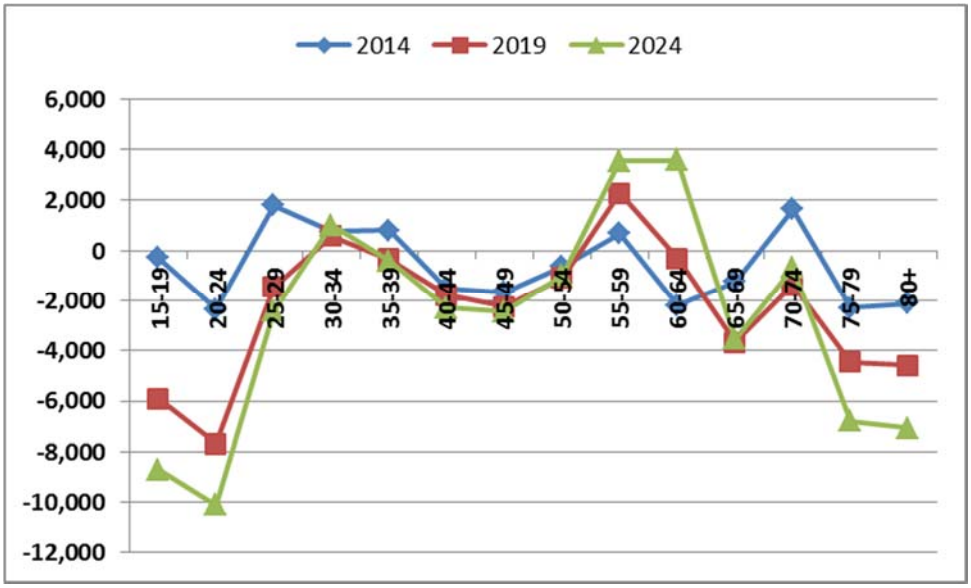
- high WAPs and low LFPRs offsetting each other for the 15-19 age group
- the baby blip WAP cohort feature at about 20-24 and the rising LFPR in this area are additive producing rises in labour supply
- the baby boomer WAP cohort feature at about 60+ years is complex, being sometimes offset by falling LFPRs (eg female 50-69, school qualification) and sometimes supported by rising LFPRs (eg male and female, no qualification, 60-64)
- an unchanging LFPR for the 35-60 ages, so that WAP patterns dominate the labour supply pattern.

It is important to recognise that for the older age groups, while LFPRs may show a rising trend over the projection period, this trend may be obscured by the overall downward trend in LFPRs associated with higher retirement rates for these age groups.

5.2 Comparison with Statistics New Zealand projections

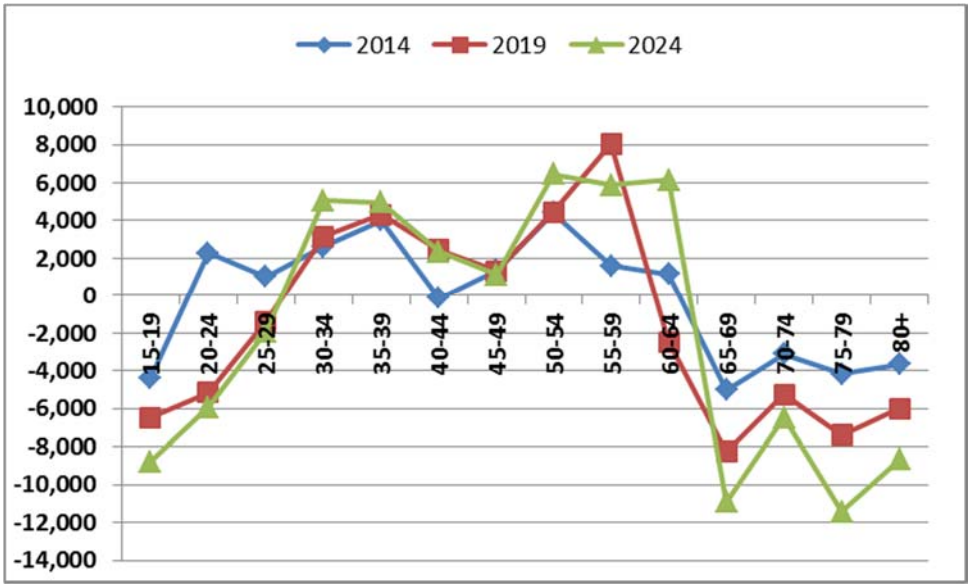
It is helpful to compare MBIE labour force projections at the age by gender level with those of Statistics New Zealand.

The differences between MBIE labour force projections, aggregated to age by gender levels, under WAP Scenario 2 and corresponding Statistics New Zealand labour force projections for males and females are shown in Figures 5a and 5b. These differences are referred to as “variances”.



Source: Statistics New Zealand, MBIE

Figure 5a: Variance of MBIE labour force projections from Statistics New Zealand labour force projections by age for males



Source: Statistics New Zealand, MBIE

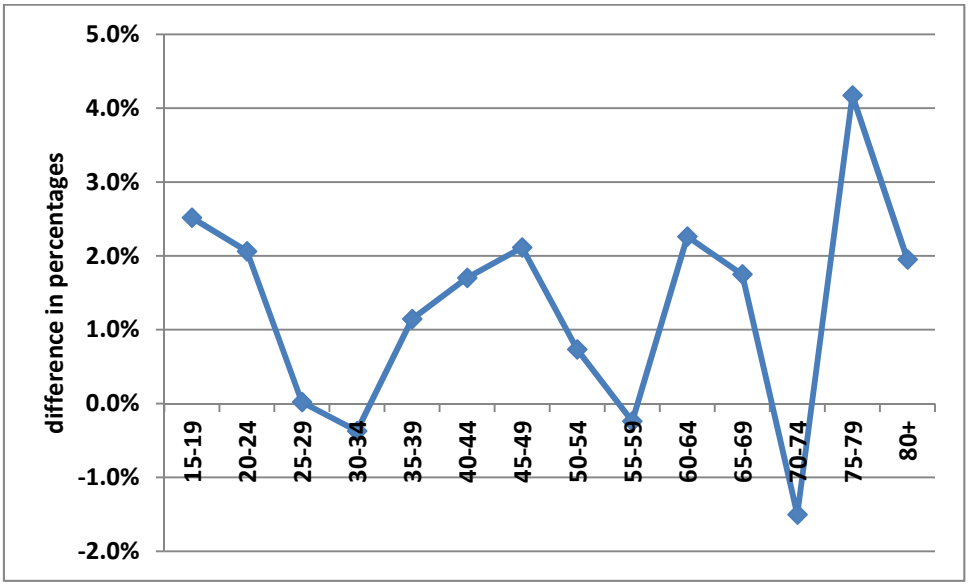
Figure 5b: Variance of MBIE labour force projections from Statistics New Zealand labour force projections by age for females

Since both MBIE projections and Statistics New Zealand projections are based on an identical working age population basis, the variances between them are attributable to different LFPR projections used by Statistics New Zealand and MBIE. The proviso to this is that the two sets of projections have the same base. This is not the case and a correction is required.

5.3 Correcting for the different bases in labour force participation rate projections

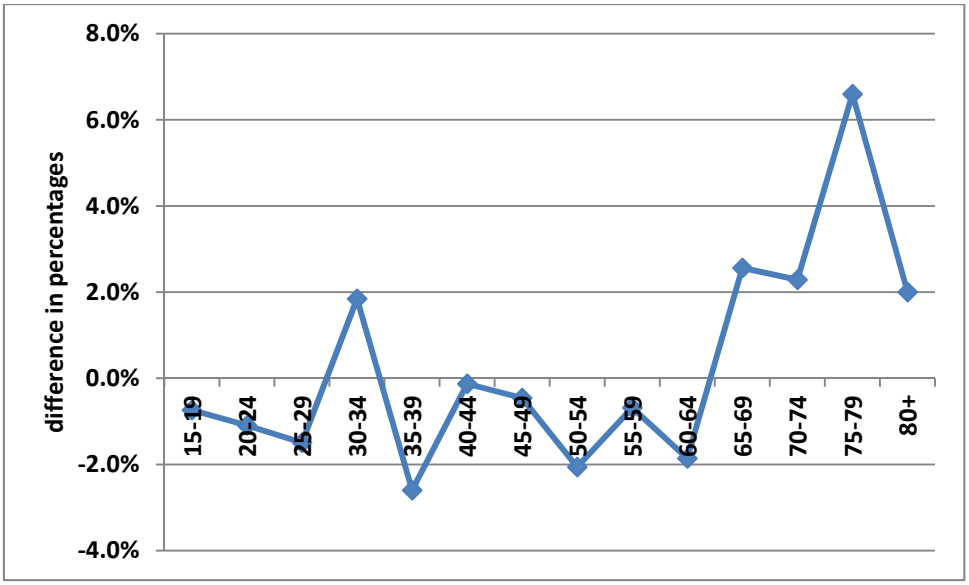
The Statistics New Zealand-based LFPR(a,g) projections from labour supply projections updated in 2012, and the MBIE projections show clear differences by age group for the 2013, 2014, 2019 and 2024 years. In part, these differences are due to differences for the 2013 year. These differences for 2013 are shown in Figures 6a and 6b.

In order to compare MBIE projections with Statistics New Zealand projections from a common baseline, each set of projections, by age and gender, is expressed in terms of the variance from its respective 2013 levels. These are referred to as the "2013-based variances".



Source: Statistics New Zealand

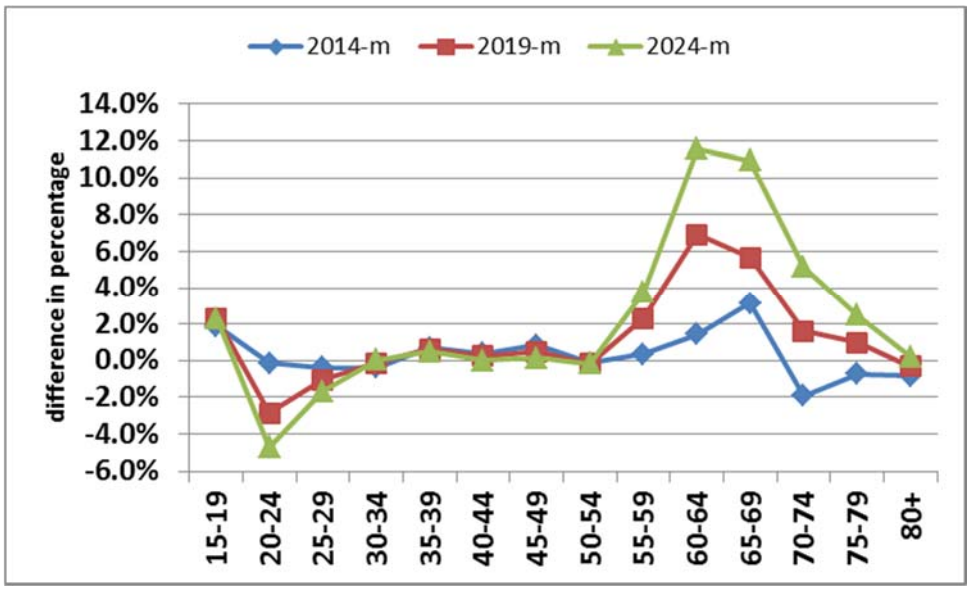
Fig 6a: Statistics New Zealand LFPR projections (2012 update) for 2013 less HLFS based LFPRs, males (difference in percentages)



Source: Statistics New Zealand

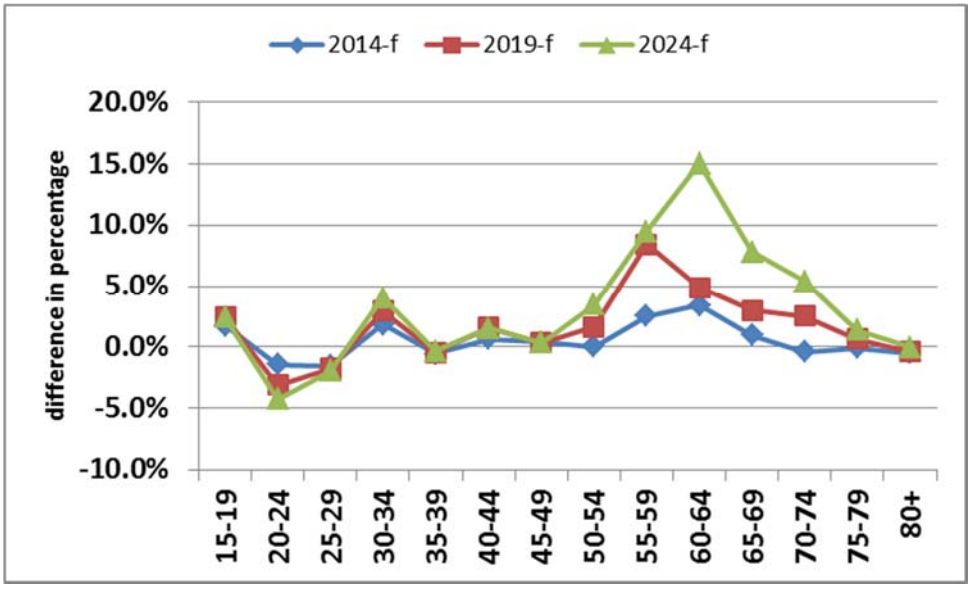
Fig 6b: Statistics New Zealand LFPR projections (2012 update) for 2013 less HLFS based LFPRs, females (difference in percentages)

The 2013-based variances, for MBIE for males and females are shown in Figures 7a and 7b. The corresponding 2013-based variances for Statistics New Zealand projections are shown in Figures 8a and 8b.



Source: Statistics New Zealand, MBIE

Fig 7a 2013-based variances of MBIE projections of LFPR, males



Source: Statistics New Zealand, MBIE

Fig 7b: 2013-based variances of MBIE projections of LFPR, females

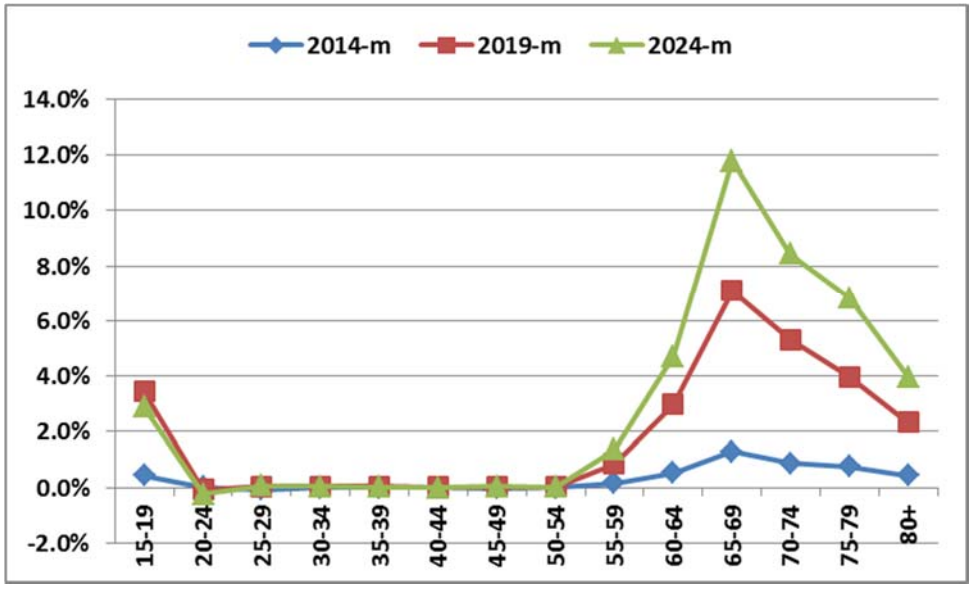
Now on a common base, both sets of projections show sharp rises commencing at the 50-54 age group that rise to peaks in both sets. These peaks for 2024 are at the 60-64 and 65-69 age groups, for males and females respectively, for the MBIE projections and at the 65-69 age group for the Statistics New Zealand projections. Other similarities are the rises from 2013 to 2024 for the 15-19 age group. The main differences between the two projections are in:

(i) the 15-19 age group where Statistics New Zealand projections show rises of about 4 percentage points from 2013 to 2024, although the behaviour of MBIE projections is mixed

(ii) the 20-24 age group where MBIE projections show a decline of about 4 percentage points from 2013 to 2024, although Statistics New Zealand projections do not

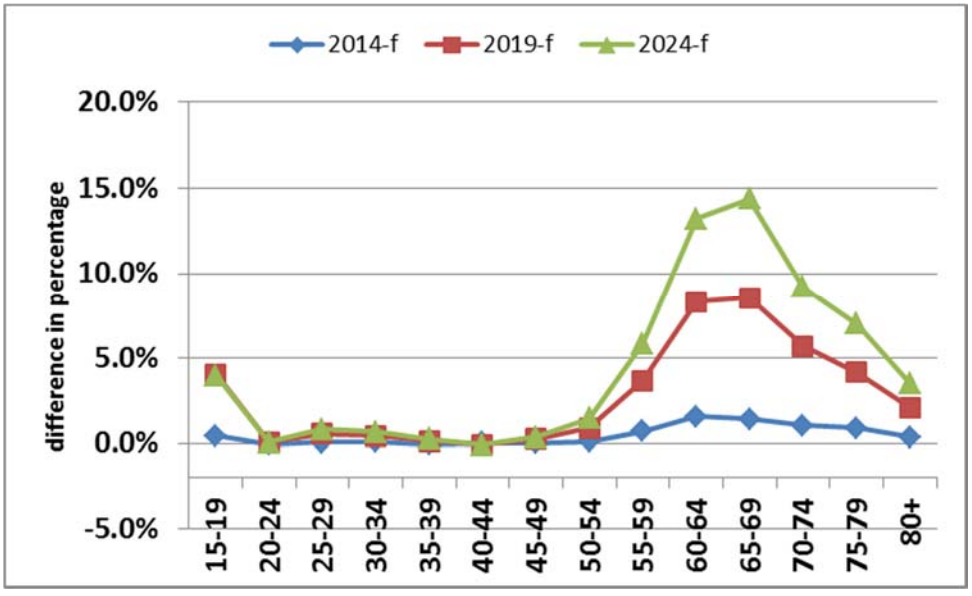
(iii) 30-34 age group for females where MBIE projections show a rise of about 4 percentage points from 2013 levels

(iv) the 80+ group where MBIE projections for all years are similar, whereas the Statistics New Zealand projections are spread out.



Source: Statistics New Zealand, MBIE

Fig 8a: 2013-based variances of Statistics New Zealand projections of LFPR, males



Source: Statistics New Zealand, MBIE

Fig 8b: 2013-based variances of Statistics New Zealand projections of LFPR, females

5.4 Impact of Qualification Composition on Projected Labour Force Participation Rates

In order to assess the impact of qualifications on LFPRs and thereby on labour supply projections, this study investigated to what extent LFPRs change with ageing of participants with a given qualification. Essentially, for each qualification level, this investigates whether the LFPR of an age by gender cohort changes as the cohort ages.

The measure used to do this is the change in LFPR for a given qualification between age group (x-5, x-1) and age (x, x+4). It is referred to as the Q-shift of age group (x, x+4) in the following. The WAP scenario used is Scenario 2.

The Q-shift is measured for 2014, 2019 and 2024. If the Q-shift rises (falls) over the projection period from 2014 to 2024, then workers in the associated group have increased (decreased) their participation over the projection period, as they aged 5 years.

The Q-shifts are shown in Tables 1a and 1b for males and females respectively. They are clearly evident for the 60-64 age group and 65-69 and 70-74 age groups as discussed below.

The large positive values for the 20-24 and 25-29 groups can be attributed to attainment of new qualifications. For ages 30 to 54 years, the Q-shift is zero in most cases.

For males and females aged 20-24, the Q-shifts tend to be unchanged from 2014 to 2019 and then to 2024 for no qualification and degree qualifications. By comparison they tend to fall for non-degree qualifications, particularly for females. This latter result is consistent with a rise in the propensity of those with some qualification at ages 15-19 years to continue studies in the 20-24 age group and thereby lower the LFPR for the 20-24 year age group. This result was observed in historic 2014 LFPR data and the method used has projected this behaviour to 2024.

For females aged 30-34, the post-school level 1-3 and level 4-6 qualifications show rises in Q-shifts over the projection period. A possible explanation for this result is in the return of females to the workforce after childbirth and during the pre-school stages of children.

For the 65-69 and 70-74 age groups, in progressing from 2014 to 2024, the Q-shift for corresponding qualifications is high and negative because workers are retiring. Over the projection period to 2024, the Q-shift for each qualification is about the same. Hence, over the projection period, there is no change in the propensity of retirement age workers, with a given qualification, to exit the labour force.

By comparison, for the 60-64 age group the Q-shift shows interesting changes over the projection period for a given qualification.

In summary, the overall trends over the period 2013 to 2024 for the 60-64 age group show that:

- most qualification groups increase participation rates
- the exceptions are degree qualified males and non-qualified females.

Male	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
2014-m											
none	0.46	0.07	0.01	0.01	-0.03	0.00	-0.01	-0.03	-0.11	-0.25	-0.21
school	0.22	0.17	0.03	0.01	-0.04	0.01	0.00	-0.01	-0.12	-0.29	-0.18
PS L1-3	0.07	0.07	-0.02	0.03	-0.04	0.03	0.00	-0.03	-0.09	-0.21	-0.20
PS L4-6	0.07	0.09	0.01	0.00	0.00	-0.02	0.00	-0.02	-0.13	-0.30	-0.26
deg+	0.85	0.06	0.06	-0.02	0.01	-0.01	0.00	-0.04	-0.11	-0.27	-0.20
Total	**0.32**	**0.12**	**0.02**	**0.01**	**-0.02**	**0.00**	**-0.01**	**-0.03**	**-0.12**	**-0.27**	**-0.22**
2019-m											
none	0.45	0.05	0.03	-0.01	0.00	-0.01	0.00	-0.02	-0.08	-0.29	-0.21
school	0.18	0.18	0.06	0.02	-0.03	0.00	-0.01	0.03	-0.10	-0.26	-0.22
PS L1-3	0.00	0.10	0.01	0.01	-0.03	0.03	0.01	-0.04	-0.08	-0.19	-0.30
PS L4-6	0.06	0.07	0.01	0.00	-0.01	-0.01	0.01	0.00	-0.07	-0.33	-0.29
deg+	0.81	0.10	0.07	-0.02	0.01	0.00	-0.03	-0.01	-0.15	-0.20	-0.22
Total	**0.29**	**0.14**	**0.04**	**0.00**	**-0.01**	**0.00**	**-0.01**	**-0.01**	**-0.10**	**-0.28**	**-0.25**
2024-m											
none	0.46	0.06	0.04	-0.02	0.00	-0.01	0.00	0.00	-0.04	-0.29	-0.23
school	0.18	0.20	0.07	0.02	-0.03	0.00	0.00	0.05	-0.07	-0.28	-0.20
PS L1-3	0.00	0.11	0.01	0.01	-0.04	0.04	0.02	-0.04	-0.04	-0.15	-0.34
PS L4-6	0.06	0.09	0.01	0.00	0.00	-0.02	0.01	0.02	-0.04	-0.32	-0.32
deg+	0.81	0.10	0.08	-0.03	0.02	0.00	-0.03	0.00	-0.15	-0.19	-0.22
Total	**0.29**	**0.15**	**0.05**	**0.00**	**-0.01**	**0.00**	**0.00**	**0.01**	**-0.07**	**-0.27**	**-0.26**

Source: MBIE

Table 1a: Q-shifts (change in LFPR from preceding 5 year age group), males

For 60-64 males:

- for non-qualified persons , while LFPRs fall by 11 percentage points (pp) % in moving from the 55-59 to the 60-64 age group in 2014, by 2024, this fall has reduced to 4pp
- for school qualified persons, the fall between these age groups is 12pp in 2013 and by 2024 this has reduced to 7pp
- for post-school level 1-3 qualified persons, this fall is 9pp in 2014 and by 2024 it is 4pp
- for post-school level 4-6 qualified persons, this fall is 13pp in 2014 and by 2024 it is 4pp
- for degree qualified persons, this fall is 11pp in 2014 and by 2024 it is 15pp.

Female											
	20-24	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**
2014-f											
none	0.25	0.02	0.06	0.08	0.01	0.06	0.00	-0.06	-0.16	-0.27	-0.16
school	0.17	-0.02	0.04	0.03	0.05	0.03	0.05	-0.07	-0.16	-0.36	-0.12
PS L1-3	0.10	-0.05	-0.02	0.04	0.07	0.03	0.01	0.00	-0.07	-0.28	-0.25
PS L4-6	-0.06	0.03	0.00	0.06	0.05	0.00	0.03	-0.02	-0.10	-0.43	-0.21
deg+	0.87	0.00	-0.03	-0.03	0.05	0.04	-0.01	-0.04	-0.09	-0.27	-0.16
Total	**0.27**	**0.03**	**0.01**	**0.01**	**0.04**	**0.03**	**0.01**	**-0.05**	**-0.14**	**-0.33**	**-0.19**
2019-f											
none	0.22	0.06	0.03	0.07	0.06	-0.01	0.02	0.03	-0.20	-0.30	-0.16
school	0.10	0.04	0.05	0.02	0.06	0.04	0.03	0.02	-0.19	-0.37	-0.14
PS L1-3	-0.01	-0.03	0.04	0.01	0.07	0.00	0.04	0.02	-0.11	-0.35	-0.19
PS L4-6	-0.10	0.02	0.04	0.02	0.09	0.01	0.03	0.02	-0.15	-0.34	-0.21
deg+	0.85	0.01	-0.04	-0.02	0.05	0.03	0.03	-0.01	-0.10	-0.23	-0.31
Total	**0.21**	**0.07**	**0.02**	**0.01**	**0.06**	**0.01**	**0.02**	**0.01**	**-0.17**	**-0.32**	**-0.20**
2024-f											
none	0.24	0.07	0.03	0.07	0.03	0.01	0.04	0.04	-0.15	-0.35	-0.18
school	0.10	0.05	0.06	0.01	0.07	0.04	0.04	0.02	-0.10	-0.44	-0.15
PS L1-3	-0.01	-0.03	0.06	0.00	0.07	-0.01	0.07	0.00	0.01	-0.42	-0.19
PS L4-6	-0.10	0.02	0.05	0.01	0.10	0.00	0.06	0.00	-0.04	-0.40	-0.23
deg+	0.85	0.01	-0.03	-0.02	0.04	0.03	0.04	-0.04	0.02	-0.27	-0.34
Total	**0.21**	**0.07**	**0.03**	**0.00**	**0.05**	**0.02**	**0.04**	**0.00**	**-0.07**	**-0.38**	**-0.22**

Source: MBIE

Table 1b: Q-shifts (change in LFPR from preceding 5 year age group), females

For 60-64 females:

- for non-qualified persons , while LFPRs fall by 16pp in moving from the 55-59 to the 60-64 age group in 2014, by 2024, this fall is 15pp
- for school qualified persons, the fall between these age groups is 16pp in 2014 and by 2024 this has reduced to 10pp
- for post-school level 1-3 qualified persons, there is a fall of 7pp in 2014 that reverses to a rise by 2024 of 1pp
- for post-school level 4-6 qualified persons, this fall is 10pp in 2014 and by 2024 it is a fall of 4pp
- for degree qualified persons, there is a fall of 9pp in 2013 that reverses to a rise of 2pp by 2024.

5.5 Labour Force projections under different WAP Scenarios

This section reports and compares labour supply projections under Scenarios 1 and 2 for WAP(a,g,q). Hence it investigates the impact on labour supply projections of different rates of change in the qualification composition of WAP(a,g,q) only.

The qualification compositions of labour force, WAP and LFPR by qualification, based on the 2014 (HLFS-based) qualification composition scenario for WAP, are shown in Table 2, in the yellow-shaded first column. The orange- shaded second column shows results for Scenario 2. The third column shows the impact of Scenario 2 relative to Scenario 1, which is attributable to the change in qualification composition of WAP, due to Scenario 2.

The data in the first two columns also show the overall projections for labour force, WAP and LFPR numbers together with those of Statistics New Zealand. In the first column the differences are due entirely to different LFPRs used by Statistics New Zealand, which are higher for males (females) by 1.7 (1.5) and 1.9 (1.6) percentage points for the 2019 and 2024 projections respectively.

Data in the second column in Table 2 show the impact on 2019 and 2024 labour force projections of adjusting the qualification composition of the WAP for 2019 and 2024 in the way described in section 4.2. Essentially this assumes that rather than remaining at 2014 proportions, the qualification composition of age, gender cohorts of the WAP during the first projection period have changed from 2014 to 2019 in the same way as from 2004 to 2009. It also assumes that the qualification composition remains unchanged during the second part of the projection period from 2019 to 2024.

	Scenario 1 WAP has 2014 qual composition			Scenario 2 WAP has 2009-basis qual composition			Impact of Scenario 2	
	LF	WAP	LFPR	LF	WAP	LFPR	LF	WAP
Male-2014								
none	223,409	383,629	0.582	223,409	383,629	0.582	0	0
sch	329,116	467,328	0.704	329,116	467,328	0.704	0	0
ps1-3	166,513	200,623	0.830	166,513	200,623	0.830	0	0
l4-6	315,040	392,977	0.802	315,040	392,977	0.802	0	0
deg+	268,759	313,044	0.859	268,759	313,044	0.859	0	0
Total	**1,302,838**	**1,757,600**	**0.741**	**1,302,838**	**1,757,600**	**0.741**	**0**	**0**
Stats NZ Proj	*1,311,500*	*1,757,600*	*0.746*	*1,311,500*	*1,757,600*	*0.746*		
Male-2019								
none	235,708	411,402	0.573	217,467	381,715	0.570	-18,241	-29,688
sch	337,786	482,242	0.700	334,295	480,531	0.696	-3,491	-1,711
ps1-3	171,119	212,645	0.805	118,434	137,618	0.861	-52,685	-75,027
l4-6	332,496	418,296	0.795	356,456	462,431	0.771	23,960	44,136
deg+	280,573	333,114	0.842	331,604	395,404	0.839	51,031	62,290
Total	**1,357,682**	**1,857,700**	**0.731**	**1,358,256**	**1,857,700**	**0.731**	**574**	**0**
Stats NZ Proj	*1,389,600*	*1,857,700*	*0.748*	*1,389,600*	*1,857,700*	*0.748*		
Male-2024								
none	248,354	440,966	0.563	229,647	409,863	0.560	-18,707	-31,103
sch	349,127	504,846	0.692	341,534	498,593	0.685	-7,593	-6,253
ps1-3	178,727	222,929	0.802	123,710	143,076	0.865	-55,017	-79,852
l4-6	347,954	440,666	0.790	373,942	490,170	0.763	25,988	49,504
deg+	292,978	349,993	0.837	348,196	417,697	0.834	55,218	67,704
Total	**1,417,139**	**1,959,400**	**0.723**	**1,417,029**	**1,959,400**	**0.723**	**-110**	**0**
Stats NZ Proj	*1,454,400*	*1,959,400*	*0.742*	*1,454,400*	*1,959,400*	*0.742*		
Female-2014								
none	194,995	474,967	0.411	194,995	474,967	0.411	0	0
sch	293,739	480,665	0.611	293,739	480,665	0.611	0	0
ps1-3	147,376	211,982	0.695	147,376	211,982	0.695	0	0
l4-6	196,490	294,531	0.667	196,490	294,531	0.667	0	0
deg+	320,727	388,956	0.825	320,727	388,956	0.825	0	0
Total	**1,153,327**	**1,851,100**	**0.623**	**1,153,327**	**1,851,100**	**0.623**	**0**	**0**
Stats NZ Proj	*1,155,400*	*1,851,100*	*0.624*	*1,155,400*	*1,851,100*	*0.624*		
Female-2019								
none	212,578	511,605	0.416	200,328	484,153	0.414	-12,251	-27,453
sch	302,414	494,091	0.612	276,963	453,611	0.611	-25,452	-40,480
ps1-3	153,562	221,864	0.692	101,751	146,769	0.693	-51,811	-75,095
l4-6	206,557	312,869	0.660	235,119	362,445	0.649	28,562	49,576
deg+	327,894	405,070	0.809	398,218	498,522	0.799	70,323	93,452
Total	**1,203,005**	**1,945,500**	**0.618**	**1,212,377**	**1,945,500**	**0.623**	**9,372**	**0**
Stats NZ Proj	*1,230,900*	*1,945,500*	*0.633*	*1,230,900*	*1,945,500*	*0.633*		
Female-2024								
none	230,966	553,777	0.417	216,894	523,883	0.414	-14,072	-29,894
sch	313,033	513,330	0.610	285,374	468,595	0.609	-27,659	-44,734
ps1-3	159,185	230,034	0.692	106,110	152,299	0.697	-53,075	-77,735
l4-6	217,423	329,715	0.659	247,067	382,728	0.646	29,645	53,013
deg+	338,309	416,444	0.812	413,680	515,794	0.802	75,371	99,351
Total	**1,258,916**	**2,043,300**	**0.616**	**1,269,125**	**2,043,300**	**0.621**	**10,209**	**0**
Stats NZ Proj	*1,291,200*	*2,043,300*	*0.632*	*1,291,200*	*2,043,300*	*0.632*		

Source: Statistics New Zealand, MBIE

Table 2: Labour Force Projections under Scenario 1 and Scenario 2

In all years the total WAP is the same as that for Statistics New Zealand projections. The composition of qualifications within WAP, however changes from 2014 to 2019 and then remains unchanged to 2024, for both males and females. This has the effect of redistributing the WAP over the LFPRs for each age and gender qualification group.

In the third column, for 2019 and 2024 and both genders, the changes in qualification compositions show increased proportions of higher qualified persons for Scenario 2 over Scenario 1, with corresponding decreases in other qualification levels. In the case of males and females, the ps 1-3 level shows large decreases in WAP. The LFPRs associated with this qualification level for males, at about 0.86, are higher than that for females, at about 0.69. This has the effect of offsetting much of the positive impact of redistribution from "deg+" and "l4-6" qualification levels for males, but not so much for females.

The net impact on the labour supply projections is also shown in the third column of Table 2. Labour supply of males in 2019 (2024) is projected to increase (decrease) by 574 (110) over 2014 levels with no change in working age population. By comparison, labour supply of females in 2019 (2024) is projected to increase by 9,372 (10,209) over 2014 levels with no change in working age population.

6.0 Summary and Discussion of Results

The labour force projections show patterns by age, gender and qualification that reflect cohort and age-specific features of WAPs and LFPRs.

At the age by gender level, the labour force projections relative to a 2013 base, are similar to those of Statistics New Zealand, although a few notable differences are observed. Importantly, in both cases, the 55-79 age groups exhibit similar LFPR growth.

The projected LFPRs by qualification for the 60-64 ages, provide insights into the qualification levels underpinning labour force levels in the face of a falling overall participation rate from 2020, due to ageing. Particularly, most qualification levels increase their propensity to remain in the labour force over the period 2014 to 2024, as they enter the 60-64 age group. The exceptions are degree qualified males and females with no qualifications.

Qualification composition of the WAP changes considerably over time. This study investigated the impact on labour supply projections by assuming a model of evolution of qualification composition of WAP in the period to 2019, based on behaviour observed from 2004 to 2009. Then, the period to 2024 assumed no change in qualification composition from 2019.

When higher qualifications were substituted for lower qualifications, for males, the LFPRs substituted have similar LFPRs to those replaced. Hence there was little net change in labour

supply for males. By comparison, the impact of the composition change for females raised the overall LFPR and therefore labour supply by over 10,000 persons.

Given that these changes occur with no change in actual WAP, they represent estimates of the impact of increase qualification numbers on LFPR and on labour supply at the period around 2020, when LFPRs are expected to decline. The results show that a scenario of higher proportionate growth in "NCEA Level 4 and above" qualifications provides a tangible component to labour supply by 2020. The proviso to this is that new higher qualifications substituted in have higher LFPRs compared with the lower qualifications replaced.

Further development of this work could usefully investigate:

(i) implications for economic growth projections, given the potential for a larger workforce with higher labour productivity, with no increase in the WAP
(ii) the impact of various net migration scenarios for WAP
(iii) other qualification composition scenarios for WAP
(iv) the impact of household composition scenarios on LFPRs.

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Hyperlinks to References

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