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Gender and Ethnicity in the Labour Market Participation Decision

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TE TARI MAHI
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MINITATANGA MŌ NGĀ WĀHINE

1 Introduction[1]

At its simplest, the labour market participation decision for each individual amounts to a choice between "participating" and "not participating". Having decided to participate, one either finds a job and is "employed" or (according to the standard internationally-accepted definition) is "unemployed" if one maintains a strong attachment to the labour force by actively seeking work and remaining available for work. Those in work may not be participating to the extent they desire in terms of hours worked. An official (and arbitrary) distinction between "part-time" and "full-time" is made at 30 hours per week.

Why the participation decision is important for the individual is clear. It affects one's access to economic resources and, to a large extent, determines one's standard of living. From society's perspective, the individual's ability truly to exercise a choice is bound up with the principle of equity. Moreover, the aggregate participation rate, particularly of prime-age individuals affects the average standard of living and the productivity level needed to improve that standard.

Our focus here is on gender and ethnic differences in participation outcomes amongst prime-age individuals or, more fundamentally, whether any differences can be explained by individual characteristics or whether there are some remaining inequities. Table 1 provides a first look at the most recently available official statistics (Statistics New Zealand 2005a). It shows, based on Household Labour Force Survey (HLFS) data for each year of the twenty-first century, participation rates broken down by gender, ethnicity and by qualifications.

Table 1 – Labour force participation rates 2001-04 by gender, ethnicity and qualification level

Year	2001	2002	2003	2004
Male	73.8	74.4	74.4	73.8
Female	57.8	58.8	59.1	59.6
Pākeha	67.0	68.0	68.1	68.2
Māori	63.5	64.5	66.3	65.2
Pacific	61.0	61.6	62.3	61.5
Other	55.3	55.9	55.6	56.4
No qualifications	48.1	49.1	49.1	48.3
School qualifications	62.9	63.1	62.9	62.4
Post-school quals only	71.1	71.6	72.0	70.5
School & post-school quals	78.8	79.5	79.6	79.8

Source: Statistics New Zealand (2005a)

In the case of gender there is a substantial participation gap, around 14% in 2004, and behind these figures hide even wider gaps in participation rates in particular age groups. For example, amongst females 30-34, the participation rate is more than 20% lower than for males in the same age group. The principal reason is evidently related to child-care responsibilities. By ethnicity, too, there are some quite wide gaps, with that between

[1] We would like to thank the staff of Statistics New Zealand, especially Kim Cullen, for inviting us to be involved with the CURF data trial.

Pākeha and "Other" of a similar magnitude to the male-female participation gap. The differences between the Pākeha participation rate and those of both Māori and Pacific Peoples are less striking but still substantial. No explanations as obvious as the one explaining the male-female difference leap to mind, especially in light of the fact that the participation rates reported in 1987 were: Pākeha 66.4%, Māori 66.7%, Pacific Peoples 71.5% and "Other" 68.8% (Statistics New Zealand 2005a).

Clearly, there are many factors other than gender and ethnicity potentially affecting labour force participation. For example, Table 1 also shows participation rates broken down by qualification and the contrast between those with no qualifications and those with tertiary qualifications is stark, although no doubt in part driven by differing age distributions for the two groups. What is clear is that a wide range of factors interacts and that is why one must go beyond such descriptive statistics to a modelling approach that simultaneously controls for as many of these factors as possible.

Recently in New Zealand, there have been a number of pieces of work in this area. Kalb and Scutella (2003) were commissioned by Treasury to develop a discrete choice structural utility model of labour supply. Using pooled data from the 1991/92 to 2000/01 Household Economic Surveys (HES), estimation of the model confirmed the expectation that female preference for work was lower when responsible for the care of young children. Kalb and Scutella's model also allowed simulation of policy changes such as changes in taxation and benefit eligibility. Stroombergen and O'Brien (2003) used the Income Supplement (IS) of the HLFS of 1997 in two exploratory binomial analyses, first comparing employment against "not in the labour force" and then unemployment against "not in the labour force". Bryant, Jacobsen, Bell and Garrett (2004) took a macroeconomic perspective, calculating potential increases in GDP from higher participation rates, especially amongst young women. The work most similar to the approach we use here is Winkelmann and Winkelmann (1997), who estimated multinomial logit models with four possible outcomes (full-time employed, part-time employed, unemployed and not in the labour force) using data from the censuses of 1981, 1986 and 1991, with a particular focus on outcomes for Māori as opposed to non-Māori. Thus it is now well over a decade since labour market participation was examined in this framework.

The nature of studies of international comparisons requires the use of different approaches, such as that by Jaumotte (2003), who focuses on the aggregate impact of government policies rather than individual decision-making as we do here. For our purposes, the standard technique is the multinomial logit model. Interestingly, the vast majority of previous international microeconomic studies of race and gender in the labour market focus either on occupational segregation or wage differences rather than the participation decision so that applications of the multinomial logit model in this context are not as numerous as one would expect. Altonji and Blank (1999) in their extensive review of the area for the *Handbook of Labor Economics* devote only 2 of 107 pages of discussion to models of labour force participation.

The data we employ is from the 2002 IS, released to us in final form on 8 February 2005 by Statistics New Zealand as the first Confidentialised Unit Record File (CURF). The CURF provides researchers with unprecedented ease of access in dealing with unit record data containing a wide range of potentially useful variables.

In Section 2, we give a brief intuitive overview of both binomial and multinomial modelling of the labour market participation decision. In Section 3, we outline some of the features of the CURF data set. Section 4 examines the practicalities of bringing together the data

set with our modelling approach to arrive at a particular specification. Section 5 presents and interprets the results, while section 6 concludes.

2 Modelling: theory

The model we estimate is a multinomial logit with four different possible outcomes: full-time employed, part-time employed, unemployed and not in the labour force. To understand the procedure, it is easier first to conceptualise a simpler problem, namely the labour force participation choice between only two states, either in the labour force (participating) or not in the labour force (not participating). For any given individual we observe whether she/he is participating or not and record this as a binary variable: 1 if participating, 0 if not.

Now, we want to explain the values of this binary variable (the dependent variable) on the basis of the observed characteristics of the individuals in our sample (the independent variables). We have the same sort of framework as a standard multi-variate regression except that the dependent variable is binary. The sort of characteristics likely to affect whether an individual participates in the labour force or not include age (or prior labour market experience), qualifications, location, other sources of available income, gender, ethnicity and so on. Having estimated the model, what results is a coefficient on each independent variable from which we can calculate the effect that variable has on the dependent variable, as well as the standard error of each coefficient, which allows us to tell whether the effect is statistically significant. The estimated model can also be used to predict the probability that a hypothetical individual with a specific set of characteristics would be participating in the labour force. The substitution of the values of that individual's characteristics into the model would produce a number between 0 and 1 (the only actually observed values of the dependent variable), which can be interpreted as the probability that an individual with the observed characteristics would participate.

The details of estimation procedures need not concern us here, but can be found in any standard econometrics text such as Hill, Griffiths and Judge (2001) or Heij, de Boer, Franses, Kloek and van Dijk (2004) or more intuitively in Kennedy (2003). What is much more important than coefficient estimates and statistical significance, in terms of understanding the results, is to focus on their economic or indeed everyday common sense meaning (Hamermesh 1999). In fact, the results from the sort of binary choice (probit or logit) models we have in mind here are not directly interpretable, except in the sense that a significantly positive coefficient estimate would indeed mean that an increase in the corresponding variable would imply an increased probability of labour market participation. We would, for example, expect to find that higher qualifications would increase the probability of labour force participation and increased child-care responsibilities would reduce it. In terms of presenting findings, one would typically calculate the marginal effects of the independent variables at the average values of these variables, but this could seem odd in the case of categorical variables such as gender or ethnicity. It would be better to present a selection of calculations for individuals of certain observed characteristics in order to give a better sense of the possible variation in marginal effects.

The multinomial model is a fairly obvious generalisation of the binomial one. In the present case, we model four rather than two possible outcomes. This presents even more difficulty in directly interpreting the estimated coefficients. In the case of a multinomial logit model it is quite possible that the marginal effect of a variable can even be of opposite

sign to the estimated coefficient. Therefore, it is even more important to calculate the marginal effects and present them in a meaningful way.

To summarise, we estimate a multinomial logit model for labour force participation in New Zealand, allowing for four possible states (full-time employed, part-time employed, unemployed and not participating), as a function of individual characteristics. Ideally, these individual characteristics would cover everything that affects labour market participation and they would all be measured precisely. In reality, we must compromise and use the data that exist. We believe that the CURF data set is the best available to us, although at the present time it is available only for the 2002 year.

3 The CURF data

The data we use in this study is Statistics New Zealand's CURF for 2002 (Statistics New Zealand 2005b). The CURF contains unit record level data from the June 2002 quarter HLFS and its supplement the New Zealand Income Survey (IS). The file, which was supplied to us in February 2005 in its finalised version, was the first-ever release by Statistics New Zealand of unit record level data in this form.

The information in the CURF has been confidentialised to protect the identity of respondents. In the first place, all household linkages have been removed, although there is the potential still for some household level analysis since variables have been added which identify household types, including variables representing numbers of children and numbers of adults and weekly household (as well as individual) income. It is, however, impossible to identify, for example, married couples, so that joint estimation of household labour supply is not possible.

Other methods used to ensure the confidentiality of the data include the collapsing of categories for some variables into a smaller number of categories (for example, country of birth has been collapsed to a simple indicator as to whether an individual was born in New Zealand or not), the top-coding of some variables (for example, income has been top-coded to mask outliers amongst high income earners) and some minor degree of data swapping in the case of "unique" individuals whose combination of responses could potentially identify them.

As a consequence of the process of confidentialisation, it is not possible to match statistics calculated from the CURF to those from the original HLFS and IS. However, Statistics New Zealand has done extensive checking to ensure that any differences in either summary statistics or regression results between the two data sets are small.

The HLFS has a complex multi-stage survey design. For official statistical purposes, New Zealand is broken up into 36,946 meshblocks. In urban areas, this is typically a residential block containing about 40 dwellings; in rural areas a mesh block covers a much wider area. For the HLFS, mesh blocks are combined to give "19,102 Primary Sampling Units (PSUs), which are stratified into 120 groups (or strata) based on region, urban/rural mix, Māori population, and other socio-economic variables (income, employment status, age 65+ population)" (Statistics New Zealand 2002). Each respondent to the HLFS is assigned a sampling weight so that she/he represents a number of people in the population of New Zealand corresponding to that weight. These weights are chosen to ensure that the survey represents accurately the number of people in sex and five-year age groups from the most recent population estimates.

The three important features of the survey design (sampling weights, PSUs and strata) all have an effect on how the data should be analysed. If the sampling weights are not used then any point estimates derived from regression analysis will be biased. If the information on PSUs and strata is ignored, point estimates will not be biased but standard errors will be incorrect. Failing to account for PSU (or ignoring what is also called "clustering', effectively treating observations in the same cluster as independent when they are not) leads to standard errors that are too small (Deaton 1997: 74-77). Failing to account for stratification typically has the opposite effect.

Unfortunately, although sampling weights are provided in the CURF, all PSU and stratum indicators have been removed in the interest of preserving confidentiality. However, replicate weights are provided in a separate data file and these allow calculation of the correct standard errors. As it turns out, with our models, the results from non-weighted regressions and from survey estimation techniques generally give broadly similar results. Although on the whole ignoring PSU and stratum indicators resulted in standard errors smaller than those estimated using the replicate weights, the difference was rarely enough to alter statistical significance at conventional levels.

There are many variables provided in the CURF for each individual, including actual and total earnings from the primary and any other wage and salary jobs, income from other sources broken down by source, indicators of receipt of various transfer payments, age, country of birth (and years in New Zealand), ethnicity, employment and labour force status, occupation and industry group (for the employed), local government region, marital status, qualifications, sex, household type, household income band and numbers of dependent children in various age groups. We have examined these variables carefully to try to formulate the most plausible model of participation given the limitations of the data.

4 Modelling: practicalities

We describe in this section the details of the variables in the models we estimated. For the binomial model the dependent variable is *lfp* (labour force participation), which takes the value 1 if an individual is participating in the labour force and 0 otherwise. For the multinomial model the dependent variable is *lfstaus* (labour force status), which can take values 1, 2, 3 or 4, respectively, as the individual is full-time employed, part-time employed, unemployed or not in the labour force.

Table 2 sets out the independent variables along with a brief description of each.

Table 2 – Independent variables

Variable name	Variable description
pakeha	1 if Pākeha, 0 otherwise
maori	1 if Māori, 0 otherwise
paci	1 if Pacific, 0 otherwise
other	1 if "Other', 0 otherwise
akl	1 if resident of Auckland, 0 otherwise
nni	1 if resident of Northern North Island, 0 otherwise
cni	1 if resident of Central North Island, 0 otherwise
wlg	1 if resident of Wellington, 0 otherwise
si	1 if resident of South Island but not Canterbury, 0 otherwise

Variable name	Variable description
canter	1 if resident of Canterbury, 0 otherwise
noqal	1 if no qualifications, 0 otherwise
schqal	1 if highest qualification is at school level, 0 otherwise
trade	1 if highest qualification is vocational or trade, 0 otherwise
uniqal	1 if highest qualification is at degree level, 0 otherwise
otpsch	1 if highest qualification is at post-school (but not degree) level, 0 otherwise
nomig	1 if born in New Zealand, 0 otherwise
mig04	1 if not born in New Zealand and living in NZ 0 to 4 years, 0 otherwise
mig59	1 if not born in New Zealand and living in NZ 5 to 9 years, 0 otherwise
mig10plus	1 if not born in New Zealand and living in NZ 10 + years, 0 otherwise
age	Age in years
agesq	Age in years squared divided by 1000
numchu5	Number of children under 5 years old
numchscage	Number of dependent children aged 5 or more
banddiff	The number of income bands separating total household income from individual's earned income

Notably missing from the list of explanatory variables in Table 2 are gender and marital status. This is because we estimated each model with separate samples of married females, single females, married males and single males. *A priori*, we expect female and male labour market participation to differ substantially and we want to be able to examine differences in our models" estimated coefficients for these two groups in detail. Also, if we define "married" to mean "living as married" and "single" to mean "living without a partner', then it is clear that labour market behaviour will differ according to the potential existence of a partner's income. Strictly speaking, we would like to examine household labour supply by simultaneously estimating a married couple's labour market participation but, as noted earlier, the CURF data provides no way of determining which individuals are part of the same household. However, we still want to include a control for other income available to an individual. We split the sample into single and married because in the former case no source of partner income exists, at least theoretically. On cross-tabulating the data we did find some households where individuals reported being "single" but then reported that the household type was "couple" or "couple with children". We cannot determine precise reasons for this, but speculate that, apart from errors in answering the survey questions, gay or trans-gender individuals may be unsure as to how to respond when asked for marital status. We decided, for now, to construct our sub-samples for the separate regression analyses based simply on taking responses to the questions on both gender and marital status at face value. Therefore, the four sub-samples consist of females who identify themselves as living as married, females who identify themselves as living without a partner and similarly for males.

The set of dummy variables *pakeha*, *maori*, *paci* and *other* captures the prioritised ethnic classification as provided in the CURF data set. No finer detail is available on ethnicity in this data set, given the collapsing of this variable. The standard prioritisation of responses to the ethnicity question categorises any person claiming, for example, to be both Māori and Pākeha as belonging to the Māori ethnic group. This cannot be avoided with the CURF data set and needs to be kept in mind when interpreting the results. All individuals

with ethnicity not specified were deleted from the samples under consideration. The variable *pakeha* does not appear in any of the models since it is used as the reference class.

A set of regional dummy variables, with *akl* (Auckland) as reference class, is included. This is the finest measure of location available in the data set.

A set of dummy variables to capture formal qualifications has *noqal*, no qualifications, as reference class. All individuals with unspecified qualifications were deleted from the samples under consideration.

The fourth and final set of dummy variables is included to separate out immigrants from those born in New Zealand. The variable *nomig*, which is used as the reference class, is 1 for all those born in New Zealand and 0 for those born elsewhere. No further detail on country of birth is present in the CURF data set. However, for those not born in New Zealand, information is provided on number of years in New Zealand in five-year bands and this is used in the construction of the variables *mig04, mig59* and *mig10plus*, defined in the obvious way.

It would be desirable to include a labour market experience variable. There is no such variable in the CURF data and it is not at all clear, given the relatively coarse nature of the qualification information, how this can be constructed based on an individual's age and qualifications and, therefore, we simply proxy experience by *age*. Most wage studies also include the square of age (divided by 1000) to capture the possible non-linear effect of age. We follow this convention here, adding the variable *agesq*. We also note here that we restricted each of the four sub-samples to individuals aged 25 to 54 to avoid complicated modelling problems over both young people's decision to pursue further education rather than join the labour force and older workers' retirement decision. This removal of the ends of the age distribution may tend to attenuate finding any significance of the age variables.

Two variables capturing the presence of children in the household are included. The first, *numchu5*, indicates the number of children in the individual's household under school age. The other, *numchscage*, indicates the number of children over the age of five but still dependent. The former variable is likely to affect labour market participation more negatively than the latter because of the need to provide care for such children, at some direct or opportunity cost, for the whole day.

The variable *banddiff* was constructed to capture the existence of income other than the individual's earned income that might affect the individual's participation decision. The CURF gives total household income in bands, that is, ranges of dollar values, not exact dollar figures, while individual earned income from a number of sources is given in dollar amounts. We constructed a band for individual income on the basis of the dollar amounts and subtracted that band from the household income band to give *banddiff*. The household income bands reported in the CURF are not all of the same width. The wider income bands, 11-13, which occur at higher level of income, are related to the narrower ones in a simple way. Band 11 is twice as wide as any band lower than it, Band 12 is 4 times as wide, and Band 13 is 6 times as wide. We incorporated this information on the width in constructing our variable in the following way. We assigned the value 12 to household income band 10, 16 to band 11, and 22 to band 13 before computing *banddiff*. Individual earned income, which is known in dollars was assigned to the appropriate band. This gives a simple interpretation to the value of *banddiff*. A difference of 1 band is worth the same regardless of whether it is the difference between 16 and 15 or 4 and 3.

Basically, a gap that is equal to 1 is worth about $96 no matter at which end of the income scale it occurs. In most cases, as one would expect, *banddiff* is positive, or at least non-negative, being zero if there is no other household income than the individual's. In a few cases, *banddiff* is negative, if other household income is in fact a loss greater than the individual's income. This can happen if the individual's partner is self-employed.

5 Results

All estimations were undertaken using STATA release eight (StatCorp 2003). The appendix tables A1 to A4 contain the full set of estimates for both binomial and multinomial models for each of the four sub-samples (married females, single females, married males and single males). As noted earlier, these estimates are not readily interpretable without further calculation, but we can comment first on statistical significance in general terms.

Appendix Table 1 contains the estimates for all four sub-samples using the probit models.

The coefficient on *age* is positive and that on *agesq* negative, although the combination of age variables only attains statistical significance for married females.

Participation falls as other available household income (as measured by *banddiff*) rises with the effect being statistically significant and of comparable magnitude across all sub-samples.

The more children there are in a household under the age of 5 the lower is the probability of participation, with this relationship being statistically significant for all women and also for married men. In the case of children of school age the negative relationship with participation is only significant for women and the effect is of a smaller magnitude than for children under 5.

Participation is lower for people of all non-Pākeha ethnicities than for Pākeha, although whether this effect is statistically significant or not varies by sub-sample. Amongst married men, the result is clear-cut for all ethnic groups. They participate to a lesser extent than do Europeans. Women (both married and single) of the *other* ethnic group have a significantly lower probability of participation.

Participation is also lower for new married male migrants than for the New Zealand born, but there is no significant effect after 5 years' residence; in the case of married female migrants the significantly negative effect does not cut out until after 10 years; amongst single migrants there is no significant difference from the New Zealand born.

As would be expected, the probability of participation generally increases with higher qualifications. This effect is generally stronger and more statistically significant for females than for males.

We detect very few significant differences by region, except that the probability of participation is lower for single men in the Central North Island (compared to Auckland) and higher for married females in Wellington.

Appendix Tables 2 to 4 report the multinomial logit results. The comparison group in each table is *full-time employed*. Appendix Table 2 reports the coefficients for the outcome *not in the labour force* across all four sub-samples. Appendix Table 3 similarly reports on the

outcome *part-time employed* and Appendix Table 4 contains the results for *unemployed*. Broadly speaking, the results are consistent with the binomial results but allow more detailed analysis of labour market status.

The coefficients in the tables permit the computation of the probability of being in any particular labour force status for an individual of any specified characteristics. We performed a number of further calculations in order to be able to illustrate the meaning of the findings. We concentrate here on presenting some findings from the multinomial logit models with the emphasis on gender and ethnic differences. However, in order to illustrate the general approach we use in a simple context first, consider Table 3, which presents some probabilities of participation in the labour market for married women by using the probit model.

Some variables have to be fixed so that the detail does not overwhelm. In Table 3, all the calculations are done for an individual of 35 years of age (which is slightly below the average age in the sample) who lives in Auckland and is a member of a household where *banddiff* is 6 (i.e. total household income is higher by six bands than the individual's own earned income). In the upper panel of the table, the woman concerned has a school level qualification and in the lower panel she has a university level qualification. The table shows the probability of labour force participation for two different ethnic groups (*pakeha* and *other*; *maori* and *paci* being omitted since the coefficient on these variables was not significant for married women) as the number of school-age children varies from 0 to 3 across the table. Down the table, migration status varies (0 meaning not a new migrant and 1 meaning new migrant of less than five years in New Zealand), as does the number of pre-school children.

Table 3 – Probit-predicted probabilities of positive outcome for lfp for a married female, age 35, Auckland resident, with banddiff=6,

		0		1		2		3	
		Pakeha	Other	Pakeha	Other	Pakeha	Other	Pakeha	Other
If school-qualified									
0	0	0.9956	0.9844	0.9936	0.9785	0.9909	0.9708	0.9872	0.9610
	1	0.9773	0.9374	0.9693	0.9197	0.9591	0.8984	0.9463	0.8732
	2	0.9163	0.8192	0.8944	0.7829	0.8685	0.7426	0.8387	0.6987
	3	0.7763	0.6147	0.7354	0.5640	0.6910	0.5121	0.6436	0.4601
1	0	0.9766	0.9358	0.9684	0.9178	0.9580	0.8961	0.9449	0.8706
	1	0.9143	0.8159	0.8920	0.7791	0.8658	0.7385	0.8355	0.6943
	2	0.7725	0.6098	0.7312	0.5589	0.6865	0.5071	0.6388	0.4551
	3	0.5502	0.3661	0.4982	0.3182	0.4463	0.2732	0.3953	0.2315
If university qualified									
0	0	0.9981	0.9925	0.9972	0.9893	0.9958	0.9850	0.9939	0.9793
	1	0.9886	0.9648	0.9841	0.9534	0.9781	0.9392	0.9703	0.9219
	2	0.9512	0.8827	0.9365	0.8549	0.9186	0.8231	0.8970	0.7872
	3	0.8498	0.7148	0.8173	0.6689	0.7807	0.6203	0.7402	0.5698
1	0	0.9882	0.9638	0.9836	0.9521	0.9774	0.9377	0.9695	0.9200

1	0.9499	0.8801	0.9349	0.8520	0.9166	0.8198	0.8947	0.7835
2	0.8468	0.7105	0.8139	0.6643	0.7769	0.6155	0.7361	0.5648
3	0.6562	0.4736	0.6070	0.4220	0.5560	0.3717	0.5041	0.3235

There are very evident differences in the two ethnic groups' labour market participation once they have pre-school children. Although there is only a small difference in participation when there are no children, the probability of participation falls and the gap widens as the number of pre-school children increases. For example, for a school-level qualified woman, the probability of being in the labour force drops from over 99% if she has no children to below 92% if she has two pre-schoolers, if she is Pākeha, but from over 98% to below 82% if she is of "Other" ethnicity. The effect of an increase in the number of children under 5 varies depending upon how many school-age children the woman has. The respective falls in the probability of participation are 0.12 and 0.23 for the same increase if the women have 2 school-age children instead of none.

School-age children have a much smaller impact on the probability of labour market participation than pre-school children. The changes in probabilities are much smaller when we move across the rows for the same ethnicity group. For example, for a school-level qualified woman with 1 pre-school child, having an extra school-age child hardly makes a difference. But the marginal effects get larger at higher number of pre-schoolers.

These probabilities are also affected if the woman is a migrant. The probability of participation is much lower if the woman is migrant once there is a child in the household.

An individual with university-level qualifications has a higher probability of being in the labour force compared to another individual with the same child-care responsibilities in the same ethnic group. For example, a new migrant woman of "Other" ethnicity with two pre-school children (and no school-age child) who is university-qualified has about a 71% chance of being in the labour force. If she had only school-level qualifications this would be less than 61%.

Appendix Tables 5 to 8 in the appendix contain examples of probabilities predicted by the multinomial logit model for individuals of various characteristics. All these tables are for the New Zealand-born only; they fix the individual's age at 35 and place of residence as Auckland. They display variations by ethnicity and qualification level, as well as gender and marital status. Appendix Tables 5 and 6 set *banddiff* at 2, while Appendix Tables 7 and 8 set it at 6. Appendix Tables 5 and 7 are for individuals with no dependent children, while Appendix Tables 6 and 8 are for those with one pre-school and one school-age child.

Comparing outcomes within each table allows one to see marital status, gender, ethnic and qualification differences. Comparing outcomes across Tables A5 and A6 (or across Tables A7 and A8) allows one to examine the effects of the presence of dependent children. Comparing outcomes across Tables A5 and A7 (or across Tables A6 and A8) allows one to inspect the effect of differing levels of household income from sources other than that earned by the individual (as measured by *banddiff*).

Within each table, there is a notable difference between the single and the married in that the probability of being in full-time employment is higher for the married. This effect appears to be very strong for non-Europeans, because their full-time employment probabilities when single are relatively low. Note that this effect cannot be put down to

differing population age-profiles because age is fixed in these calculations. Marriage leads to a greater proportion of both men and women in full-time work.

By ethnicity, there is a striking difference in the behaviour of single women. Those of "Other" ethnicity are much less likely to be in full-time employment. By contrast, when married, women of all non-European ethnic groups are typically more likely to be in full-time employment than Europeans. This illustrates quite clearly the danger of taking the sign of a coefficient from a multinomial regression at face value.

The probability of not being in the labour force and of being unemployed falls with increasing level of qualifications. Amongst university-qualified married Pākeha males with children the probability of not participating in the labour force is less than 1% and it not much more than that for married men of other ethnic groups. Amongst university-qualified women, labour force non-participation varies from about 2% to 9%, depending on ethnicity and other household income.

The presence of dependent children substantially reduces the full-time employment chances of women and there seems to be an effect at work for single men too. For single men without university qualifications, the presence of children reduces their labour force participation rate by 4 to 7 percentage points. The effect is less for those with university qualifications. For married women, the reduction in labour force participation varies from as much as 10 percentage points for those of "Other" ethnicity with no qualifications to about 2 percentage points for Pākeha with university qualifications. The most dramatic effects are for single women where percentage point falls in participation vary from 7 to over 50. Effects are very strong for those with lower qualifications. Married men maintain very high full-time employment rates whether or not children are present.

There are no great differences evident when *banddiff* is varied from 2 to 6, but it does seem that employment and participation probabilities generally fall, more so for women than for men.

Further inspection of these tables would reveal more subtle effects and suggest other computations that could be made to illustrate differences between individuals with different characteristics. The coefficients in Tables A2 through A4 are all that one needs to check any possible situation.

6 Conclusion

It has been well over a decade since the type of approach we use here has been applied to the participation decision in the New Zealand labour market. Easy access to unit record data from the HLFS and IS has only very recently become available through Statistics New Zealand's CURF project. We applied survey probit and multinomial logit models to this data set.

In interpreting the results here we have placed a focus on gender and ethnicity. In particular, we have quantified the effect of children of both pre-school and school age on the participation decision of prime-age individuals. Controlling for other factors, that effect, as expected, varies substantially by gender, but also strongly by ethnicity. Women classified of *other* ethnicity (i.e. not *pakeha*, not *maori* and not *paci*) have the strongest tendency to withdraw from the labour force to care for young children. Married men tend

not to vary their labour market behaviour. Marriage, in general, increases labour force attachment, as does a higher level of formal qualifications.

If we could really access the data at household level, in the sense of identifying members of the same household, we have no doubt that a more complete picture would emerge. The decision we want to study is a joint household one and it would be preferable jointly to estimate the labour market participation of household partners. The results we have to date rely on proxying the existence of a partner through entering other household income into the analysis. In the case of married people, the variable that we use (*banddiff)* may serve this purpose quite well. For single people, *bandiff* probably captures government transfers and therefore is still useful in modelling participation, but it needs to be interpreted differently.

In spite of the limitations of the CURF data set we believe its availability will do much to facilitate labour market research in New Zealand, including the further development of the approach we have put forward in the present paper.

References

Altonji, J.G. and Blank, R.M. (1999), "Race and gender in the labor market", chapter 48 in *Handbook of Labor Economics Volume 3c,* Ashenfelter, O. and Card, D. (editors), Elsevier, Amsterdam.

Bryant, J., Jacobsen, V., Bell, M. and Garrett, D. (2004), "Labour force participation and GDP in New Zealand", *New Zealand Treasury Working Paper 04/07*, New Zealand Treasury, Wellington.

Deaton, A. (1997), *The Analysis of Household Surveys,* The John Hopkins University Press, Baltimore.

Hamermesh, D. (1999), "The Art of Labormetrics", *NBER Working Paper Series*, Working Paper 6927, National Bureau of Economic Research.

Heij, C., de Boer, P., Franses, P.H., Kloek, T. and van Dijk, H.K. (2004), *Econometric Methods with Applications in Business and Economics*, Oxford University Press, Oxford.

Hill, R.C., Griffiths, W.E. and Judge, G.G. (2001), *Undergraduate Econometrics*, John Wiley and Sons, New York.

Jaumotte, F. (2003), "Female labour force participation: Past trends and main determinants in OECD countries", *ECO/WKP(2003)30*, Organisation for Economic Co-operation and Development, Paris.

Kalb, G. and Scutella, R. (2003), "New Zealand Labour Supply from 1991-2001: An analysis based on a discrete choice structural utility model", *New Zealand Treasury Working Paper 03/23*, New Zealand Treasury, Wellington.

Kennedy, P. (2003), *A Guide to Econometrics*, MIT Press, Cambridge, Massachusetts.

StataCorp (2003), *STATA release eight*, Stata Corporation, College Station, Texas.

Statistics New Zealand (2005a), *Labour Market Statistics 2004*, http://www.stats.govt.nz/analytical-reports/labour-market-stats-2004.htm (released 22 March 2005), Statistics New Zealand, Wellington.

Statistics New Zealand (2005b), *Metadata for the New Zealand Income Survey June 2002 quarter Confidentialised Unit Record File* (released on CD-ROM 8 February 2005), Statistics New Zealand, Wellington.

Statistics New Zealand (2002), *A Report on the Post-enumeration Survey 2001*, http://www.stats.govt.nz/analytical-reports/post-enumeration-survey-2001/default.htm, Statistics New Zealand, Wellington.

Stroombergen, A. and O'Brien, T. (2003), "Labour supply in New Zealand – A preliminary analysis using unit record data from the Household Labour Force Survey", Infometrics and Labour Market Policy Group, department of Labour, Wellington.

Winkelmann, Rainer and Winkelmann, Liliana (1997), “Determining the relative labour force status of Māori and non-Māori using a multinomial logit model”, *Labour Market Bulletin*, 1997(1): 24-62.

Appendix

Appendix Table 1 – Survey probit using replicate weights, dependent variable lfp

	Married females		Single females		Married males		Single males	
variable	coefficient	t	coefficient	t	coefficient	t	coefficient	t
age	.16065765	4.2802732	.06865056	1.4571761	.07235333	1.3988807	.01190186	.19881521
agesq	-.20971649	-4.3475568	-.08730783	-1.4705453	-.10920475	-1.711341	-.02937032	-.39072931
banddiff	-.02677116	-4.978144	-.0274135	-3.1234245	-.02501164	-2.6740989	-.02196681	-1.9018463
numchu5	-.62093337	-15.050391	-.55866743	-7.423461	-.14829596	-2.8392543	-.15427292	-1.1443106
numchscage	-.13056759	-4.3270242	-.16467034	-3.2555697	-.01203876	-.27040182	-.04247628	-.48786503
maori	-.11248086	-1.5524651	-.06933582	-.64339677	-.53683887	-5.5076807	-.21194547	-1.639149
paci	-.15345897	-1.2669419	-.07435029	-.39041647	-.50768038	-3.4686709	-.41148402	-1.3806539
other	-.46816294	-4.60168	-.88322648	-4.5268282	-.37349301	-2.7318365	-.275817	-1.2044292
mig04	-.63366541	-5.6761254	-.27017731	-1.0242757	-.6670865	-4.4286878	-.28695361	-1.2007974
mig59	-.38265289	-3.1801924	-.00539381	-.01547859	-.02672958	-.1197935	-.12376005	-.28456949
mig10plus	.1693369	1.7349688	.0078564	.05248	-.05267903	-.46068828	.07602442	.3356981
schqal	.26988503	3.9162849	.46027019	4.8496866	.28400539	3.1435343	.1773595	1.3662429
trade	.4574959	6.4015626	.70067269	7.2051359	.33811502	3.4293842	.57339537	4.8695455
uniqal	.54580366	5.3880646	1.0901669	6.8068472	.405837	2.9055317	.55844935	3.3716956
otpsch	.24303436	1.9974558	.56062498	3.6251503	.22748824	1.4822649	.51336616	2.6956529
nni	-.02058176	-.25078163	-.05800259	-.49791616	-.07311043	-.50422145	-.14059076	-.93223901
cni	-.0259192	-	-	-	-	-	-	-

	Married females		Single females		Married males		Single males	
variable	coefficient	t	coefficient	t	coefficient	t	coefficient	t
		.31780955	.15217168	1.3322225	.13533681	1.1138826	.25801293	1.7993195
wlg	.13590542	1.6624299	-.09935838	-.66924019	.06043567	.39402325	.00212298	.01205976
si	.05253669	.60882899	-.12506628	-.99835819	-.08999603	-.76285529	-.18888963	-1.1204036
canter	.06850948	.68898522	.03684557	.27083944	.02850205	.17750331	-.06144725	-.32722075
constant	-1.7990121	-2.5915327	-.66038739	-.71151302	.7111173	.69457363	1.0026876	.83540264
No of obs	5947		2486		5457		1909	
Wald chi2 (20)	609.53		300.08		187.86		95.90	
Prob>chi2	0.0000		0.0000		0.0000		0.0000	
Pseudo R2	0.1347		0.1453		0.0885		0.0625	

Appendix Table 2 – Survey multinomial logit using replicate weights, dependent variable lfstatus, comparison group employed

Outcome: *not in labour force*

	Married females		Single females		Married males		Single males	
variable	coefficient	t	coefficient	t	coefficient	t	coefficient	t
age	-.29585836	-3.9678884	-.14169428	-1.5708769	-.16426234	-1.5620251	-.02563803	-.23594444
agesq	3.95825	4.1825883	1.7795284	1.5708643	2.4315336	1.8736135	.62297971	.45898732
banddiff	.07162609	7.1762807	.05842722	3.5323979	.05708371	2.9148202	.03725105	1.7525922
numchu5	1.5362997	15.106912	1.258696	7.0125856	.32267184	3.1315104	.31859154	1.2442579
numchscage	.45828347	7.6927006	.48631787	4.9245526	-.01338814	-.15092153	.1096409	.69650171
maori	-.03530246	-.21512567	.19763474	1.009914	1.1315914	5.8999643	.50372457	2.1155043
paci	-.06224762	-.26712535	-.00268589	-.00721993	1.0281741	3.4106304	.69840596	1.3042681
other	.65228837	3.3574025	1.6472167	4.6004538	.86041162	3.2536917	.83553393	1.6810131
mig04	1.2437342	5.4924016	.39271068	.80076192	1.4607733	5.0064084	.59771259	1.2739133
mig59	.76454809	3.3843289	-.08197424	-.12129842	.19566576	.40794185	-.02799087	-.03219121
mig10plus	-.4035919	-2.1890016	.01957179	.06398283	.13021633	.54195341	-.11274949	-.26616261
schqal	-.59028096	-4.4906443	-.82130215	-4.2715578	-.59104243	-3.1672326	-.3119288	-1.3135695
trade	-.88807379	-6.0198652	-1.2420024	-6.0819397	-.75478053	-3.7308993	-1.1089005	-5.1179177
uniqal	-1.2003681	-5.9006813	-2.0338579	-6.3910718	-.88815666	-3.0574577	-1.0668095	-3.2451163
otpsch	-.56813246	-2.4172864	-.76479432	-2.2594681	-.51087149	-1.6293934	-.95193238	-2.6027549
nni	.15710106	1.0074596	.40437109	1.8410679	.18396306	.61572754	.18933463	.67172326
cni	.17780371	1.1770412	.47029993	1.9814682	.33310944	1.3333978	.40892508	1.5808012
wlg	-.26070209	-1.5738986	.21553194	.79838869	-.13484783	-.42444647	-.0503764	-.15245773
si	.08248545	.48870133	.39492976	1.7395602	.18735146	.74569148	.31521413	1.0314076
canter	.13054142	.67055025	.15783373	.60470724	-.04897126	-.14438519	.02591417	.07383002
constant	3.329474	2.3733008	1.6975949	.95256516	-.72843564	-.35052895	-1.4371269	-.65541814
Wald chi2(20)	1004.57		407.83		388.91		166.22	
Prob > chi2	0.0000		0.0000		0.0000		0.0000	
Pseudo R2	0.1240		0.1191		0.0754		0.0571	

Appendix Table 3 – Survey multinomial logit using replicate weights, dependent variable lfstatus, comparison group full-time employed

Outcome: *part-time employed*

	Married females		Single females		Married males		Single males	
variable	coefficient	t	coefficient	t	coefficient	t	coefficient	t
age	.01106159	.16874657	-.06764632	-.68950419	-.19748587	-1.3950354	-.04014132	-.2658746
agesq	.15028155	.18177181	.90339775	.72443224	2.5723607	1.4697681	.80838548	.42954958
banddiff	.0587352	6.6721214	.01241175	.62775428	.06399446	2.3507832	.00086034	.02685097
numchu5	1.0689783	10.038438	.69689767	3.5010048	.26560688	1.6788995	.28185751	.44665386
numchscage	.53389662	9.4584708	.56575698	5.5755726	-.04570633	-.43344342	.16765541	.72354136
maori	-.66111093	-3.6289035	-.07826752	-.35448068	.28195338	.90427839	.60839566	1.2800596
paci	-1.0442755	-3.4937189	-.50692822	-1.0800767	.02634611	.06797102	-.13061033	-.20571779
other	-.58740752	-2.2365486	.42253663	.56877307	.18819138	.49496241	1.2058371	1.5872024
mig04	.24240267	.78629074	-.44342681	-.56194555	.91807426	2.1612699	.02532853	.02662869
mig59	.16157182	.50322886	-.26189768	-.28428528	.90612305	2.1469957	-.60575504	-.02085757
mig10plus	-.17129597	-1.1005113	-.21573015	-.60333729	.13935682	.45215309	.30398281	.62544549
schqal	-.30246719	-2.2021971	-.01977019	-.07913963	-.01772769	-.06125788	.29866173	.80330763
trade	-.28340931	-2.1592833	-.15358931	-.70440849	-.39305859	-1.3985863	-.13809217	-.40596805
uniqal	-.69138122	-4.3058545	-.59930456	-1.7382895	-.2972836	-.94243376	.09263747	.15522217
otpsch	-.28643078	-1.4814153	.26531997	.69002106	-.37918352	-.93456378	-.14441051	-.28328689
nni	.29571683	1.899058	.74888476	2.7111011	.2245725	.59174574	-.8219675	-1.9312072
cni	.36407527	2.4841299	.6550452	2.1776219	.02678324	.06509358	-.2658682	-.58854913
wlg	-.01685562	-.09501428	.29197817	1.0187851	-.12646159	-.40377038	-.17410087	-.41729055
si	.43960201	2.6761931	.67276272	2.3371961	-.13325908	-.38511773	-.22125832	-.4617547
canter	.59333565	4.0173624	.57400629	2.0091882	.01170521	.03492583	-.77324549	-1.6267196
constant	-2.5134498	-1.9811991	-.75105669	-.39511772	.11783026	.04341957	-1.8167398	-.61408771

Appendix Table 4 – Survey multinomial logit using replicate weights, dependent variable lfstatus, comparison group full-time employed

Outcome: *unemployed*

	Married females		Single females		Married males		Single males	
variable	coefficient	t	coefficient	t	coefficient	t	coefficient	t
age	-.42601667	-2.5691924	-.03964659	-.23801509	-.28071905	-1.9078514	.03091335	.18805981
agesq	5.540947	2.6863998	.34527676	.15600192	3.7707053	2.0799115	-.1782934	-.08505212
banddiff	.02796874	1.0180631	.06941585	3.2151242	.01088455	.30969313	-.01945577	-.68610847
numchu5	.94036876	4.9041557	.82464669	3.1502411	.34290873	1.7500395	.0600456	.10233269
numchscage	.61612142	4.5818018	.46213919	3.7861271	.19201372	1.5628782	.15780782	.7358045
maori	.59119034	1.8863343	.87424366	3.746707	1.0845976	3.1684111	.75916988	2.7624032
paci	.55019219	1.029707	.13258242	.18498029	1.2484927	2.1651542	-.08006085	-.07107846
other	.5793226	1.3101175	.64770109	.98315056	1.5803605	4.5455647	1.1666239	1.7946079
mig04	1.3631328	2.4385565	.28850456	.25144913	1.2088353	3.7821274	.92446013	1.2958671
mig59	1.174292	2.3199526	-.13489222	-.1595487	.78278691	1.5420215	-1.1751201	-.01699519
mig10plus	-.29592432	-.63486071	.66382282	1.2566907	-.49507798	-1.083515	-.12152635	-.22262896
schqal	-.41765728	-1.1792449	-.4929075	-1.1922918	-.83180705	-2.2035475	.26952373	.79350912
trade	.17139581	.45890261	-.10757907	-.30941246	-.94391073	-2.6431676	-.738233	-2.4134143
uniqal	-.54068966	-1.1501528	-.5374216	-.95886142	-.82082449	-1.7894895	.81075217	1.7597309
otpsch	-.95357115	-1.3761295	.71848325	1.5161374	-.4557227	-.90147781	-.44339503	-.76348889
nni	.43396624	1.1627323	.99190902	2.8494694	.48300593	1.3576187	-.05509031	-.15932059
cni	.15182241	.36987707	.48522947	1.1611695	.66078088	1.7439918	-.31384988	-.77323127
Wlg	-.07938496	-.18521005	-.14289146	-.29629477	.26302814	.54771533	-.41031437	-.75643102
Si	-.02626907	-.05193489	.5023367	1.1447293	.02558222	.05285007	.25720491	.69023984
Canter	.52421268	1.2933761	.75035656	1.6904669	.38729667	.90483332	.0685906	.14752519
Constant	3.3286107	1.0452743	-2.5679103	-.86765722	.55128895	.19726099	-3.0114457	-.95092121

Appendix Table 5 – Predicted multinomial logit probabilities for NZ-born individuals at age 35 with no children (Auckland resident, with banddiff=2)

		No qualification				School qualification				University qualification			
		Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other
	not in lf	0.1058	0.1229	0.1080	0.3669	0.0500	0.0594	0.0511	0.2063	0.0159	0.0190	0.0161	0.0750
Single	part-time	0.0644	0.0568	0.0397	0.0656	0.0678	0.0611	0.0419	0.0822	0.0407	0.0368	0.0248	0.0563
Female	unempl	0.0221	0.0504	0.0258	0.0281	0.0145	0.0338	0.0169	0.0220	0.0148	0.0348	0.0172	0.0257
	full-time	0.8077	0.7700	0.8266	0.5394	0.8677	0.8457	0.8900	0.6895	0.9286	0.9094	0.9419	0.8430
	not in lf	0.0105	0.0108	0.0108	0.0211	0.0060	0.0061	0.0061	0.0121	0.0034	0.0034	0.0033	0.0067
Married	part-time	0.1270	0.0699	0.0487	0.0741	0.0976	0.0529	0.0367	0.0564	0.0685	0.0366	0.0252	0.0391
Female	unempl	0.0003	0.0005	0.0005	0.0005	0.0002	0.0004	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003
	full-time	0.8622	0.9188	0.9400	0.9043	0.8962	0.9406	0.9569	0.9312	0.9279	0.9597	0.9711	0.9538
	not in lf	0.1145	0.1551	0.2088	0.1796	0.0869	0.1200	0.1627	0.1395	0.0449	0.0655	0.0872	0.0792
Single Male	part-time	0.0492	0.0740	0.0392	0.1118	0.0688	0.1055	0.0562	0.1599	0.0615	0.0996	0.0522	0.1572
	unempl	0.0929	0.1624	0.0778	0.2029	0.0736	0.1312	0.0632	0.1643	0.0470	0.0886	0.0420	0.1156
	full-time	0.7434	0.6084	0.6742	0.5057	0.7707	0.6433	0.7178	0.5353	0.8466	0.7463	0.8186	0.6480
	not in lf	0.0078	0.0236	0.0213	0.0181	0.0043	0.0132	0.0120	0.0101	0.0032	0.0099	0.0089	0.0075
Married	part-time	0.0063	0.0081	0.0063	0.0074	0.0062	0.0081	0.0063	0.0074	0.0047	0.0062	0.0048	0.0056
Male	unempl	0.0010	0.0029	0.0034	0.0048	0.0004	0.0013	0.0015	0.0021	0.0004	0.0013	0.0015	0.0021
	full-time	0.9850	0.9654	0.9689	0.9697	0.9891	0.9774	0.9803	0.9804	0.9917	0.9827	0.9848	0.9847

Appendix Table 6 – Predicted multinomial logit probabilities for NZ-born individuals at age 35 with 1 child under 5 and 1 at school age (Auckland resident, with banddiff=2)

		No qualification				School qualification				University qualification			
		Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other
	not in lf	0.3520	0.3790	0.3684	0.7074	0.1980	0.2231	0.2103	0.5271	0.0749	0.0853	0.0779	0.2745
Single	part-time	0.1323	0.1081	0.0836	0.0780	0.1658	0.1418	0.1064	0.1297	0.1181	0.1021	0.0742	0.1272
Female	unempl	0.0464	0.0983	0.0556	0.0343	0.0362	0.0803	0.0441	0.0355	0.0441	0.0988	0.0525	0.0595
	full-time	0.4693	0.4147	0.4925	0.1814	0.6000	0.5549	0.6392	0.3077	0.7630	0.7137	0.7955	0.5388
	not in lf	0.0491	0.0589	0.0625	0.1086	0.0312	0.0360	0.0376	0.0681	0.0193	0.0214	0.0219	0.0411
Married	part-time	0.4015	0.2576	0.1916	0.2573	0.3399	0.2101	0.1537	0.2151	0.2629	0.1556	0.1116	0.1621
Female	unempl	0.0008	0.0018	0.0019	0.0017	0.0006	0.0013	0.0014	0.0013	0.0006	0.0013	0.0013	0.0012
	full-time	0.5486	0.6817	0.7439	0.6324	0.6283	0.7525	0.8073	0.7155	0.7171	0.8218	0.8652	0.7955
	not in lf	0.1580	0.2044	0.2780	0.2280	0.1209	0.1593	0.2201	0.1775	0.0643	0.0903	0.1232	0.1048
Single Male	part-time	0.0694	0.0997	0.0533	0.1450	0.0977	0.1431	0.0777	0.2079	0.0901	0.1403	0.0753	0.2125
	unempl	0.1039	0.1734	0.0839	0.2087	0.0829	0.1411	0.0693	0.1695	0.0546	0.0989	0.0480	0.1239
	full-time	0.6687	0.5225	0.5849	0.4183	0.6985	0.5565	0.6328	0.4450	0.7910	0.6705	0.7535	0.5588
	not in lf	0.0105	0.0317	0.0287	0.0243	0.0059	0.0179	0.0162	0.0137	0.0044	0.0134	0.0121	0.0102
Married	part-time	0.0078	0.0100	0.0078	0.0092	0.0077	0.0100	0.0078	0.0091	0.0058	0.0076	0.0059	0.0070
Male	unempl	0.0017	0.0049	0.0058	0.0080	0.0007	0.0022	0.0026	0.0036	0.0008	0.0022	0.0026	0.0036
	full-time	0.9800	0.9534	0.9577	0.9585	0.9857	0.9700	0.9735	0.9736	0.9891	0.9768	0.9794	0.9792

Appendix Table 7 -- Predicted multinomial logit probabilities for NZ-born individuals at age 35 with no children (Auckland resident, with banddiff=6)

		No qualification				School qualification				University qualification			
		Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other
	not in lf	0.1287	0.1477	0.1313	0.4179	0.0618	0.0729	0.0633	0.2446	0.0199	0.0236	0.0201	0.0919
Single	part-time	0.0652	0.0567	0.0402	0.0622	0.0698	0.0624	0.0431	0.0811	0.0423	0.0380	0.0258	0.0574
Female	unempl	0.0280	0.0633	0.0327	0.0335	0.0187	0.0433	0.0219	0.0272	0.0193	0.0451	0.0224	0.0329
	full-time	0.7780	0.7323	0.7958	0.4864	0.8497	0.8214	0.8717	0.6471	0.9185	0.8933	0.9317	0.8178
	not in lf	0.0135	0.0141	0.0141	0.0274	0.0078	0.0080	0.0080	0.0158	0.0044	0.0045	0.0044	0.0088
Married	part-time	0.1549	0.0865	0.0607	0.0912	0.1201	0.0658	0.0458	0.0700	0.0850	0.0458	0.0317	0.0489
Female	unempl	0.0003	0.0006	0.0006	0.0006	0.0002	0.0004	0.0004	0.0004	0.0002	0.0004	0.0003	0.0003
	full-time	0.8313	0.8989	0.9247	0.8808	0.8719	0.9258	0.9458	0.9139	0.9104	0.9494	0.9636	0.9420
	not in lf	0.1314	0.1777	0.2358	0.2056	0.1000	0.1380	0.1849	0.1602	0.0519	0.0757	0.1001	0.0915
Single Male	part-time	0.0488	0.0733	0.0383	0.1107	0.0684	0.1049	0.0552	0.1587	0.0615	0.0996	0.0518	0.1570
	unempl	0.0849	0.1483	0.0700	0.1851	0.0675	0.1202	0.0573	0.1504	0.0433	0.0816	0.0384	0.1064
	full-time	0.7348	0.6006	0.6560	0.4987	0.7641	0.6370	0.7026	0.5307	0.8433	0.7432	0.8097	0.6450
	not in lf	0.0097	0.0294	0.0266	0.0225	0.0054	0.0165	0.0149	0.0126	0.0040	0.0124	0.0112	0.0094
Married	part-time	0.0081	0.0104	0.0081	0.0095	0.0080	0.0104	0.0081	0.0095	0.0060	0.0079	0.0061	0.0072
Male	unempl	0.0010	0.0030	0.0035	0.0049	0.0005	0.0013	0.0016	0.0022	0.0005	0.0013	0.0016	0.0022
	full-time	0.9812	0.9572	0.9617	0.9630	0.9862	0.9718	0.9754	0.9757	0.9895	0.9784	0.9811	0.9811

Appendix Table 8 – Predicted multinomial logit probabilities for NZ-born individuals at age 35 with 1 child under 5 and 1 at school age (Auckland resident, with* banddiff=*6)

		No qualification				School qualification				University qualification			
		Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other	Pākeha	Māori	Pacific	Other
	not in lf	0.3991	0.4212	0.4159	0.7431	0.2332	0.2581	0.2472	0.5756	0.0910	0.1018	0.0945	0.3159
Single	part-time	0.1247	0.0999	0.0785	0.0682	0.1625	0.1365	0.1040	0.1178	0.1193	0.1013	0.0749	0.1218
Female	unempl	0.0550	0.1141	0.0656	0.0377	0.0446	0.0971	0.0541	0.0405	0.0559	0.1231	0.0665	0.0715
	full-time	0.4212	0.3648	0.4401	0.1510	0.5597	0.5083	0.5947	0.2660	0.7338	0.6738	0.7642	0.4908
	not in lf	0.0582	0.0721	0.0777	0.1310	0.0377	0.0449	0.0476	0.0840	0.0239	0.0271	0.0281	0.0519
Married	part-time	0.4524	0.2995	0.2262	0.2946	0.3907	0.2489	0.1846	0.2520	0.3090	0.1877	0.1362	0.1940
Female	unempl	0.0008	0.0019	0.0020	0.0017	0.0006	0.0014	0.0015	0.0013	0.0006	0.0014	0.0014	0.0013
	full-time	0.4886	0.6266	0.6941	0.5726	0.5710	0.7047	0.7664	0.6627	0.6664	0.7838	0.8343	0.7528
	not in lf	0.1802	0.2325	0.3106	0.2591	0.1384	0.1821	0.2480	0.2027	0.0742	0.1040	0.1407	0.1206
Single Male	part-time	0.0684	0.0980	0.0515	0.1424	0.0968	0.1414	0.0757	0.2053	0.0898	0.1397	0.0743	0.2115
	unempl	0.0944	0.1573	0.0747	0.1890	0.0757	0.1285	0.0622	0.1543	0.0502	0.0908	0.0437	0.1137
	full-time	0.6569	0.5122	0.5632	0.4095	0.6892	0.5480	0.6141	0.4377	0.7858	0.6655	0.7413	0.5542
	not in lf	0.0132	0.0394	0.0358	0.0303	0.0073	0.0223	0.0202	0.0171	0.0055	0.0167	0.0151	0.0128
Married	part-time	0.0100	0.0128	0.0100	0.0117	0.0099	0.0128	0.0100	0.0117	0.0075	0.0098	0.0076	0.0089
Male	unempl	0.0018	0.0050	0.0060	0.0083	0.0008	0.0022	0.0026	0.0037	0.0008	0.0023	0.0027	0.0038
	full-time	0.9751	0.9428	0.9483	0.9497	0.9820	0.9626	0.9672	0.9675	0.9863	0.9712	0.9746	0.9745