CHARACTERISING NEW ZEALAND'S UNDERUTILISED WORKFORCE

EVIDENCE FROM THE HOUSEHOLD LABOUR FORCE SURVEY

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AUTHORS

Christopher Erwin, Kabir Dasgupta and Gail Pacheco

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DISCLAIMER

The results in this paper are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) managed by Statistics NZ.

The opinions, findings, recommendations, and conclusions expressed in this paper are those of the authors, not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation. The results in this paper have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

Note: Labour force figures presented in the appendix of this paper have been rounded to the nearest hundred to protect confidentiality.

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1. INTRODUCTION

The primary research objective of this study is to provide a detailed understanding of the underutilised workforce in New Zealand (NZ). The International Labour Organisation (see Mehran *et al.*, 2008; Statistics New Zealand, 2016a)[1] considers workers to be underutilised if they are unemployed, time-related underemployed (referred to as underemployed hereinafter) or belong to the potential labour force (all three groups are explicitly defined in Section 3). To better understand NZ's underutilised population, we classify our analysis into three research aims:

Aim 1: *Understand social, economic, demographic, and work-related characteristics of underutilised workers in NZ.* This involves a descriptive analysis comparing underutilised workers to those that are fully utilised.[2]

Aim 2: *Explore the transience of underutilisation.* Leveraging the longitudinal nature of the Household Labour Force Survey data, we examine persistence in experiencing underutilisation.

Aim 3: *Identify potential drivers of the duration of underutilisation and unemployment.* We estimate non-linear regressions of underutilisation intensity to examine which household and work characteristics are associated with underemployment and unemployment.

Our primary data source is the Household Labour Force Survey (HLFS), which documents a wide range of individual, household, and work characteristics for a representative sample of NZ's working age population aged 15 and above. Introduced in December 1985, the HLFS is conducted on a quarterly basis and individuals can be included in the survey for a maximum of eight consecutive quarters. We focus on the period June 2016 through June 2018 to take advantage of survey modifications introduced in the redevelopment of the HLFS in 2016 (Statistics New Zealand, 2016b). The modifications were aimed at enhancing the quality and relevance of NZ's labour market information by incorporating new variables such as employer-employee relationship, duration of unemployment spells, and worker preferences for changes to their current employment. Most relevant to our research objective, one of the major changes was the introduction of information to identify the underutilised workforce in NZ. From June 2016 onwards, the survey identifies respondents in three underutilised categories (underemployed, unemployed, and potential labour force) in accordance with the International Labour Organisation (ILO) definition described above.

The remainder of the report proceeds as follows. Section 2 provides the motivation for our research aims. Section 3 describes the HLFS as the primary data source of this study. Sections 4, 5 and 6 present the findings for Aims 1, 2 and 3, respectively. In particular, Section 4.1 provides preliminary findings of the individual and household characteristics of the underutilised workforce in NZ, including an examination of how characteristics vary across different sub-groups of underutilised workers; and Section 4.2 presents a similar analysis focusing on employed individuals' work characteristics. Section 5.1 examines the transience of the underutilised workforce through transition probability matrices, which estimate the likelihood of moving from one employment state to another over time (e.g., moving from underemployed to fully utilised); and Section 5.2 examines the intensity of underutilisation over time. Finally, Section 6 presents multinomial logistic regression results, which identify significant associations between individual characteristics and underutilisation intensity (Section 6.1), as well as unemployment duration (Section 6.2). Section 7 concludes.

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[1] See https://www.ilo.org/global/statistics-and-databases/statistics-overview-and-topics/WCMS_470306/lang--en/index.htm; Accessed on June 4, 2019.
[2] This is defined as employed at time of survey and not wanting additional hours of work.

2. MOTIVATION

Labour underutilisation has large negative implications both at the micro- and macroeconomic level resulting in a substantial loss of human capital, productivity, efficiency and overall well-being (Tsang, 1987; Prause & Dooley, 1997; Dooley, 2003; Dooley & Catalano, 2003; Baum *et al.*, 2009; Rodríguez Hernández, 2018). The three mutually exclusive groups of the workforce that constitute underutilisation include the time-related underemployed, the unemployed, and the potential labour force. While time-related underemployment represents employed individuals who are willing to work for longer hours, potential labour force refers to the section of "extended" labour force consisting of individuals "not in employment who express an interest in this form of work but for whom existing conditions limit their active job search and/or their availability" (Statistics New Zealand, 2016a).[3]

In the academic literature, the majority of past studies have focussed on the unemployed component of underutilisation. For example, it has been well-documented that experiencing long spells of unemployment reduces future earnings and labour market attachment. There are three phenomena that appear to drive this relationship. First, like many other assets, human capital depreciates over time. When a worker is out of the labour market for an extended period, on-the-job skills may decline, as may interviewing or networking skills (Mincer & Ofek, 1982; Acemoglu, 1995; Stratton, 1995). Second, as the length of unemployment increases, job search intensity declines due to worker discouragement resulting from continued failure to acquire suitable jobs (Krueger *et al.*, 2011; Faberman & Kudlyak, 2019). Third, large gaps in employment can send negative signals to employers and therefore adversely affects workers' employability. For instance, there is evidence that employers are often hesitant to hire workers who have experienced a prolonged period of joblessness regardless of their human capital and skills (Eriksson & Rooth, 2011; Ghayad, 2013; Kroft, Lange, & Notowidigdo, 2013). At the macroeconomic level, high rates of unemployment have also been linked to declines in economic growth and productivity (Machin & Manning, 1999; Eliason & Storrie, 2006; Gordo, 2006; Benigno *et al.*, 2015).

Despite its popularity as a labour market performance indicator, estimates of unemployment rates have been subjected to criticism on the grounds that such measures often understate the true extent of labour market challenges and downturns. Several studies have argued that unemployment does not accurately articulate employment hardship and disadvantage, especially for underemployed individuals (Jensen *et al.*, 1999; Mehran *et al.*, 2008; Baum *et al.*, 2009). In response to these concerns, the ILO (see Mehran *et al.*, 2008) discussed the advantages of a supplemental labour market indicator capturing labour underutilisation in a broader sense than unemployment alone. Like unemployment, underemployment also has been found to have similar socio-economic consequences. For instance, in addition to the adverse macroeconomic implications, there is evidence that underemployment negatively affects individuals' mental and psychological well-being (Prause & Dooley, 1997; Dooley, 2003; Dooley & Catalano, 2003).

Given evidence of the large social costs associated with labour underutilisation, our study provides a first look at NZ's underutilised workforce. We compare characteristics of underutilised and fully utilised workers, examine how persistent experiences of underutilisation are, and which individual, household, and work characteristics tend to increase the likelihood of being underutilised. To the best of our knowledge, this is the first study in NZ that explores this population in detail.

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[3] Also see the ILO Glossary of Statistical Terms. Accessed from
https://www.ilo.org/ilostat-files/Documents/Statistical%20Glossary.pdf on June 6, 2019.

3. DATA

This study uses the HLFS, which is administered by Statistics New Zealand (Stats NZ). This is a large-scale, nationally representative survey commonly used to estimate official labour market statistics for NZ. The HLFS is conducted on a quarterly basis and based on a sample of individuals aged 15 and above, belonging to approximately 16,000 households.[4]

The HLFS began incorporating specific details about the underutilised workforce with the redevelopment in April 2016.[5] As such, our analysis is based on nine quarters spanning from June 2016 through June 2018. Collection of income data is also built into the June quarter of the HLFS annually. We use this to incorporate gross household information into our analysis and derive household poverty indicators.

Following the definitions provided by the ILO, an individual is classified as "underutilised" if they are:

1)   *Unemployed* – individuals who are not in employment, and available to work, and actively seeking employment.

2)   *Underemployed* – individuals who are employed, but are willing to work more hours, and are available to do so.

3)   *The potential labour force* – unavailable jobseekers[6] and available potential jobseekers[7].

Together, these three populations form NZ's underutilised workforce. Figure 1 provides a general overview of recent trends in NZ's labour underutilisation rate for the period between June 2016 and June 2018. It presents time trends of both the weighted and unweighted estimates of underutilisation, as well as its three sub-components (unemployed, underemployed and potential labour force).[8] In general, underutilisation has fluctuated between 12 and 13 percent across the sample period, ending at 12.1 percent in June 2018 (unweighted estimate).

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[4] The HLFS-related details are accessed from http://archive.stats.govt.nz. Specific details have been extracted from http://archive.stats.govt.nz/survey-participants/a-z-of-our-surveys/household-labour-force-survey.aspx and http://archive.stats.govt.nz/survey-participants/survey-resources/hlfs-resource.aspx#1.

[5] See 'Overview of key changes' summarised in the Stats NZ website. Accessed from http://archive.stats.govt.nz/browse_for_stats/income-and-work/employment_and_unemployment/improving-labour-market-statistics/hlfs-summary-of-changes-2016/section-1.aspx.

[6] Individuals who are actively seeking work but were not available to have started work in the survey week, and would become available within a short subsequent period.

[7] Individuals who are not actively seeking work but were available in the survey week and want a job.

[8] See Table A 1 in Appendix A for the specific numbers illustrated in Figure 1, and a comparison with official statistics.

Figure 1. Trends in underutilisation rates in NZ
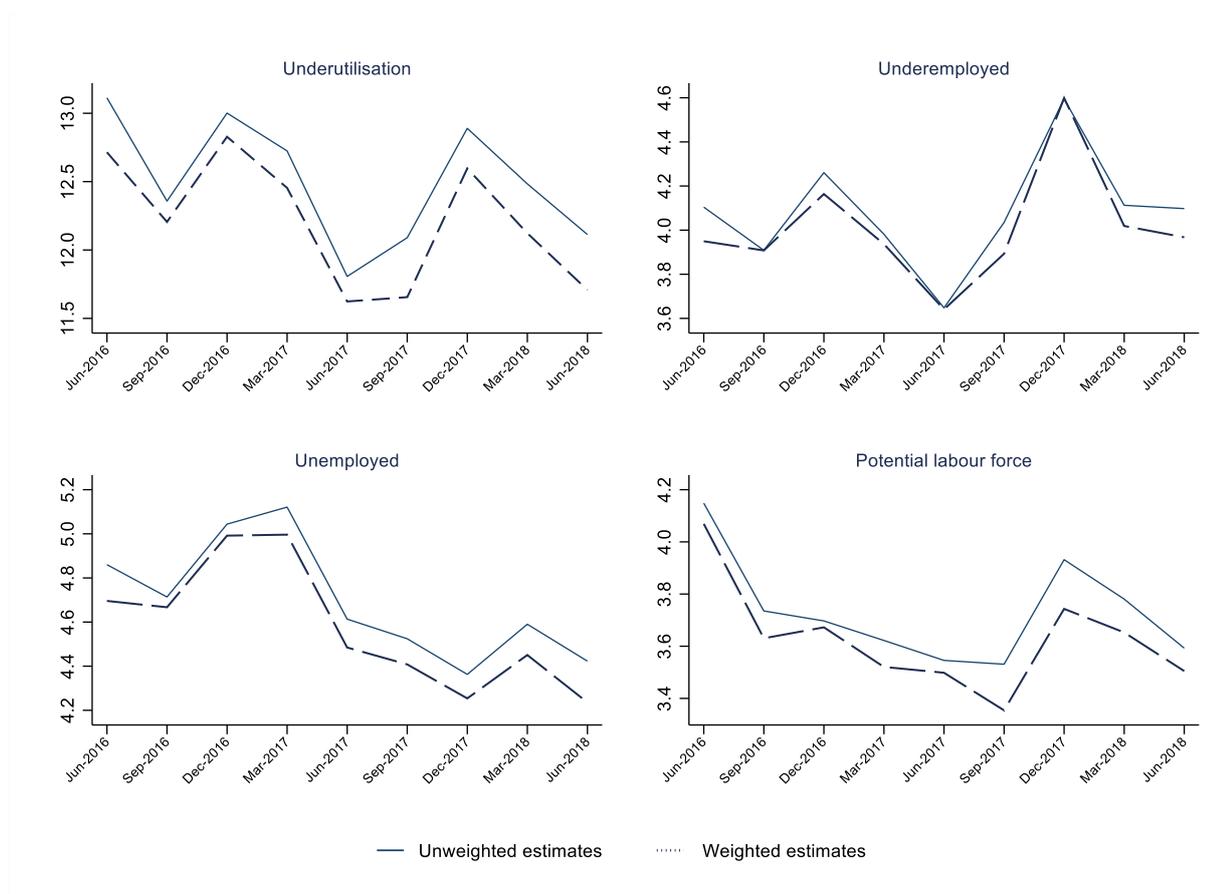
Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

To provide context to the results discussed in the following sections, Table 1 defines the variables used in this study across individual, household and work characteristics.

Table 1. Variable definitions

Characteristic	Definition
Individual and household	
Age	Continuous variable in years. In descriptive statistics age is broken into categories.
Regional council area	Set of 12 dummy variables equal to one if the respondent reported living in the council area, zero otherwise.
Born in NZ	Dummy variable equal to one if reported being born in NZ, zero otherwise.
Female	Dummy variable equal to one if identified as female, zero otherwise.
Household income	Gross weekly household income collected in the June quarter of the HLFS. The OECD-modified equivalence scale is applied. Figures are adjusted for inflation using 2017Q2 as the base period.
Poverty indicator	Dummy variable equal to one if household income is below 60 percent of the sample median household income, zero otherwise.
Household size	Count of total number of people in the household.
Parenthood	Dummy variable equal to one if respondent identified as being in a parenting role, zero otherwise.
Non-prioritised ethnicity	Set of dummy variables equal to one if respondent identified as being of one of the following ethnicities, and zero otherwise: Māori, Pacific Peoples, Asian, MELAA, European, other. Respondents are able to choose multiple ethnicities.
Prioritised ethnicity	Set of dummy variables equal to one if prioritised ethnicity was identified as being one of the following ethnicities, and zero otherwise: Māori, Pacific Peoples, Asian, MELAA, European, other. Respondents are allocated a single ethnicity where the order of priority is in accordance with the list above.
Highest educational attainment	Set of dummy variables indicating the highest educational attainment of the respondent.
Deprivation decile	Based on NZDep2013 deprivation deciles published by the University of Otago. A decile of 1 represents areas with the least deprivation.
Urban / rural	Dummy variable equal to one if the respondent lived in an area classified as urban according to the 2015 classification, zero otherwise.
Years in NZ	Number of years the respondent has lived in NZ if born overseas.
Region of birth	Set of nine dummy variables equal to one if the respondent was born in the following regions, and zero otherwise: Oceania and Antarctica, Northwest Europe, Southern and Eastern Europe, North Africa and the Middle East, Southeast Asia, Northeast Asia, Southern and Central Asia, the Americas, Sub-Saharan Africa.

Table 1. Variable definitions (continued)

Characteristic	Definition
Work	
Holds multiple jobs	Dummy variable equal to one if respondent had more than one job in the week prior to the survey, zero otherwise.
Number of jobs	Count of the number of jobs the respondent held in the week preceding the survey.
Employment status in main job	Employment status in main job (if employed): paid employee, employer, self-employed with no employees, unpaid family worker.
Main occupation	Set of dummy variables equal to one if respondent's main job was in one of the nine 2013 level-1 ANZSCO occupation categories, and zero otherwise.
Main industry	Set of dummy variables equal to one if respondent's main job was in one of the 20 2006 level-1 ANZSIC industry categories, and zero otherwise.
Usual hours per week in all jobs	Hours usually worked each week in all jobs.
Actual hours per week in all jobs	Hours worked in the week preceding the survey in all jobs.
Total number of hours wanted per week	Number of hours of work per week wanted for those who would prefer to work more hours.
Increase in usual hours wanted	[(total number of hours wanted per week – usual hours per week in all jobs) / usual hours per week in all jobs] x 100
Increase in actual hours wanted	[(total number of hours wanted per week – actual hours per week in all jobs) / actual hours per week in all jobs] x 100
Union membership	Dummy variable equal to one if respondent belongs to a union in their main job, and zero otherwise.
Contract type in main job	Set of dummy variables equal to one if respondent's main job had the following contract types, and zero otherwise: permanent, fixed term, project-based, temporary, casual, seasonal.
Underemployment job seeking	Set of dummy variables indicating whether underemployed workers were actively seeking another job, not actively seeking another job, or did not specify, zero otherwise.
Reason for underemployment	Set of dummy variables indicating the main reason the respondent felt they were underemployed.
Available to work more hours	Dummy variable equal to one if underemployed respondents indicated they are available to work more hours, zero otherwise.

4.   RESULTS FOR AIM 1

Aim 1: Understand social, economic, demographic, and work-related characteristics of underutilised workers in NZ.

4.1 Individual and household characteristics

Table 2 presents summary statistics for fully utilised workers and the three sub-groups that comprise underutilised workers (underemployed, unemployed, and potential labour force). The reference group of fully utilised workers is defined as those employed at the time of the survey and not wanting additional hours of work. Descriptive statistics of this group are presented in column 1 of Table 2. Note that Table 2 presents proportions by each labour force state.[9] To provide an alternative perspective, Appendix B (Tables B 1 and B 2) presents the distribution of the four labour force states by individual, household and work characteristics (i.e., rows sum to one). Together, the two approaches allow us to better identify the particular demographic and socio-economic characteristics that are more likely to be associated with underutilisation in NZ.

Columns 2 through 4 of Table 2 present summary statistics for underemployed workers, the unemployed, and those in the potential labour force, respectively. We observe that underutilised workers in general (across all three categories) tend to be significantly younger than fully utilised workers. For example, 19.0 percent of the underemployed workforce are aged 15-19, while the share of the unemployed in this same age group is 23.1 percent and the share of the potential labour force is 29.4 percent. In contrast, only 3.9 percent of fully utilised workers are aged 15-19. Comparing each of the three underutilised groups with fully utilised workers, the differences in all sample proportions across the age distribution are statistically different from zero at the 1 percent significance level. Age differences observed in Table 2 could be driven by several factors, including the types of occupations and industries that younger workers tend to be employed in, lower experience levels, academic responsibilities, or lower qualifications (Ruiz-Quintanilla & Claes, 1996; Baum *et al.*, 2003; Wilkins, 2004).

Table 2 also suggests that that women are more likely to be underutilised in NZ compared to men, especially for those identifying as underemployed. More specifically, almost 70 percent of all workers identifying as underemployed in the HLFS are women, compared to approximately half of fully utilised workers. Further, women account for 58.3 percent of all individuals in the potential labour force.[10]

Additionally, on average, those in the underutilised workforce tend to be less educated. For example, the percentage of fully utilised workers with at least a bachelor's degree is 32 percent, whereas percentages

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[9] Since we estimate the proportions by each of the four labour force states, for individual characteristics that are classified into multiple categories such as age group or regional council area, the proportions in each individual column in Table 2 sum to one.

[10] It is reasonable to question whether the gendered nature of underutilisation is caused by the gendered nature of work in NZ. Although we cannot ascertain from this analysis or data whether there is a causal relationship between the two, we do note that certain industries have a higher prevalence of women as well as labour underutilisation. For example, according to an infographic from Stats NZ (2018), "Women in the workforce 2017" found that two of the most common industries where women work are health care and social assistance and education and training. Table 3 shows that over 25 percent of all underemployed workers in the HLFS report working in one of these two industries.

for underemployed, unemployed, and the potential labour force are 21, 16, and 14 percent, respectively. With respect to economic status, underutilised workers are also more likely to live in poverty. The poverty rate for fully utilised workers is 8.6 percent, while the share of the unemployed living in poverty is 47.4 percent. Table 2 also suggests that underutilised workers are more likely to have been born in NZ.

Another important takeaway from Table 2 is that we observe significantly larger household sizes for underutilised workers. However, underutilised individuals appear to be less likely to be parents compared to fully utilised workers. This is likely explained by the relatively young age-profiles of the underutilised group. Further, classifying the parents' sample by sex, although the proportions of fathers and mothers in the fully utilised group are marginally different (22.9 percent versus 21.3 percent, respectively), mothers have comparatively higher proportions (than fathers) across all three classifications of underutilisation. With respect to ethnicity, underutilised workers are less likely to be European, and significantly more likely to identify as Māori or Pacific Peoples.

Table 2. Individual and household characteristics

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Age group				
15 − 19	0.039	0.190***	0.231***	0.294***
20 − 24	0.070	0.132***	0.152***	0.112***
25 − 34	0.186	0.153***	0.189	0.135***
35 − 44	0.204	0.161***	0.143***	0.116***
45 − 54	0.229	0.183***	0.147***	0.120***
55 − 64	0.193	0.145***	0.118***	0.121***
65 and over	0.079	0.036***	0.019***	0.101***
Regional council area				
Northland	0.026	0.032***	0.040***	0.038***
Auckland	0.310	0.235***	0.294***	0.291***
Waikato	0.104	0.110*	0.106	0.103
Bay of Plenty	0.055	0.069***	0.064***	0.060**
Gisborne / Hawke's Bay	0.046	0.050	0.066***	0.069***
Taranaki	0.028	0.036***	0.034***	0.030
Manuwatu / Wanganui	0.050	0.080***	0.065***	0.077***
Wellington	0.129	0.117***	0.124**	0.107***
Nelson / Tasman / Marlborough / West Coast	0.039	0.051***	0.030***	0.039
Canterbury	0.141	0.135	0.110***	0.119***
Otago	0.050	0.055*	0.045	0.047
Southland	0.022	0.030***	0.023	0.019

Table 2. Individual and household characteristics (continued)

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Born in NZ	0.714	0.740***	0.733***	0.742***
Female	0.503	0.695***	0.526***	0.583***
Household income	1,254.11 (821.96)	840.35*** (630.30)	599.49*** (590.89)	661.61*** (546.62)
Poverty indicator✓	0.086	0.263***	0.474***	0.396***
Household size	3.122 (1.454)	3.391*** (1.498)	3.507*** (1.689)	3.507*** (1.703)
Parenthood	0.442	0.395***	0.321***	0.300***
Female	0.229	0.327***	0.219**	0.238*
Male	0.213	0.068***	0.102***	0.062***
Non-prioritised ethnicity				
European	0.756	0.716***	0.574***	0.628***
Māori	0.109	0.175***	0.268***	0.230***
Pacific Peoples	0.056	0.065***	0.124***	0.104***
Asian	0.122	0.124	0.130**	0.124
MELAA	0.010	0.014***	0.021***	0.014***
Other	0.016	0.019*	0.019**	0.018
Prioritised ethnicity				
European	0.697	0.621***	0.464***	0.454***
Māori	0.109	0.175***	0.268***	0.230***
Pacific Peoples	0.052	0.055	0.108***	0.089***
Asian	0.119	0.120	0.124	0.117
MELAA	0.010	0.014***	0.019***	0.014***
Other	0.015	0.017	0.017	0.016
Highest educational attainment				
Doctorate	0.010	0.004***	0.004***	0.004***
Masters	0.042	0.031***	0.026***	0.020***
Bachelor's	0.265	0.170***	0.129***	0.115***
Post-school	0.460	0.527***	0.491***	0.440**
School	0.077	0.091***	0.102***	0.126***
No qualification	0.126	0.150***	0.223***	0.276***

Table 2. Individual and household characteristics (continued)

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Deprivation decile	5.323 (2.775)	6.039*** (2.780)	6.676*** (2.803)	6.423*** (2.866)
Urban / rural				
Main urban areas	0.795	0.768***	0.815***	0.800
Secondary urban areas	0.050	0.063***	0.046	0.052
Minor urban areas	0.063	0.086***	0.076***	0.074***
Rural centres	0.009	0.012**	0.013***	0.011
Rural areas	0.083	0.071***	0.050***	0.063***
Years in NZ	18.674 (14.686)	15.773*** (13.689)	14.804*** (12.912)	17.175** (15.500)
Region of birth				
Oceania and Antarctica	0.770	0.789***	0.801***	0.808***
Northwest Europe	0.081	0.062***	0.043***	0.055***
Southern and Eastern Europe	0.008	0.009	0.007	0.004***
North Africa and the Middle East	0.003	0.005***	0.011***	0.008***
Southeast Asia	0.029	0.029	0.032	0.029
Northeast Asia	0.033	0.034	0.033	0.033
Southern and Central Asia	0.036	0.035	0.037	0.029***
The Americas	0.014	0.017*	0.012**	0.008***
Sub-Saharan Africa	0.025	0.021***	0.024	0.026
Observations	134,802	7,617	8,754	6,957

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: Standard deviations are presented in parentheses. *, **, and *** denote statistically significant differences between variable means compared with the fully utilised population (column 1) at the 10, 5, and 1 percent-levels, respectively. Definitions of each variable can be found in Table 1. Gross weekly household income is sourced from the June quarter of the HLFS. The OECD-modified equivalence scale is applied. Household income estimates are adjusted for inflation using the second quarter of 2017 as the base period.

✓ Poverty thresholds are traditionally estimated using disposable household income (net of taxes). However, since the data only provides information on gross household income, our poverty indicator (60% of median income threshold) is computed using gross household income estimates.

4.2 Work characteristics

Table 3 presents work characteristics of the fully utilised and underutilised survey respondents. Since, by definition, unemployed persons and those in the potential labour force do not hold jobs at the time of the survey, we focus on comparing job characteristics of the underemployed to fully utilised workers. For additional insight, we classify the fully utilised workers into full-time workers and part-time workers because work-related characteristics (such as occupations and industries) may vary between the two groups. We also present descriptive statistics on last reported occupation and industry for all three categories of underutilised workers in Appendix C.[11]

Several important differences between fully utilised and underemployed workers emerge in Table 3. Underemployed workers (and fully utilised part-time workers) are significantly more likely to hold multiple jobs compared to fully utilised full-time workers (7.5 percent versus 4.7 percent, respectively). Compared to fully utilised full-time workers, underemployed individuals are more likely to be self-employed and less likely to be employers themselves.

An important part of understanding worker underutilisation comes from analysing current occupations and industries in main jobs. Occupations are categorised according to the one-digit Australia and New Zealand Standard Classification of Occupations (ANZSCO) codes, while industries are categorised according to Australia and New Zealand Standard Industrial Classification (ANZSIC) codes. Survey results suggest that fully utilised and underemployed workers take on very different roles in New Zealand's labour market. Underemployed workers are significantly more likely to be community and personal service workers, work in sales, and to be labourers relative to fully utilised full-time workers. Conversely, fully utilised full-time workers are more prevalent in managerial, professional, and technical and trade positions. With respect to industry characteristics, underemployed workers are substantially more likely (relative to fully utilised full-time workers) to work in retail; accommodation and food services; administrative and support services; education; and health care. In comparison to the reference group, underemployed workers are also less likely to belong to a union and hold permanent or fixed term positions.

Respondents in the HLFS are also asked how many hours they *usually* work in a given week and how many hours they *actually* worked in the week prior to the survey. As a corollary to these questions, workers who identified as underemployed were asked how many total hours they would like to work in a typical week. We use these responses to compare the *usual*, as well as the *actual*, working hours of fully utilised and underemployed workers. On average, fully utilised full-time respondents *usually* worked more than two and half times as many hours as the underemployed (41 to 15 hours, respectively).

Another way to assess underemployed workers' demand for additional hours is to consider the ratio of total wanted hours to usual hours, and to actual hours worked. The average ratios are also reported in Table 3. The survey indicates that underemployed workers, on average, desire 1.6 times as many hours as they usually work in each week. This means a hypothetical underemployed respondent working 15 hours per week would, on average, prefer to work 24 hours per week. As a caveat, we point out the large standard deviations of these measures, which occurs because of the outliers in both tails of the distribution.

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[11] The tables in Appendix C are based on individuals who provided prior employment information in the HLFS, or individuals who were observed to be employed in previous HLFS waves and hence whose prior employment status can be supplemented with lagged information.

In addition, to total desired hours per week, the HLFS includes two other questions specifically designed to better understand underemployed workers in NZ. The first asks whether underemployed respondents are actively seeking employment. Over the study period, 57.8 percent of the underemployed reported they were actively seeking additional employment. The second question documents the main reason for their underemployment. Four responses were dominant: not enough work available (59.5 percent); other reasons (13.5 percent); studying or training (11.8 percent); and other family responsibilities (7.3 percent). Because responses to this question are central to understanding the causes of underutilisation in NZ, we further disaggregate responses in Table 4 by gender and age group.

Table 4 illustrates clear gender and age differences. For instance, women are four times more likely than men to cite *difficulty in finding suitable childcare* as the reason for underemployment (4.1 versus 1.1 percent). Similarly, this reason and *other family responsibilities* are more common amongst the 25-44 age bracket relative to older age groups. Importantly, regardless of gender or age, the majority of underemployed workers cited *lack of available work* as the main reason behind their underemployment.

Table 3. Work characteristics

Characteristic	Fully utilised, full-time	Fully utilised, part-time	Under-employed
	(1)	(2)	(3)
Holds multiple jobs	0.047	0.072***	0.075***
Number of jobs	1.052	1.082***	1.082***
Employment status in main job			
Paid employee	0.856	0.737***	0.830
Employer	0.052	0.051	0.012***
Self-employed with no employees	0.090	0.179***	0.143***
Unpaid family worker	0.002	0.032***	0.015***
Main occupation			
Manager	0.197	0.120***	0.065***
Professional	0.262	0.203***	0.144***
Technicians and trades workers	0.135	0.065***	0.071***
Community and personal service workers	0.071	0.148***	0.212***
Clerical and administrative workers	0.123	0.157***	0.097***
Sales workers	0.068	0.134***	0.170***
Machinery operators and drivers	0.055	0.032***	0.036***
Labourers	0.083	0.135***	0.198***
Residual categories	0.006	0.008	0.007

Table 3. Work characteristics (continued)

Characteristic	Fully utilised, full-time	Fully utilised, part-time	Under-employed
	(1)	(2)	(3)
Main industry			
Agriculture, forestry, and fishing	0.042	0.064***	0.030***
Mining	0.002	0.0003***	0.0003***
Manufacturing	0.115	0.043***	0.044***
Electricity, gas, water, and waste services	0.011	0.003***	0.002***
Construction	0.102	0.045***	0.027***
Wholesale trade	0.051	0.022***	0.021***
Retail trade	0.081	0.129***	0.149***
Accommodation and food services	0.036	0.098***	0.155***
Transport, postal, and warehousing	0.040	0.032**	0.033**
Information media and telecommunications	0.018	0.012***	0.014**
Financial and insurance services	0.034	0.017***	0.007**
Rental, hiring, and real estate services	0.018	0.028***	0.012***
Professional, scientific, and technical services	0.097	0.067***	0.050***
Administrative and support services	0.028	0.049***	0.073***
Public administration and safety	0.077	0.021***	0.020***
Education and training	0.083	0.124***	0.127***
Health care and social assistance	0.107	0.150***	0.137***
Arts and recreation services	0.013	0.033***	0.034***
Other services	0.038	0.050***	0.053***
Not classified elsewhere	0.009	0.014***	0.013***
Contract type in main job			
Permanent	0.957	0.812***	0.714***
Fixed term	0.590	0.311***	0.256***
Project-based	0.184	0.107**	0.145
Temporary	0.094	0.091	0.086
Casual	0.396	0.725	0.799
Seasonal	0.015	0.027	0.050
Union membership	0.184	0.112***	0.094***
Usual hours per week in all jobs	40.971 (5.238)	16.224*** (7.513)	15.334*** (7.502)
Actual hours per week in all jobs (last week)	36.850 (13.060)	14.783*** (9.927)	15.133*** (9.651)
Total number of hours wanted per week	-	-	30.525 (10.597)

Table 3. Work characteristics (continued)

Characteristic	Fully utilised, full-time	Fully utilised, part-time	Under-employed
	(1)	(2)	(3)
Increase in usual hours wanted (percent)	-	-	160.57 (264.25)
Increase in actual hours wanted (percent)	-	-	181.21 (304.07)
Underemployment job seeking			
Actively seeking	-	-	0.578
Not actively seeking	-	-	0.414
Seeking not specified	-	-	0.008
Reason for underemployment			
Difficulty finding suitable childcare	-	-	0.032
Other family responsibilities	-	-	0.073
Own sickness/illness/disability	-	-	0.034
Studying or training	-	-	0.118
Not enough work available	-	-	0.595
Weather conditions	-	-	0.008
Other reason	-	-	0.135
Available to work more hours	-	-	1.000
Observations	107,898	26,904	7,617

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: Standard deviations are presented in parentheses. *, **, and *** denote statistically significant differences between variable means compared with the fully utilised working age population (column 1) at the 10, 5, and 1 percent-levels, respectively. Definitions of each variable can be found in Table 1. Occupations are categorised according to 2013 level 1 ANZSCO codes from Stats NZ. Industries are categorised according to 2006 level 1 ANZSIC codes from Stats NZ.

Table 4. Reason for underemployment by gender and age

	All	Women	Men	15-24	25-44	45-64	65+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reason for underemployment							
Difficulty finding suitable childcare	0.032	0.041	0.011	0.008	0.074	0.018	0.004
Other family responsibilities	0.073	0.093	0.028	0.012	0.140	0.075	0.014
Own sickness/illness/disability	0.034	0.031	0.039	0.011	0.042	0.049	0.025
Studying or training	0.118	0.098	0.161	0.299	0.050	0.017	0.004
Not enough work available	0.595	0.590	0.608	0.545	0.561	0.662	0.736
Weather conditions	0.008	0.003	0.020	0.006	0.007	0.012	0.007
Other reason	0.135	0.139	0.125	0.115	0.120	0.161	0.196
Observations	7,617	5,292	2,325	2,451	2,391	2,499	276

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

5.   RESULTS FOR AIM 2

Aim 2: Explore the transience of underutilisation.

5.1 Transience of underutilised workers

Next, we explore how transient the underutilised workforce is. Specifically, we attempt to answer the following questions:

1)   Do workers frequently move in and out of underemployment?

2)   How likely are fully utilised workers to still be fully utilised the next time they are observed?

To provide insights into these queries, we construct a transition probability matrix. In particular, Table 5 presents the proportions of individuals in each of the four labour market states (i.e., underemployed, unemployed, potential labour force, or fully utilised) in quarter QTR_{t+1}, given the respondent's labour market state in the previous quarter, QTR_t. The matrix is constructed using 100,890 observations, which is based on respondents with at least two successive observations in the HLFS over the study period.

Of particular interest in Table 5 are the estimates on the downward diagonal. These proportions can be interpreted as approximate measures of state dependence, i.e., the likelihood of remaining in a particular labour market state in the successive quarter. As shown in Table 5, NZ workers exhibit strong quarter-to-quarter state dependence. Workers reporting underemployment in a given quarter have a 41.6 percent likelihood of remaining so in the following quarter. The proportions for the unemployed and the potential labour force are similar in magnitude (47.2 percent and 42.4 percent, respectively). Fully utilised workers are highly stable from quarter-to-quarter, experiencing a 96.0 percent likelihood of remaining fully utilised in the next quarter, conditional on currently being fully utilised.

Despite strong quarter-to-quarter state dependence, Table 5 indicates there is a higher probability of underutilised workers moving to a state of being fully utilised in the short-run. Around half of the individuals who reported to be underemployed in a particular quarter became fully utilised in the subsequent quarter. Additionally, 28.1 percent of the unemployed become fully utilised in the following quarter.

Further, unemployed persons in the current quarter have an 8.1 percent likelihood of being underemployed by the next quarter (which may be considered an overall improvement in their labour force status). For those in the potential labour force, there is a 30.0 percent probability they join the labour force in the next quarter but are unable to find work, and a 22.2 percent likelihood of being fully utilised in the next quarter.

Table 5. One-quarter transition matrix

		QTR_{t+1}			
	State	Underemployed	Unemployed	Potential labour force	Fully utilised
QTR_t	Underemployed	0.416 (1,977)	0.047 (222)	0.032 (156)	0.504 (2,394)
	Unemployed	0.081 (384)	0.472 (2,253)	0.167 (795)	0.281 (1,344)
	Potential labour force	0.054 (180)	0.300 (1,003)	0.424 (1,413)	0.222 (744)
	Fully utilised	0.023 (2,028)	0.010 (897)	0.007 (594)	0.960 (84,510)

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: The above figures are produced using information from 100,890 observations, which is based on respondents with at least two successive observations in the HLFS over the study period. Within-cell observation counts are presented in parentheses.

When we incorporate a longer-term perspective by looking at a full year forward, there are substantially higher levels of mobility out of underutilisation into full utilisation. Table 6 presents a transition probability matrix of underutilisation looking one year ahead, rather than one quarter ahead (as presented in Table 5). Here we see that, conditional on reporting underemployment in the current year, the likelihood of remaining underemployed one year later is quite low (6.7 percent). This reduction in state dependence is a result of workers having a high probability of being able to move to the state of full utilisation one year later, estimated to be 84.8 percent. The same dynamic is also seen among unemployed individuals and those in the potential labour force: state dependence for both labour force states declines over time, and the likelihood of being fully utilised is significantly higher at 71.2 percent and 67.5 percent, respectively. There is still strong state dependence for fully utilised workers looking one year in the future.

Table 6. One-year transition matrix

		YR_{t+1}			
	State	Underemployed	Unemployed	Potential labour force	Fully utilised
YR_t	Underemployed	0.067	0.049	0.034	0.848
	Unemployed	0.068	0.134	0.088	0.712
	Potential labour force	0.069	0.152	0.104	0.675
	Fully utilised	0.039	0.026	0.018	0.916

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: The above figures are produced using information from 100,890 observations, which is based on respondents with at least two successive observations in the HLFS over the study period. This matrix is constructed by exponentiating the one-step probability matrix, so it is necessarily based on the same cell counts as in Table 5 (which are not shown for brevity sake).

Together, Tables 5 and 6 characterise underemployment as a short-run phenomenon: from quarter-to-quarter, the underemployed have a 50 percent probability of moving into full utilisation. Over a longer time horizon of a year, the probability increases to 85 percent. Further, evidence from both tables indicate that once individuals are fully utilised, they have a high probability of remaining in that state. These labour market features are further investigated in the following section, where we examine the percentage of time that survey respondents spend underutilised (and fully utilised) over their observed time in the HLFS.

5.2 Intensity of underutilisation over time

For further understanding of transience among the underutilised population, we examine the intensity of underutilisation (all three classifications combined) by following a cohort of individuals over time. Specifically, we start by considering a subsample of HLFS respondents that were included in the 2016 Q2 (first) survey wave, and then calculate the proportion of this cohort that fall into different levels of underutilisation intensity at each follow-up until respondents left the survey. There is a maximum of seven follow-up quarters, ranging from 2016 Q3 to 2018 Q1. We calculate the proportion of the cohort that reported underutilisation in at least half of their survey responses (≥ 50 %), the proportion that reported underutilisation in less than half of their survey responses (< 50 %), and the proportion that reported full utilisation in at least half of their survey responses in each quarter. Table 7 presents this information in tabular form. If underutilisation in the NZ workforce is indeed a short-run phenomenon, then we would expect to see the proportion of respondents reporting high intensity underutilisation to decrease as their time spent in the survey increases. This is exactly what we find in Table 7.

To interpret Table 7 estimates, it is important to note that at the first quarter following 2016 Q2, the three reported categories (i.e., underutilised for 100% of the time, underutilised for 50% of the time and fully utilised for 100% of the time) are mutually exclusive and exhaustive: the sum of the respective proportions is one. For the following surveys thereafter (i.e., 2016 Q4 onwards), the proportion of fully

utilised for at least half of the time observed is the same as being underutilised for less than half of the time observed. This is evident in the estimates presented in Table 7.

From the second-quarter follow-ups (2016 Q4) to the seventh-quarter follow-ups (2018 Q1), the proportion of respondents reporting they had spent at least half the time being underutilised decreased from 8.7 percent to 5.8 percent, supporting the notion that underutilisation rates decrease within two years of initially reporting underutilisation in NZ.

The descriptive statistics presented thus far are key to developing a basic sense of who belongs to each underutilised group in NZ. However, more reliable associations can be explored by predicting worker outcomes using regression techniques, which simultaneously consider a wide range of relevant individual, household, and work characteristics of the individual respondents. Section 6 embraces such techniques, providing a deeper understanding of the associations between respondent backgrounds, family experiences, and labour market histories with the likelihood of underutilisation for NZ.

Table 7. Underutilisation intensity over time

Labour force status		2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1
Underutilised (2016 Q2)		= 100% 0.078	≥ 50% 0.087	≥ 50% 0.087	≥ 50% 0.058	≥ 50% 0.058	≥ 50% 0.054	≥ 50% 0.058
		= 50% 0.073	< 50% 0.913	< 50% 0.913	< 50% 0.942	< 50% 0.942	< 50% 0.947	< 50% 0.942
Fully utilised (2016 Q2)		= 100% 0.849	≥ 50% 0.913	≥ 50% 0.913	≥ 50% 0.942	≥ 50% 0.942	≥ 50% 0.947	≥ 50% 0.942
Unique sample individuals		10,812	7,443	5,025	3,234	2,097	1,197	522

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

6.   RESULTS FOR AIM 3

Aim 3: Identify potential drivers of the duration of underutilisation and unemployment.

6.1 Regression analysis of underutilisation intensity

For our final research aim, we begin by estimating a multinomial logistic regression to examine potential drivers of underutilisation intensity. This model setup is appropriate when outcomes are categorical and have no natural ordering to them. Based on samples defined in Table 8, we create our dependent variable, $Under_i$, which takes on a value of zero for fully utilised workers (the base outcome), a value of one for workers who spend less than 50 percent of their time underutilised, and a value of two for workers who spend at least 50 percent of their time underutilised.

Table 8. Overview of regression analysis samples

Variable	Observations
Panel A: Underutilisation intensity	
Low-intensity (< 50% of time)	2,580
High-intensity (≥ 50% of time)	6,285
Fully utilised	28,752
Total	37,617
Panel B: Unemployment spell in survey	
Short-term (< 1 month)	939
Medium-term (between 1 and 12 months)	2,346
Long-term (> 12 months)	681
Total (including fully utilised)	32,721

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

The model set-up is as follows:

$$\frac{P(under_i = underutilised < 50\% \text{ of time})}{P(under_i = fully\ utilised)} = (X_i = x_i)\beta \quad (1)$$

$$\frac{P(under_i = underutilised \geq 50\% \text{ of time})}{P(under_i = fully\ utilised)} = (X_i = x_i)\beta \quad (2)$$

where X_i is a vector of individual characteristics (including socio-demographic, economic and household attributes), x_i is the value characteristics take on, and β is a vector of estimated coefficients.

Associations between characteristics and underutilisation intensity outcomes are presented as relative risk ratios. To interpret these findings:

Relative risk ratios greater than 1 reflect a factor that is associated with an increase in the likelihood of being in a certain intensity-specific category of underutilised relative to being fully utilised. For instance, in the low-intensity underutilisation model (equation 1), female has a relative risk ratio of 1.871 – this indicates that females are 87.1 percent more likely to experience low-intensity underutilisation than their male counterparts, holding all other factors constant. This result is relative to being fully utilised.

Relative risk ratios below 1 reflect a factor that is associated with a decline in the likelihood of being in a certain intensity-specific category of underutilised relative to being fully utilised. For instance, in the high-intensity underutilisation model (equation 2), holding a bachelor's degree has a relative risk ratio of 0.365 – this indicates that degree-holders are 36.5 percent as likely as non-degree-holders to experience high-intensity underutilisation, holding all other factors constant. This result is relative to being fully utilised.

Asterisks provided next to each risk ratio indicate the statistical significance of the result, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Table 9 presents regression results for underutilisation intensity outcomes.[12] Note that all results are interpreted relative to the base outcome of full utilisation.[13] Results show a U-shaped relationship between age and underutilisation: the likelihood of underutilisation initially decreases with age, before increasing at later years. Being a woman is positively and significantly associated with the likelihood of being underutilised relative to men. Workers in larger households are more likely to experience both low- and high-intensity underutilisation. Respondents identifying as Māori are 75.5 percent more likely to experience high-intensity underutilisation compared to Europeans. For Pacific Peoples, this increase is estimated to be 34.5 percent. Education and neighbourhood characteristics are also found to be strong predictors of underutilisation. For example, compared to no schooling, having school-level or higher educational attainment is associated with a lower likelihood of underutilisation, and areas with higher

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[12] Note that the inclusion of age-squared in addition to the age variable is in accordance with the Mincer earnings equation which models labour market earnings as a quadratic function of experience/age (see Heckman, Lochner, & Todd, 2006). Age is commonly treated as an indicator of labour market experience. The economic intuition behind this is that although earnings are positively related to individuals' experience, during initial labour market years earnings increase at an increasing rate and at a decreasing rate after a certain point in time as workers grow older. Going by the standard approach, we expect that underutilisation (another labour market outcome) is likely to follow a similar trajectory to that of labour market earnings.

[13] Table 9 results are for underutilisation in general, see Appendix D for results focussed on underemployment.

levels of deprivation, along with urban areas, have higher rates of underutilisation. Overall, our regression results substantiate the descriptive evidence presented in Table 2.

Table 9. Multinomial logistic model of underutilisation intensity

Reference group: Fully utilised workers	Relative risk ratio (standard error)	
	Underutilised < 50%	Underutilised ≥ 50%
	(1)	(2)
Age	0.855*** (0.008)	0.803*** (0.006)
Age^2	1.002*** (< 0.001)	1.002*** (< 0.001)
Female	1.871*** (0.081)	1.811*** (0.056)
Household size	1.060*** (0.017)	1.031** (0.012)
Parent	1.163*** (0.065)	1.096** (0.046)
Prioritised ethnicity (Base category: European)		
Māori	1.052 (0.072)	1.755*** (0.075)
Pacific Peoples	1.058 (0.104)	1.345*** (0.086)
Asian	1.281*** (0.087)	1.500*** (0.078)
MELAA	1.882*** (0.328)	2.129*** (0.290)
Other	0.710 (0.149)	1.410*** (0.175)
Highest educational attainment (Base category: No qualification)		
Doctorate	0.618* (0.163)	0.310*** (0.074)
Master's	0.794* (0.103)	0.514*** (0.051)
Bachelor's	0.701*** (0.053)	0.365*** (0.020)
Post-school	0.897* (0.058)	0.636*** (0.026)
School	0.996 (0.087)	0.728*** (0.042)
Deprivation decile	1.005 (0.008)	1.093*** (0.007)
Urban	1.051 (0.081)	1.205*** (0.072)
Territorial Authority fixed effects	✓	
Observations	36,369	

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: The covariates are from the first survey wave that each individual is observed in the HLFS. The regression sample size is slightly lower than the total sample size reported in Panel A of Table 8 due to missing data on covariates. Definitions of each variable can be found in Table 1.

6.2 Regression analysis of unemployment duration

To examine the potential drivers of unemployment, classified by durations of joblessness, we estimate an additional multinomial logistic regression. This model is similar to that represented by equations (1) and (2), and again uses the fully utilised workforce as the base outcome. Table 10 presents regression results for three categories of unemployment duration (short-, medium- and long-term). Consistent with ILO's classification (ILO, 2012), short-term and long-term unemployment are defined as unemployment for less than a month and for a year or more, respectively. Medium-term unemployment pertains to unemployment for a period between 1 and 12 months.

Similar to the results for underutilisation (Table 9), Table 10 shows a negative and non-linear relationship between age and short- and medium-term unemployment. However, there is no evidence of a significant relationship between long-term unemployment and age. Women are between 40.9 and 50.8 percent more likely to experience an unemployment spell of a year or less, relative to men. Estimates indicate no statistically significant relationship between gender and long-term unemployment. Additionally, with respect to parenting roles, we do not observe statistically significant association with any of the three unemployment categories. However, larger households are less likely to experience an unemployment spell lasting longer than one year. The point estimate on household size suggests that for each additional member added to the household, the likelihood of experiencing long-term unemployment decreases by approximately 8.5 percent.[14]

We note strong relationships between ethnicity, education, and unemployment spells. Compared to Europeans, every prioritised ethnicity has a higher likelihood of experiencing unemployment of any duration. Māori are 2.5 times as likely than Europeans to experience an unemployment spell longer than one year. For Pacific Peoples, the increased risk of long-term unemployment is 90.1 percent. Those reported as being Middle Eastern, Latin American, or African (MELAA) are over three times as likely to experience long-term unemployment relative to Europeans. Asian respondents are 69.7 percent more likely to experience long-term unemployment relative to Europeans.

Schooling is also highly predictive of unemployment spells, with higher levels of education generally reducing the risk of unemployment. The odds of experiencing long-term unemployment decrease significantly when any type of education qualification is held. For example, workers holding a bachelor's degree are estimated to be 22.3 percent as likely to experience long-term unemployment compared to a worker with no credential.

Neighbourhood characteristics are strongly associated with unemployment spells. A one-unit increase in the deprivation decile increases the risk of a long-term unemployment spell by 22.6 percent. Those living in urban environments have a 46.8 percent higher risk of medium-term unemployment compared to those living in rural areas. However, the models detect no statistically significant relationship between urbanicity and short- or long-term unemployment.

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[14] This number is found by taking the inverse of the relative risk ratio (1 / .922 = 1.0846).

Table 10. Multinomial logistic model of unemployment duration

Reference group: Fully utilised workers	Relative risk ratio (standard error)		
	Unemployed (Short-term)	Unemployed (Medium-term)	Unemployed (Long-term)
	(1)	(2)	(3)
Age	0.808*** (0.013)	0.808*** (0.009)	0.989 (0.017)
Age^2	1.002*** (< 0.001)	1.002*** (< 0.001)	1.000 (< 0.001)
Female	1.508*** (0.105)	1.409*** (0.065)	1.103 (0.089)
Household size	1.038 (0.026)	1.028 (0.018)	0.922** (0.032)
Parent	1.059 (0.104)	1.055 (0.069)	0.859 (0.091)
Prioritised ethnicity (Base category: European)			
Māori	1.578*** (0.152)	2.123*** (0.128)	2.509*** (0.250)
Pacific Peoples	1.556*** (0.210)	1.732*** (0.158)	1.901*** (0.293)
Asian	1.666*** (0.178)	1.619*** (0.122)	1.697*** (0.246)
MELAA	2.451*** (0.634)	2.391*** (0.451)	3.140*** (0.966)
Other	0.612 (0.254)	1.290 (0.261)	2.086*** (0.563)
Highest educational attainment (Base category: No qualification)			
Doctorate	0.229** (0.164)	0.465** (0.152)	0.112** (0.113)
Master's	0.414*** (0.102)	0.453*** (0.072)	0.517*** (0.122)
Bachelor's	0.380*** (0.047)	0.362*** (0.030)	0.223*** (0.035)
Post-school	0.596*** (0.055)	0.595*** (0.036)	0.559*** (0.056)
School	0.634*** (0.086)	0.809** (0.069)	0.631*** (0.097)
Deprivation decile	1.035*** (0.014)	1.075*** (0.010)	1.226*** (0.023)
Urban	1.211 (0.179)	1.468*** (0.147)	1.058 (0.165)
Territorial Authority fixed effects	✓		
Observations	31,620		

Source: HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: Covariates are from the first survey wave that each individual is observed in the HLFS. The regression sample size is slightly lower than the total sample size reported in Panel B of Table 8 due to missing data on covariates. Definitions of each variable can be found in Table 1. Short-term, medium-term, and long-term unemployment are defined as individuals reported to be unemployed for: less than a month, between 1 and 12 months and more than 12 months, respectively.

7. CONCLUSION

This study uses HLFS data (over the period June 2016 – 2018) to provide a detailed examination of the underutilised workforce in NZ. We employ the ILO definition of underutilisation, which includes individuals who are unemployed, time-related underemployed and those who belong to the potential labour force. We address three research aims: to understand the socio-economic and work-related characteristics of underutilised workers; to explore the transience of underutilisation; and to identify potential drivers of underutilisation intensity and unemployment duration.

With respect to our first research aim, we find significant differences between fully utilised and underutilised workers. We observe that underutilised workers (across all three sub-groups) tend to be significantly younger and female. For example, close to one-third of underemployed are aged 15-24; and nearly 70 percent of the underemployed are women (53 percent of unemployed and 58 percent of the potential labour force). Other characteristics that were linked with being more likely to be underutilised included low educational attainment, ethnic minorities, and large household size.

Underemployed workers are most likely to be community and personal service workers or labourers; and most likely to be found in accommodation and food services or retail trade. The average underemployed worker desires 30 hours per week, but currently has 15 hours per week. The primary reason provided their underemployment was *not enough work available* (59.5 percent). Additional reasons given included *studying or training* (11.8 percent) and *other family responsibilities* (7.3 percent). Of note, when reasons for underemployment were broken down by age and gender, we found women to be four times more likely than men to cite *difficulty in finding suitable childcare* as their reason (4.1 versus 1.1 percent).

For the second research aim, we find evidence to indicate that underutilisation is a short-term phenomenon. For those who are underemployed, there is a 50.4 percent probability they will be fully utilised in the next quarter they are observed in the HLFS. When we extend the time horizon to a year out, this probability rises to 84.8 percent. Furthermore, there is high state dependence in full utilisation (96 percent probability of remaining in this state one quarter later, and 91.6 percent one year later).

For the final research aim, we use multinomial logit models to identify potential risk factors associated with underutilisation intensity, as well as unemployment duration. Our findings largely corroborate the results found in the descriptive statistics in the first research aim. Specifically, females, ethnic minorities, low education and neighbourhood deprivation appear to be associated with greater risk of high-intensity underutilisation (i.e., ≥ 50 percent underutilisation). Similar patterns are found for long-term unemployment (> 12 months), excluding gender.

While this study provides a detailed exploration of the landscape for underutilised workers in NZ, there are several avenues for potential future research. For example, it would be worthwhile to link the HLFS with administrative data records (the Integrated Data Infrastructure) to permit analysis of aspects that are not provided in the current survey. Such aspects include immigration data (to understand the role of visa restrictions, as well as labour market assimilation of new migrants to NZ), drivers licence records (to investigate whether lack of access to transport plays a part), and address data (to examine the relationship between residential mobility and underutilisation).

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APPENDICES

Appendix A.

In Table A 1, we provide the specific numbers corresponding to Figure 1. The rates are presented in percentages of "extended labour force", which includes the sum of the potential labour force, the employed and the unemployed population (Statistics New Zealand, 2016b). The unweighted estimates of underutilisation and its three sub-groups (columns 2-5) are based only on the sample of surveyed individuals, while the weighted estimates (columns 7-10) utilise the individual-level survey-based final weight estimates that are expected to indicate the number of persons in the actual NZ population that each surveyed individual represents per quarter (Statistics New Zealand, 2017).

Table A 1 allows us to compare the underutilisation rates based on weighted, unweighted and Stats NZ estimates (columns 2, 7 and 12, respectively). The three estimates are largely similar to each other. In particular, over all nine quarters, the average unweighted estimate of underutilisation rate is 12.5 percent, while the average weighted and Stats NZ estimates of the underutilisation rate are 12.2 percent.

Table A 1. Underutilisation rates in NZ

HLFS	Unweighted estimates					Weighted estimates					Stats NZ estimates
Quarter	Under-utilised	Under-employed	Un-employed	Potential labour force	Extended labour force (n)	Under-utilised	Under-employed	Un-employed	Potential labour force	Extended labour force (N)	Underutilised
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Jun-16	13.1	4.1	4.9	4.1	20,367	12.7	3.9	4.7	4.1	2,690,000	12.7
Sept-16	12.4	3.9	4.7	3.7	20,748	12.2	3.9	4.7	3.6	2,696,000	12.2
Dec-16	13.0	4.3	5.0	3.7	20,934	12.8	4.2	5.0	3.7	2,767,000	12.8
Mar-17	12.7	4.0	5.1	3.6	21,147	12.5	3.9	5.0	3.5	2,784,000	12.5
Jun-17	11.8	3.6	4.6	3.5	19,572	11.6	3.6	4.5	3.5	2,750,000	11.8
Sept-17	12.1	4.0	4.5	3.5	21,042	11.7	3.9	4.4	3.4	2,791,000	11.8
Dec-17	12.9	4.6	4.4	3.9	20,652	12.6	4.6	4.3	3.7	2,847,000	12.1
Mar-18	12.5	4.1	4.6	3.8	21,372	12.1	4.0	4.5	3.7	2,858,000	11.9
Jun-18	12.1	4.1	4.4	3.6	20,595	11.7	4.0	4.2	3.5	2,844,000	12.0

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: The percentage estimates of each category of underutilisation are calculated relative to extended labour force, which includes the sum of employment, unemployment and potential labour force (identified from HLFS information on labour force status and underutilisation). The weighted and unweighted estimates are not adjusted for seasonal changes. The Stats NZ estimates are accessed from quarterly labour market statistics available in http://archive.stats.govt.nz.

Appendix B.

Table B 1. Individual and household characteristics (rows sum to one)

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Age group				
15 – 19	0.488	0.134	0.188	0.190
20 – 24	0.753	0.080	0.105	0.062
25 – 34	0.869	0.041	0.058	0.033
35 – 44	0.893	0.040	0.041	0.026
45 – 54	0.898	0.040	0.037	0.024
55 – 64	0.897	0.038	0.036	0.029
65 and over	0.902	0.024	0.014	0.060
Regional council area				
Northland	0.805	0.055	0.079	0.061
Auckland	0.867	0.037	0.054	0.042
Waikato	0.850	0.051	0.056	0.043
Bay of Plenty	0.832	0.059	0.063	0.047
Gisborne / Hawke's Bay	0.812	0.050	0.075	0.063
Taranaki	0.828	0.060	0.066	0.046
Manuwatu / Wanganui	0.798	0.071	0.067	0.063
Wellington	0.864	0.044	0.054	0.037
Nelson / Tasman / Marlborough / West Coast	0.852	0.063	0.042	0.044
Canterbury	0.870	0.047	0.044	0.038
Otago	0.856	0.053	0.049	0.042
Southland	0.839	0.066	0.058	0.038
Born in NZ	0.848	0.050	0.057	0.046
Female	0.829	0.065	0.056	0.050
Household income	1,254.11 (821.96)	840.35 (630.30)	599.49 (590.89)	661.61 (546.62)
Poverty indicator✓	0.634	0.087	0.160	0.120
Household size	3.122 (1.454)	3.391 (1.498)	3.507 (1.689)	3.507 (1.703)

Table B 1. Individual and household characteristics (rows sum to one) (continued)

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Parenthood	0.883	0.045	0.042	0.031
Female	0.836	0.068	0.052	0.045
Male	0.940	0.017	0.029	0.014
Non-prioritised ethnicity				
European	0.873	0.047	0.043	0.037
Māori	0.735	0.067	0.118	0.080
Asian	0.849	0.048	0.059	0.044
Pacific Peoples	0.766	0.050	0.111	0.074
other	0.833	0.054	0.065	0.048
MELAA	0.776	0.062	0.105	0.056
Prioritised ethnicity				
European	0.883	0.044	0.038	0.035
Māori	0.735	0.067	0.118	0.080
Asian	0.850	0.048	0.058	0.043
Pacific Peoples	0.778	0.047	0.106	0.070
other	0.837	0.055	0.062	0.046
MELAA	0.781	0.062	0.101	0.056
Highest educational attainment				
Doctorate	0.943	0.019	0.021	0.017
Masters	0.903	0.038	0.037	0.022
Bachelor's	0.917	0.033	0.029	0.021
Post-school	0.845	0.055	0.059	0.042
School	0.808	0.054	0.069	0.068
No qualification	0.773	0.052	0.089	0.087
Deprivation decile	5.323 (2.775)	6.039 (2.780)	6.676 (2.803)	6.423 (2.866)
Urban / rural				
main urban areas	0.853	0.047	0.057	0.044
secondary urban areas	0.844	0.060	0.051	0.046
minor urban areas	0.823	0.063	0.064	0.050
rural centres	0.809	0.062	0.078	0.051
rural areas	0.888	0.043	0.035	0.035
Years in NZ	18.674 (14.686)	15.773 (13.689)	14.804 (12.912)	17.175 (15.500)

Table B 1. Individual and household characteristics (rows sum to one) (continued)

Characteristic	Fully utilised	Under-employed	Unemployed	Potential labour force
	(1)	(2)	(3)	(4)
Region of birth				
Oceana and Antarctica	0.848	0.049	0.057	0.046
Northwest Europe	0.899	0.039	0.031	0.031
Southern and Eastern Europe	0.874	0.052	0.050	0.025
North Africa and the Middle East	0.705	0.061	0.151	0.083
Southeast Asia	0.848	0.048	0.061	0.043
Northeast Asia	0.852	0.049	0.056	0.044
Southern and Central Asia	0.860	0.047	0.057	0.036
The Americas	0.872	0.057	0.046	0.025
Sub-Saharan Africa	0.862	0.039	0.053	0.046
Observations	134,802	7,617	8,754	6,957

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: Standard deviations are presented in parentheses. *, **, and *** denote statistically significant differences between variable means compared with the fully utilised population (column 1) at the 10, 5, and 1 percent-levels, respectively. Definitions of each variable can be found in Table 1. Gross weekly household income is sourced from the June quarter of the HLFS. The OECD-modified equivalence scale is applied. Household income estimates are adjusted for inflation using the second quarter of 2017 as the base period.

✓ Poverty thresholds are traditionally estimated using disposable household income (net of taxes). However, since the data only provides information on gross household income our poverty indicator (60% of median income threshold) is computed using gross household income estimates.

Table B 2. Work characteristics (rows sum to one)

Characteristic	Fully utilised, full-time	Fully utilised, part-time	Under-employed
	(1)	(2)	(3)
Holds multiple jobs	0.666	0.258	0.076
Number of jobs	1.052	1.082	1.082
Employment status in main job			
Paid employee	0.779	0.167	0.053
Employer	0.794	0.193	0.013
Self-employed with no employees	0.621	0.309	0.070
Unpaid family worker	0.205	0.701	0.095
Main occupation			
Manager	0.851	0.129	0.020
Professional	0.812	0.157	0.031
Technicians and trades workers	0.865	0.103	0.032
Community and personal service workers	0.576	0.301	0.123
Clerical and administrative workers	0.729	231	0.040
Sales workers	0.600	0.294	0.106
Machinery operators and drivers	0.841	0.120	0.039
Labourers	0.636	0.257	0.107
Residual categories	0.712	0.230	0.059
Main industry			
Agriculture, forestry, and fishing	0.697	0.267	0.036
Mining	0.949	0.041	0.012
Manufacturing	0.893	0.084	0.024
Electricity, gas, water, and waste services	0.928	0.061	0.011
Construction	0.886	0.098	0.017
Wholesale trade	0.881	0.094	0.025
Retail trade	0.656	0.259	0.085
Accommodation and food services	0.504	0.343	0.153
Transport, postal, and warehousing	0.796	0.158	0.047

Table B 2. Work characteristics (rows sum to one) (continued)

Characteristic	Fully utilised, full-time	Fully utilised, part-time	Under-employed
	(1)	(2)	(3)
Main industry (continued)			
Information media and telecommunications	0.818	0.138	0.044
Financial and insurance services	0.878	0.109	0.012
Rental, hiring, and real estate services	0.689	0.276	0.035
Professional, scientific, and technical services	0.828	0.142	0.030
Administrative and support services	0.618	0.268	0.114
Public administration and safety	0.920	0.063	0.017
Education and training	0.675	0.252	0.073
Health care and social assistance	0.695	0.242	0.063
Arts and recreation services	0.559	0.341	0.100
Other services	0.701	0.230	0.069
Not classified elsewhere	0.653	0.276	0.071
Usual hours per week in all jobs	40.97 (5.24)	16.22 (7.51)	15.33 (7.50)
Actual hours per week in all jobs (last week)	36.85 (13.06)	14.78 (9.93)	15.13 (9.65)
Total number of hours wanted per week	-	-	30.53 (10.60)
Increase in usual hours wanted (percent)	-	-	160.57 (264.25)
Increase in actual hours wanted (percent)	-	-	181.21 (304.07)
Union membership	0.842	0.128	0.030
Contract type in main job			
Permanent	0.812	0.147	0.041
Fixed term	0.592	0.293	0.116
Project-based	0.392	0.358	0.251
Temporary	0.290	0.484	0.227
Casual	0.275	0.473	0.251
Seasonal	0.624	0.238	0.138
Observations	107,898	26,904	7,617

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Notes: Standard deviations are presented in parentheses. *, **, and *** denote statistically significant differences between variable means compared with the fully utilised working age population (column 1) at the 10, 5, and 1 percent-levels, respectively. Definitions of each variable can be found in Table 1. Occupations are categorised according to 2013 level 1 ANZSCO codes from Stats NZ. Industries are categorised according to 2006 level 1 ANZSIC codes from Stats NZ.

Appendix C.

In Tables C 1 through to C 3 we present tabulations on underutilised individuals' previous job-related characteristics based on non-missing responses. Further information regarding missing observations on previous employment status is available from authors upon request.

Table C 1. Previous employment status

Variable	Underemployed	Unemployed	Potential labour force
Paid employee	0.830	0.874	0.818
Employer	0.014	0.009	0.016
Self-employed with no employees	0.147	0.052	0.074
Unpaid family worker	0.008	0.022	0.028
Not stated	0.001	0.043	0.065
Observations	**4,422**	**2,706**	**1,725**

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Table C 2. Previous level 1 main occupation

Variable	Underemployed	Unemployed	Potential labour force
Manager	0.074	0.106	0.116
Professional	0.161	0.134	0.163
Technicians and trades workers	0.068	0.108	0.098
Community and personal service workers	0.205	0.114	0.138
Clerical and administrative workers	0.102	0.105	0.088
Sales workers	0.164	0.103	0.088
Machinery operators and drivers	0.037	0.055	0.053
Laborers	0.184	0.258	0.235
Residual categories	0.006	0.017	0.020
Observations	**4,422**	**1,383**	**882**

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

Table C 3. Previous level 1 main industry

Variable	Underemployed	Unemployed	Potential labour force
Agriculture, forestry, and fishing	0.028	0.030	0.029
Mining	0.001	0.002	0.001
Manufacturing	0.048	0.081	0.092
Electricity, gas, water, and waste services	0.002	0.007	0.002
Construction	0.028	0.095	0.091
Wholesale trade	0.022	0.025	0.015
Retail trade	0.144	0.089	0.075
Accommodation and food services	0.144	0.068	0.058
Transport, postal, and warehousing	0.032	0.069	0.075
Information media and telecommunications	0.013	0.053	0.050
Financial and insurance services	0.008	0.029	0.026
Rental, hiring, and real estate services	0.013	0.015	0.020
Professional, scientific, and technical Services	0.055	0.042	0.033
Administrative and support services	0.065	0.046	0.034
Public administration and safety	0.019	0.043	0.038
Education and training	0.141	0.071	0.072
Health care and social assistance	0.142	0.049	0.062
Arts and recreation services	0.034	0.039	0.048
Other services	0.053	0.046	0.066
Not classified elsewhere	0.011	0.026	0.029
21 (not in current HLFS codebook)	0.000	0.014	0.010
22 (not in current HLFS codebook)	0.000	0.064	0.076
Observations	4,422	2,706	1,719

Source: NZ HLFS (2016 Q2 - 2018 Q2), Stats NZ.

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