Maori/Non-Maori Income Gaps: Do Differences in Worker Mobility Play a Role?

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Abstract

We estimate a model of net migration between Regional Councils for three age cohorts to test whether or not there are significant Maori/non-Maori differences. We find little evidence of a statistically significant link between worker mobility and labor market conditions. Only in the case of the youngest individuals (20-24 years of age) do we find a significant wage response, and this wage response does not differ significantly between Maori and non-Maori. Unemployment is no case found to be significantly related to migration. We conclude from this that differences in worker mobility – and attendant differences in the propensity to take advantage of spatially dispersed economic opportunities – has limited potential for explaining Maori/non-Maori income differentials.

JEL Classification: J61 (Geographic labour mobility), R11 (Regional economic activity)

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Do Differences in Worker Mobility Play a Role?

Persistent earnings differentials between Maori and non-Maori has been a perennial source of interest among economists and policy makers in New Zealand. A multitude of candidate explanations have been offered for the existence of these income differentials and why they might persist. One possibility, of course, is that there is active wage discrimination in the sense that for a given job a non-Maori worker would tend to be paid a higher wage than a Maori worker with identical qualifications and aptitudes. However, available research to date has generally found little if any evidence of explicit wage discrimination against Maori (Durbin, 1996).

A second possibility is that differences in human capital endowments – particularly differences educational attainment – mean that non-Maori have both a comparative advantage in securing specific jobs, and that Maori worker tend on average to be employed in lower paying jobs requiring lower skill levels (Maani, 2000). A substantial body of evidence cited by Gibson and Scrimgeour (2004) confirms this**.**

A third possible explanation for Maori/non-Maori income differentials relates to differences in mobility. Bonds to tribal land occupy a pre-eminent position in Maori culture Walker, 1990). Access to land is central to individual identity, and traditionally gaining title to land required permanent occupation (Metge, 1964). The strength of these emotional and cultural ties to land may well pose a disincentive to migration. To the extent that the propensity of Maori workers to move is limited by such factors, they would be less likely to exploit available employment opportunities in locations other than where they reside, thereby lowering average Maori earnings *vis-à-vis* non-Maori.

On the other hand, it would appear that the importance of ties to land among Maori has weakened over time, such that mobility behaviour across ethnic groups has converged to

some degree. Evidence of this may be found in the fact that in most regional councils well over half of the Maori population does not identify itself as being a member of an iwi whose traditional tribal boundaries lie within that region (Table 1). Indeed, nationally about two-third of working aged Maori live in areas other areas other than those encompassed by their own iwi. In addition, the rapid urbanisation of New Zealand's Maori population over the past century – from only 16% in 1926 to over 80% today (Pool, 1991) – also points to escalating mobility among Maori over time.

Most studies of the determinants of mobility for New Zealand have focused on aggregate migration patterns without reference to ethnic group (Hampton and Giles, 1978; Poot, 1986; Mare and Timmins, 2003). An exception is found in Vaithianathan's (1995) work, which analyzed Maori/non-Maori differences in migration over the period 1986 - 1991. Vaithianathan estimated binary logit move/stay models to investigate the impact of regional and personal characteristics on individual out-migration probabilities, and found Maori migration to be substantially less sensitive to local labor market conditions (as proxied by unemployment rates) than was non-Maori migration.

In this paper we estimate the determinants of net migration of Maori and non-Maori working aged persons between 1991 and 2001. Our analysis extends existing work on New Zealand worker mobility in a number of ways. Most importantly, we specifically test whether the response of migration to various determining factors differs statistically between ethnic groups. Beyond that, we also stratify our analysis by age cohort to capture important life-cycle aspects of worker mobility often ignored in the migration literature (Cushing and Poot, 2004). Finally, we use more recent data than most other migration studies in New Zealand analyses (the recent work of Mare and Timmins notwithstanding).

The paper is laid out as follows. The next section describes our empirical model. Next we discuss the data used and provide some descriptive statistical analysis of key economic

variables in our model. We then present our econometric results and their implications, before closing with some concluding remarks in the paper's final section.

Empirical Model

Our empirical model derives from the standard conceptualisation of the micro-foundations of worker mobility dating back to Sjaastad's (1962) seminal article. We assume that individual decisions over whether to stay or move at a given point in time are motivated by the relative benefits and costs of staying or moving. Following Greenwood (1975), we begin by writing a straightforward linear model that folds these economic determinants of aggregate worker mobility into a traditional gravity model of migration:

$$M_{ij} = \beta_{0i} + \beta_{1i}D_{ij} + \beta_{2i}P_i + \boldsymbol{\beta_{3i}'X_j} \qquad \textbf{(1)}$$

where M_{ij} is gross migration from location i to location j, D_{ij} is the distance between i and j, P_i the population of location i, and $\mathbf{X_j}$ is a vector of variables thought to influencing migration decisions, including wage rates, unemployment, local cost of living, locational amenities, etc. We take distance to be an important proxy for the costs (both financial and psychic) of mobility, while the elements of **X** constitute individuals' assessment of the economic forces conditioning the net benefits of changing location.

As our interest is in ascertaining the aggregate outcomes for different types of individuals – i.e., Maori vs. non-Maori of different age cohorts – we are more concerned with net migration functions. Letting $NM_{ij}^{AG} \equiv M_{ij}^{AG} - M_{ji}^{AG}$ be net migration between i and j for age cohort A and ethnic group G:

$$\begin{aligned} NM_{ij}^{AG} &= (\beta_{0i} - \beta_{0j}) + (\beta_{1i} - \beta_{1j})D_{ij} + \beta_2(P_j - P_i) + (\beta_{3i} - \beta_{3j})'\boldsymbol{\Delta X^{AG}} \\ &= \beta_0 + \beta_1 D_{ij} + \beta_2 \Delta P + \boldsymbol{\beta_3'\Delta X^{AG}} \qquad \textbf{(2)} \end{aligned}$$

where $\Delta P = P_j - P_i$ and $\mathbf{\Delta X} = \mathbf{X_j} - \mathbf{X_i}$.[1]

Equation 2 forms the basis for our empirical analysis. Specifically, we estimated a set of regression equations of the form :

$$\underset{}{\ln NM_{ij}^{A}} = \underset{}{\beta_0} + \underset{-}{\beta_1 \ln D_{ij}} + \underset{+}{\beta_2 \Delta P} + \underset{+}{\beta_3 \ln(W_j/W_i)^{A}} + \underset{-}{\beta_4 \ln(U_j/U_i)^{A}} + \underset{-}{\beta_5 SN} + \underset{+}{\beta_6 UNI} + \underset{?}{\beta_7 M} + \varepsilon_{ij} \quad \textbf{(3)}$$

for three different age cohorts – 20-24 year olds, 25-44 year olds, and 45-64 year olds. Here, W_j/W_i is the ratio of average wages in regions j and i, which we expect to have a positive effect on net migration; U_j/U_i is the ratio of average unemployment rates for regions j and i (expected to affect net migration negatively); SN is a dummy variable taking a value of 1 if a move between regions i and j involves going from the South Island to the North Island (or vice versa); UNI takes a value of 1 if either of the regions has a major university (i.e., Auckland, Waikato, Wellington, Christchurch, or Dunedin), and M is a dummy variable taking a value for Maori, 0 for non-Maori.

Expected signs of the parameters are written underneath the variables. We expect a positive relationship between migration and relative wages, as well as a negative impact on migration of relative unemployment (which we take as an indicator of the relative probability of landing a job in the destination region). Distance and migration between the North and South Islands should make movement more costly, and hence we expect a negative impact. The UNI variable captures the amenities and "gravitational" effects of major urban centres that would cause aggregate migration flows to be larger. It will also pick up the effect of movement to attend university for the youngest age cohort of our analysis (20-24 year olds).

As our particular interest is to test whether Maori/non-Maori differences exist in migration behaviour, we interacted each of the independent variables of equation (3) with the Maori dummy. Parameter estimates for these interaction terms measure the extent to which

[1] Note that we additionally assume here that $\beta_{2i} = \beta_{2j} = \beta_2$.

migration responds differently across ethnic groups, thus providing a nicely nested means of testing whether such differences are statistically significant.

Data

Our analysis is based on Regional Council-level data from the 1996 and 2001 Censuses of Population and Dwellings. Origin-destination tables detailing the place of residence five years prior to the Census date were assembled for three age cohorts – 20-24, 25-44, and 45-64 years of age at the time of the Census – for both Maori and non-Maori. From these, net migration flows were computed. For each pair of regions, two net migration values exist (one positive, the other negative). To facilitate estimating the model in log-log form, we selected the positive values as the basis for analysis, and then assembled the data for right-hand side variables to preserve the appropriate origin-destination relationship. As there are 16 regional councils, there are (16□15)/2 = 120 observations for each year.

Tables 2a and 2b provide data on regional migration rates, along with net (internal) migration totals for Maori and non-Maori over the 1991-1996 and 1996-2001 periods.[2] As one would expect, these suggest a strong tendency for mobility to decline with age. With regard to Maori/non-Maori differences in migration rates, the national totals suggest that there is a somewhat greater rate of movement (both inward and outward) among Maori for all three age groups. The national totals mask significant regional variation, however. For example, throughout most regions of the North Island, where Maori populations are largest, out-migration rates among 20-24 year olds are is generally higher for non-Maori (Auckland being a notable exception). For the two older age cohorts, out-migration rates of Maori and non-Maori generally differ by only a few percentage points or less for most regions on the North Island (again, with the exception of Auckland), while the rates for Maori substantially

[2] Despite its importance, we ignore international migration due to lack of data on labor market conditions outside of New Zealand. Evidence provided by Mare and Timmins (2003) suggests that this unavoidable oversight is likely to be most damaging for Auckland and (to a lesser extent) Wellington and Canterbury.

exceed those of non-Maori in all regions of the South Island. These patterns appear to be fairly similar in both the 1991-1996 and 1996-2001 periods.

The relatively small size of the net migration figures in Table 2 suggests substantial bi-directionality of migration flows. Again there seems to be little substantial difference in magnitude or net direction between the two time periods. One clear tendency that emerges from the data is that younger working-aged individuals are drawn to Auckland, Wellington, Canterbury, Otago, and (for Maori) Waikato – unsurprisingly, given the presence of major universities in those regions. Interestingly, significant net migration *out* of Auckland (and somewhat less dramatically for Wellington) is evident among the 45-64 year old cohort.

We also used 1996 and 2001 Census data on average wage earnings and unemployment in our econometric analysis. In the spirit of Sir John Hicks, we wished to use as clean a measure of wages as possible, since in our model it is wage differentials (as opposed to the more conventionally used income differentials) that are hypothesised to drive worker mobility. Unfortunately, in both years the Census questionnaire only asked respondents to list the various sources of income (e.g., wages, dividends, pensions, etc.) but not the proportion of their incomes from each source. However, a substantial number of individuals listed wage earnings as their only source of income,[3] and it is this data that we used to compute age- and ethnic group-specific wages.

A comparison of these two measures in instructive (Table 3). When all sources of income are included, Maori/non-Maori income differentials are strikingly greater than when only wage income is considered. We presume that a substantial portion of the greater total income differentials is accounted for by asset earnings, which would be consistent with recent

[3] 54% and 56% of Maori listed only wage earnings in 1996 and 2001, respectively, whereas the comparable figures for non-Maori were 44% and 46%. T-tests confirmed that these Maori/non-Maori differences in the shares sub-sampled were significantly different than one another. However, for both years total median income levels averaged over nine different occupational classes for the "wages only" sub-sample was within 5% of the comparable averages for the "all sources" sources sub-sample, which provided us with some confidence that the wages-only sub-sample is reasonably unbiased.

analyses indicating substantial Maori/non-Maori wealth disparities (Gibson and Scobie, 2003; Gibson and Scrimgeour, 2004). Clearly, wage disparities are much less pronounced than overall income disparities.

Results

Equation (3) was estimated for each of the three age cohorts noted in the previous section. As there was ample reason to expect *a priori* that errors would be correlated across equations, we estimated the three equations as a system of seemingly unrelated regressions. We were also mindful of the possible statistical endogeneity of two key right hand side variables – relative wages and relative unemployment rates. This prompted us to test for simultaneity bias using a Wu-Hausman test comparing OLS estimates with instrumental variables estimates (that used time dummies and relative population as instruments). In all cases, these indicated that the consistency of the OLS estimates could not be rejected.

Descriptive statistics for the key economic variables are presented in Table 4. Two aspects of these data are noteworthy. First, they indicate that for some of the age-ethnic group cohorts migrants did <u>not</u>, on average, flow from regions of low wages (high unemployment) to regions of high wages (low unemployment), particularly for the oldest age group. This is an interesting phenomenon about which we will have more to say below. Second, there is a striking similarity in the means for right hand side variables across time periods, a fact which leads us to not include time dummies in our analysis.[4]

Table 5 presents the econometric results. The model fit the data reasonably well, as indicated by a system-weighted R^2 of 0.53. Taken as a whole the parameter estimates are in broad conformance with a standard gravity model: Distance and population are invariably of the correct sign and strongly significant, as is the case with the UNI and SN dummies.

[4] Consistent with this observation, inclusion of these time dummies yielded no meaningful impact on the empirical results presented below.

Less impressive is the performance of wage and unemployment variables in explaining observed net migration behaviour. Only in the case of 20-24 year olds are relative wages found to have a positive and significant effect on net migration. For the 25-44 cohort the point estimate is positive but not significant, while for the 45-64 cohort it is significantly negative. Meanwhile, none of the estimated coefficients for relative unemployment are significantly negative. This evidence of limited labour market impact on migration echoes the findings of Mare and Timmins (2003) in their recent analysis of gross migration flows.

Table 6 provides the implied response of net migration to different variables for Maori and non-Maori, based on the econometric results. The values for W_j/W_i, U_j/U_i, and distance are elasticities; the values for the SN dummy indicates the average percentage change in net migration associated with moves between the North and South Islands; and the values for the UNI dummy indicate the average percentage change in net migration for moves in which either the origin or destination has a major university (i.e., AU, WA, WE, CB, or OT). In all cases, responses for Maori are the sum of the relevant parameter estimates for the variable of interest and the interaction term, while the level of significance is computed based on the standard errors for the relevant estimates and the covariance between the two. P-values for tests of significant Maori/non-Maori differences are those associated with the estimated interaction terms.

The figures presented in Table 6 indicate only modest evidence of statistically significant Maori/non-Maori differences in migration behavior. For the youngest cohort, the UNI dummy is significantly larger for non-Maori, presumably reflecting the lower rate of university attendance among Maori. For the older cohorts, non-Maori are significantly more sensitive to distance (and, in the case of the oldest cohort, inter-island movement). One possible explanation of this is that some sizable proportion of Maori choose to move based on

a desire to reside in their home iwi, particularly as they age, thereby reducing the importance of distance in mobility decisions.

For all other variables, there is no significant difference in evidence (although the p-value of .20 for relative wage variable provides some modest evidence that Maori are more responsive to wages than are non-Maori). We conclude, therefore, that differences in worker mobility – and the attendant differences in the propensity to take advantage of spatially dispersed economic opportunities – has limited potential for explaining Maori/non-Maori income differentials.

Finally, recall that the descriptive statistics presented in Table 4 indicated that there is a central tendency for older workers in particular to move from regions of high wages and/or low unemployment to regions of low wages and/or high unemployment. Hence it seems likely that our model is not capturing some important variable(s) underlying mobility decisions. One obvious possibility is cost of living differences across regions. In an attempt to capture these, we experimented with using median rents as an explanatory variable. However, the estimated parameters of the rent variable were generally not significant and/or of the wrong sign, leading to conclude that we need to pursue a better proxy for cross-sectional cost of living differences.

Concluding Remarks

In this paper we have attempted to shed light on the proposition that a differences in worker mobility – and the attendant differences in the propensity to take advantage of spatially dispersed economic opportunities – provides a partial explanation for Maori/non-Maori income differentials. To test this proposition, we estimated net migration functions for three age cohorts of both Maori and non-Maori workers. The empirical model was crafted in such a way as to allow direct statistical tests of differences in the response of migration to labour

market conditions and measures of the cost of migration (distance and inter-island movement).

Econometric results indicated only very limited impacts of labour market conditions on worker mobility. Only in the case of 20-24 year olds are relative wages found to have a positive and significant effect on net migration, while unemployment rates are in no case found to exert a significant influence.

The empirical results similarly indicate only modest evidence of statistically significant Maori/non-Maori differences in migration behavior. What significant differences are detected appear more related to university attendance (for the youngest cohort) and distance for older workers. We conclude, therefore, that differences in worker mobility – and the attendant differences in the propensity to take advantage of spatially dispersed economic opportunities – has limited potential for explaining Maori/non-Maori income differentials.

We are mindful, however, that that our model is in all likelihood not capturing some important variable(s) underlying mobility decisions. In future work we intend to test additional variables capable of capture regional differences in the cost of living and in amenities.

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Table 1. Share of regional Maori population belonging to local iwi

Region (Local iwi designation)	2001	1996
NO (Northland/Auckland iwi)	0.635	0.619
AU (Northland/Auckland iwi)	0.349	0.343
WA (Hauraki/Waikato/King Country iwi)	0.279	0.297
BP (Rotorua/Taupo/Bay of Plenty iwi)	0.489	0.556
GI (East Coast iwi)	0.550	0.565
HB (Hawkes Bay/Wairarapa iwi)	0.385	0.388
TK (Taranaki iwi)	0.346	0.274
MW (Wanganui/Rangitikei/Manawatu iwi)	0.184	0.137
WL (Horowhenua/Wellington iwi)	0.067	0.034
WC (South Island/Chatham Island iwi)	0.293	0.266
CB (South Island/Chatham Island iwi)	0.267	0.218
OT (South Island/Chatham Island iwi)	0.275	0.206
SL (South Island/Chatham Island iwi)	0.327	0.254
TS-NE-MB (South Island/Chatham Island iwi)[a]	0.271	0.201
All New Zealand	**0.334**	**0.332**

a. Data for Tasman, Nelson, and Marlborough regions were aggregated.

Source: Te Puni Kokiri and Stats New Zealand

Table 2a. Regional out-migration rates, in-migration rates, and net (internal) migration, 1996-2001[a]

	Age	NO	AU	WA	BP	GI	HB	TK	MW	WE	WC	CB	OT	SL	TS	NE	MB	Nat'l
		---------- Maori ----------																
Out-migration	20-24	38%	14%	25%	28%	38%	31%	35%	33%	19%	51%	19%	34%	35%	55%	47%	40%	**25%**
Out-migration	25-44	21%	15%	19%	16%	22%	18%	21%	24%	18%	32%	17%	27%	20%	29%	38%	27%	**19%**
Out-migration	45-64	10%	11%	10%	8%	11%	10%	10%	11%	11%	18%	9%	12%	13%	18%	25%	14%	**10%**
In-migration	20-24	23%	23%	27%	22%	23%	22%	26%	29%	25%	31%	27%	44%	22%	58%	52%	28%	**25%**
In-migration	25-44	21%	15%	20%	19%	20%	18%	19%	20%	18%	21%	19%	23%	15%	42%	41%	28%	**19%**
In-migration	45-64	14%	8%	11%	10%	11%	9%	10%	11%	9%	17%	9%	11%	6%	18%	28%	18%	**10%**
Net migrants[b]	20-24	-555	1146	120	-390	-282	-279	-132	-144	336	-54	234	150	-132	12	21	-48	**3**
Net migrants	25-44	18	-93	204	489	-159	27	-90	-417	60	-99	171	-126	-156	135	45	9	**18**
Net migrants	45-64	258	-414	195	213	-6	-60	3	-33	-153	-6	-15	-21	-93	-3	12	24	**-99**
		---------- Non-Maori ----------																
Out-migration	20-24	45%	8%	31%	40%	48%	41%	37%	37%	17%	45%	17%	32%	38%	46%	52%	47%	**23%**
Out-migration	25-44	17%	9%	18%	17%	23%	16%	15%	23%	13%	24%	11%	20%	16%	21%	31%	24%	**14%**
Out-migration	45-64	9%	6%	10%	8%	12%	7%	8%	9%	7%	13%	4%	7%	9%	10%	16%	9%	**7%**
In-migration	20-24	22%	16%	25%	29%	26%	21%	16%	32%	28%	25%	22%	39%	17%	35%	43%	34%	**23%**
In-migration	25-44	20%	9%	18%	24%	17%	16%	13%	16%	15%	19%	12%	14%	11%	31%	31%	25%	**14%**
In-migration	45-64	13%	4%	11%	15%	7%	8%	6%	9%	5%	11%	5%	7%	4%	17%	16%	16%	**7%**
Net migrants	20-24	-1179	4311	-1053	-1059	-348	-1413	-1161	-810	2790	-384	1368	1158	-1263	-258	-306	-348	**45**
Net migrants	25-44	540	741	306	3345	-441	12	-669	-3906	1626	-486	1755	-3132	-1143	1203	30	150	**-69**
Net migrants	45-64	1137	-4167	759	2994	-327	123	-459	-234	-1698	-216	1392	318	-918	681	-24	687	**48**

a. Out-migration rates are the out-migrants' share of initial population; in-migration rates are in-migrants' share of final population.

b. Total (national) net migration figures do not add to zero due to rounding errors.

Source: Te Puni Kokiri and Stats New Zealand

Table 2b. Regional out-migration rates, in-migration rates, and net (internal) migration, 1991-1996[a]

Group	Age	NO	AU	WA	BP	GI	HB	TK	MW	WE	WC	CB	OT	SL	TS	NE	MB	Nat'l
		---------- Maori ----------																
Out-migration	20-24	38%	15%	26%	27%	32%	31%	33%	30%	22%	40%	19%	33%	35%	52%	41%	43%	**25%**
Out-migration	25-44	18%	14%	17%	14%	18%	16%	19%	22%	19%	27%	18%	25%	21%	32%	30%	21%	**17%**
Out-migration	45-64	9%	10%	9%	7%	10%	8%	10%	10%	11%	19%	8%	14%	13%	19%	24%	11%	**10%**
In-migration	20-24	24%	22%	27%	23%	21%	21%	23%	29%	26%	37%	27%	39%	17%	50%	47%	37%	**25%**
In-migration	25-44	20%	13%	19%	18%	17%	16%	17%	19%	16%	27%	17%	23%	15%	37%	41%	27%	**17%**
In-migration	45-64	16%	7%	10%	10%	11%	8%	9%	11%	7%	17%	9%	10%	6%	26%	20%	15%	**9%**
Net migrants[b]	20-24	-561	1077	54	-234	-216	-354	-168	-6	249	-12	312	105	-213	-9	30	-27	**27**
Net migrants	25-44	318	-180	330	657	-75	-51	-84	-339	-534	0	-63	-93	-207	48	132	78	**-63**
Net migrants	45-64	435	-465	81	198	36	12	-18	48	-228	-9	27	-57	-105	30	-12	18	**-9**
		---------- Non-Maori ----------																
Out-migration	20-24	42%	10%	29%	38%	44%	37%	33%	33%	19%	42%	17%	31%	33%	44%	48%	44%	**23%**
Out-migration	25-44	17%	8%	17%	17%	20%	15%	14%	21%	14%	21%	11%	18%	14%	22%	27%	20%	**14%**
Out-migration	45-64	10%	5%	10%	8%	11%	7%	8%	9%	7%	13%	4%	7%	9%	12%	16%	10%	**7%**
In-migration	20-24	21%	16%	26%	30%	27%	20%	17%	32%	24%	31%	21%	35%	17%	36%	45%	37%	**23%**
In-migration	25-44	20%	9%	17%	23%	19%	16%	12%	16%	13%	21%	11%	14%	11%	31%	29%	26%	**14%**
In-migration	45-64	13%	4%	10%	16%	7%	7%	5%	8%	4%	12%	5%	7%	5%	17%	16%	15%	**7%**
Net migrants	20-24	-1368	4305	-735	-909	-327	-1440	-1101	-195	1617	-258	1353	795	-1149	-264	-120	-219	**-15**
Net migrants	25-44	639	1953	-249	3066	-96	372	-507	-2631	-1989	66	30	-1974	-714	1143	282	636	**27**
Net migrants	45-64	870	-1767	159	2922	-246	3	-513	-543	-2154	-39	1089	18	-831	405	42	477	**-108**

a. Out-migration rates are the out-migrants' share of initial population; in-migration rates are in-migrants' share of final population.

b. Total (national) net migration figures do not add to zero due to rounding errors.

Source: Te Puni Kokiri and Stats New Zealand

Table 3. Maori/Non-Maori wage and income differentials, 1996 and 2001[a]

	Wage income only[a]			Median income (all sources)[b]		
Region	**Maori**	**Non-Maori**	**Diff.**	**Maori**	**Non-Maori**	**Diff.**
			1996			
NO	21,048	22,904	8.8%	16,905	21,763	28.7%
AU	24,198	26,570	9.8%	23,403	27,413	17.1%
WA	21,748	23,876	9.8%	19,585	24,624	25.7%
BP	22,404	23,676	5.7%	19,751	24,103	22.0%
GI	20,455	23,110	13.0%	16,852	23,445	39.1%
HB	20,580	22,457	9.1%	16,972	22,532	32.8%
TK	22,010	23,693	7.6%	19,435	24,232	24.7%
MW	22,211	23,376	5.2%	19,865	22,870	15.1%
WE	24,669	27,478	11.4%	23,542	28,305	20.2%
WC	20,685	22,713	9.8%	18,012	21,146	17.4%
CB	22,053	23,677	7.4%	20,595	23,478	14.0%
OT	20,993	22,744	8.3%	19,210	22,324	16.2%
SL	21,628	22,883	5.8%	19,995	22,766	13.9%
TS	20,423	21,485	5.2%	17,719	19,553	10.4%
NE	21,297	23,819	11.8%	20,255	23,318	15.1%
MB	20,912	21,986	5.1%	20,123	21,095	4.8%
TOTAL	**22,937**	**24,835**	**8.3%**	**20,814**	**25,141**	**20.8%**
			2001			
NO	24,523	25,697	4.8%	20,414	25,131	23.1%
AU	28,100	30,745	9.4%	26,974	31,184	15.6%
WA	24,714	26,968	9.1%	22,008	27,447	24.7%
BP	24,811	26,390	6.4%	21,850	26,622	21.8%
GI	22,148	25,024	13.0%	18,883	25,416	34.6%
HB	23,414	25,396	8.5%	20,018	25,467	27.2%
TK	24,774	26,169	5.6%	22,477	26,893	19.6%
MW	24,389	25,833	5.9%	21,784	25,436	16.8%
WE	27,995	31,047	10.9%	26,422	31,903	20.7%
WC	22,864	24,881	8.8%	19,435	22,954	18.1%
CB	25,268	26,628	5.4%	23,066	26,204	13.6%
OT	23,535	25,249	7.3%	21,309	24,883	16.8%
SL	23,211	24,991	7.7%	21,989	25,673	16.8%
TS	20,579	22,955	11.5%	18,179	22,075	21.4%
NE	24,602	25,317	2.9%	21,847	24,927	14.1%
MB	21,709	23,497	8.2%	20,150	23,387	16.1%
TOTAL	**25,858**	**27,749**	**7.3%**	**23,568**	**28,068**	**19.1%**

a. Median income of individuals reporting only wages as an income source.

b. Total median income for all individuals from all income sources.

Source: Te Puni Kokiri and Stats New Zealand

Table 4. Descriptive statistics for selected variables

		Maori				Non-Maori			
Variable	**Age**	**Mean**	**C.V.**	**Min**	**Max**	**Mean**	**C.V.**	**Min**	**Max**
		1996							
NM_{ij}	20-24	21.70	2.00	0	372	95.70	1.70	0	1176
W_j/W_i	20-24	1.03	0.08	0.84	1.21	1.04	0.08	0.81	1.28
U_j/U_i	20-24	0.89	0.31	0.50	1.99	1.03	0.21	0.70	1.48
NM_{ij}	25-44	22.98	1.51	0	201	128.75	1.79	0	1662
W_j/W_i	25-44	0.99	0.08	0.83	1.18	0.98	0.09	0.78	1.21
U_j/U_i	25-44	1.02	0.33	0.50	1.93	0.94	0.19	0.68	1.48
NM_{ij}	45-64	11.08	2.73	0	300	86.45	2.05	0	1194
W_j/W_i	45-64	0.98	0.08	0.83	1.21	0.97	0.08	0.78	1.21
U_j/U_i	45-64	1.08	0.32	0.50	1.99	0.95	0.20	0.68	1.48
		2001							
NM_{ij}	20-24	21.50	2.23	0	411	103.95	1.71	0	1224
W_j/W_i	20-24	1.03	0.11	0.73	1.36	1.05	0.10	0.82	1.35
U_j/U_i	20-24	0.91	0.48	0.30	2.83	1.06	0.27	0.52	2.06
NM_{ij}	25-44	19.23	1.38	0	138	151.18	1.76	0	1317
W_j/W_i	25-44	1.01	0.12	0.73	1.29	1.01	0.11	0.74	1.32
U_j/U_i	25-44	1.00	0.48	0.34	3.29	0.94	0.24	0.49	1.55
NM_{ij}	45-64	10.23	2.19	0	171	98.33	2.19	0	1350
W_j/W_i	45-64	0.99	0.11	0.73	1.29	0.97	0.11	0.74	1.25
U_j/U_i	45-64	1.09	0.44	0.30	3.11	0.93	0.24	0.49	1.52

Table 5. Seemingly unrelated regression results[a]

	Age Class		
Variable	**20-24**	**25-44**	**45-64**
ln (W_j/W_i)	1.866**	0.974	-2.540***
	(2.04)	(1.32)	(3.23)
ln (W_j/W_i) × Maori	1.548	-0.694	1.745*
	(1.29)	(0.70)	(1.66)
ln (U_j/U_i)	-0.053	-0.427	0.045
	(0.17)	(1.24)	(0.14)
ln (U_j/U_i) × Maori	-0.174	0.630	0.714*
	(0.48)	(1.64)	(1.94)
ln (Distance)	-0.403***	-0.539***	-0.583***
	(4.00)	(5.08)	(5.45)
ln (Distance) × Maori	0.139	0.260*	0.451***
	(1.00)	(1.73)	(3.01)
SN dummy[b]	-0.731***	-0.871***	-0.981***
	(5.26)	(5.66)	(6.36)
SN × Maori	-0.107	0.071	0.457**
	(0.54)	(0.33)	(2.11)
UNI dummy[c]	1.400***	0.482***	0.475***
	(8.30)	(2.71)	(2.71)
UNI × Maori	-0.530**	-0.033	-0.289
	(2.39)	(0.14)	(1.27)
ΔP (×1000)	0.017***	0.006***	0.007***
	(5.06)	(6.92)	(5.82)
ΔP×Maori (×1000)	0.106***	0.023***	0.066***
	(4.89)	(3.43)	(4.51)
Maori	-1.982**	-2.719***	-4.320***
	(2.35)	(2.99)	(4.78)
Intercept	5.069***	6.655***	6.448***
	(8.36)	(10.36)	(10.01)
Wu-Hausman test statistics (~T_{1404})[d]			
ln (W_j/W_i)	0.242	1.063	1.527
	(0.81)	(0.29)	(0.13)
ln (U_j/U_i)	0.257	0.902	0.040
	(0.80)	(0.37)	(0.97)

a. Dependent variable is ln(net migration). System-weighted R^2 = .528. N = 1440. t-values in parentheses. ***, **, and * denote significance at the .01, .05, and .10 levels, respectively.

b. Takes a value of 1 if move is between the North and South Islands, 0 otherwise.

c. Takes a value of 1 if either the origin or destination has a university (AU, WA, WE, CB, or OT), 0 otherwise.

d. Tests for endogeneity. P-values in parentheses.

Table 6. Response of net migration to different variables, Maori vs. non-Maori[a]

	20-24 Year Olds			25-44 Year Olds			45-64 Year Olds		
	Maori	Non-Maori	p-value of difference	Maori	Non-Maori	p-value of difference	Maori	Non-Maori	p-value of difference
W_j/W_i	3.41***	1.87**	.20	0.28	0.97	.48	-0.79	-2.54***	.10
U_j/U_i	-0.23	-0.05	.63	0.20	-0.43	.10	0.76***	0.04	.05
Distance	-0.26***	-0.40***	.32	-0.28***	-0.54***	.08	-0.13	-0.58***	<.01
SN dummy	-0.84***	-0.73***	.59	-0.80***	-0.87***	.74	-0.52***	-0.98***	.04
UNI dummy	0.87***	1.40***	.01	0.45***	0.48***	.89	0.19	0.47***	<.21

a. Values for relative wages, relative unemployment, distance, and population are elasticities. Values for the SN dummy variable indicate the average percentage change in net migration associated with moves between the North and South Islands. Values for the UNI dummy variable indicate the average percentage change in net migration for moves in which either the origin or destination has a major university (i.e., AU, WA, WE, CB, or OT). Asterisks denote that the response is significantly different from zero at the .01 level.