

**The Effect of Social Networks on Economic  
Outcomes: Evidence from Māori Ties to their Rohe**

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## **Abstract**

Mobility is constrained by moving costs and uncertain returns. Networks between origin and destination areas can substantially reduce moving costs and increase the returns from the move by improving labor market outcomes at the destination. In this paper, we use data from the New Zealand Census to examine the relationship between the strength of an individual's social networks and internal mobility and labor market outcomes. We focus on outcomes for Māori, which allows us to use traditional tribal ties to specific geographical regions as a measure of social networks, hence avoiding the typical problem of endogenously formed networks. We find that Maori who locate in their tribal area are strongly negatively selected on education, and that family considerations are an important consideration in this choice. Maori in their tribal area have modestly lower employment and hourly earnings than other Maori in the same labor market area, but our results suggest the small earnings difference hides both strong negative selection on unobservables, and a strong positive causal impact of living in the tribal area.

Keywords: Social Networks, Mobility, Labour Market Outcomes, New Zealand, Māori

## 1 Introduction

Human mobility across space is constrained by the costs and the uncertainty associated with any move, and by the legal restrictions which further bind the movement across borders (Pritchett, 2006). Networks between origin and destination areas created by past moves can substantially reduce moving costs (Massey et al., 1994, Palloni et al., 2001), increase the returns from the move by improving labor market outcomes at the destination (Munshi, 2003; Dustmann et al., 2011 ), and possibly help to circumvent legal restrictions on human mobility across countries (Dolphin and Genicot, 2010; Beine et al., 2011). This applies both to international and to internal migration; though within-country moves are not constrained by legal selection mechanisms and impose smaller costs, networks can play a key role in shaping the size and composition of the internal flows of minorities, as the seminal contributions by Carrington et al. (1996) showed for black migration in the United States and Kritz and Nogle (1994) for immigrants in the United States.

In this paper, we investigate empirically how networks affect the internal mobility and labor market outcomes of the Māori ethnic group in New Zealand. In general, the effects of social networks on outcomes, such as migration, are challenging to estimate because it is difficult to distinguish the effects of having a large peer group in one location from the factors that caused the peer group to congregate at that location in the first place. We address this challenge for Māori by using their traditional tribal ties to specific geographical regions as a measure of social networks. The iwi (loosely, tribe) is traditionally the largest socio-political organization in Māori society, and iwi members today retain strong ties to the rohe, or traditional region, of their iwi. Rohe, therefore, provide exogenous variation in the location decisions of Māori of different iwi, while iwi provide a convenient measure of the social groups of Māori individuals.

We hypothesize several interactions between networks, location decisions and labour market outcomes. The location decisions that individuals make will depend on both the economic (e.g. employment opportunities) and non-economics (e.g. local amenities) benefits of living in a particular area, as well as the economic (e.g. the cost of local housing) and non-economic (e.g. missing friends who do not live nearby) costs. Social networks potentially impact both economic and non-economic benefits and costs. For example, networks can help individuals find employment and lower the costs of going to work, say by providing childcare. But, they also potentially change people's preferences for leisure as there are obvious complementarities to having social networks and leisure time.

It is often suggested that Māori are less mobile than other ethnic groups because of attachment to particular geographical locations (Walker, 1990). If this is in fact the case, Māori may be disadvantaged because they are less likely to pursue employment opportunities outside locations in which they currently reside. Limited prior research has examined the location decisions of Māori.<sup>1</sup> Vaithianathan (1995) uses unit record data from the 1991 census to study the mobility of Māori between 1986 and 1991 compared to that of non-Māori in a multivariate framework. She finds that Māori are, on average, more mobile than non-Māori, but that Māori location decisions are less responsive than non-Māori decisions to changes in regional unemployment rates. She also finds that Māori living in their traditional iwi area are much less mobile than Māori living outside their iwi area. Renkow and Scrimgeour (2005) use grouped data from the 1996 and 2001 censuses to study the relative mobility of Māori between 1991 and 2001. They find that Māori location decisions are equally responsive to differences in regional unemployment and wage rates as non-Māori decisions.

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<sup>1</sup> A number of papers, including Kerr et al (2001), Maré and Timmins (2004), and Maré and Choy (2001) examine internal mobility in New Zealand using aggregate data, but are unable to analyse differences between population groups.

In this paper, we use unit record data from the 1996, 2001, and 2006 censuses to examine three related questions on the interaction between social networks and outcomes for Māori. First, we examine what characteristics predict whether Māori are likely to live in their rohe and in areas with larger populations of Māori from the same iwi. We evaluate the role of both individual and area level characteristics. Second, we examine the relationship between where Māori live, in particular whether they live in their rohe and how many other Māori of the same iwi live in the area, and their labour market outcomes, in particular employment and wages. Third, we evaluate whether any measured differences are likely to reflect selection among Māori who choose to live in particular areas or a causal impact of social networks on a particular outcomes.

We find that Māori who choose to live either in their rohe or an area where they have a strong iwi network are negatively selected on education. For instance, an individual with a university degree is over 9.5 percentage points less likely to live in his rohe than an individual with no qualifications. The relationship between family structure and living in one's rohe suggests family reasons are an important determinant of location choice; a man with a partner and dependent children is more likely to live in his rohe than a man with a partner and no dependent children, and a single man with dependent children is more likely again.

We next compare the labour market outcomes for a Māori living in his rohe relative to a Māori living in the same region, but for whom it is not his rohe. We find living in one's rohe is associated with about a 3 percentage point lower probability of employment, and a 1.5 to 2 percent lower hourly income, conditional on employment. These magnitudes are statistically significant, though economically modest. Similarly, labour market outcomes are poorer for those living in an area where they have a strong iwi network. However, this effect can be fully explained by such areas being more likely to be rohe.

Māori who live in a rohe or network area may have different outcomes because of either treatment or selection effects. We attempt to disentangle the two by comparing the outcomes of two types of Māori who currently live in the same region, which is not their rohe. The first type have migrated out of their rohe in the past five years, and the second have migrated out of non-rohe areas in the same period. Differences between the two will relate only to selection, because neither is currently in their rohe. To the extent that the selection of migrants out of rohe areas mirrors the selection of migrants out of non-rohe areas,<sup>2</sup> a comparison between these two types of migrant will be informative about the selection of individuals who choose to live in their rohe.

We find large differences in hourly earnings between the two groups: individuals who migrated from their rohe earn 9.3 to 9.9 percent less than those who migrated from other areas. When compared with the 1.5 to 2.5 percent less that individuals earn when living in their rohe, this suggests that strong negative selection into living in a rohe disguises a large positive impact of being in the rohe on hourly earnings for workers. On the other hand, we find limited evidence living in a rohe has more than a very modest negative causal impact on employment. Hence, our results suggest that rohe networks mainly help individuals find higher quality jobs as opposed to employment more generally.

## **2 Data**

This paper uses unit record data for the New Zealand population from the 1996, 2001 and 2006 censuses. Individuals can record up to three self-defined ethnicities on a census form. We differentiate between two groups of Māori in our analysis; sole Māori, being individuals who report Māori as their only ethnicity, and mixed Māori, being individuals who report

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<sup>2</sup> The next stage of our research will investigate the extent to which this assumption is likely to hold.

Māori ethnicity and at least one other ethnicity.<sup>3</sup> We restrict our analysis to the male New Zealand-born Māori population aged 30–59. We focus on this age group because students and individuals nearing retirement tend to migrate for quite different reasons from working-aged people. In some of our models, we condition on an individual’s location five years prior to the current census. At this point, individuals in our sample were as young as 25, so their previous location was also likely to be primarily determined by labour market rather than education considerations. Excluding Māori born outside New Zealand drops very few individuals and we suspect that these people may have very different networks and outcomes than New Zealand-born Māori. We currently focus on males, because they are more likely than females to be the primary earners in their household, and thus household location decisions are more likely to depend on their labour market opportunities.<sup>4</sup>

Information is collected in each census about the current usual residential location of each individual and their usual residential location (including overseas) five years before the census date (i.e. at the time of the previous census). The location information is coded to the relatively fine census ‘area unit’ level.<sup>5</sup> Newell and Papps (2001) have estimated the geographical boundaries of local labour market areas (LMAs) using an algorithm that ensures that most people who live in a particular LMA work in it and most people who work in a particular LMA live in it.<sup>6</sup> This procedure creates 140 LMAs; these are the geographical aggregation that we focus on in this area when comparing people living in the same location.

The census asks individuals with Māori ancestry to list up to five iwi affiliations. The term iwi can loosely be translated as tribe. The iwi is traditionally the largest socio-political

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<sup>3</sup> Chapple (1999) shows that this can be an important distinction when examining labour market outcomes for Māori.

<sup>4</sup> We plan to replicate our analysis for women.

<sup>5</sup> At the time of the 2001 census, there were 1,860 area units in New Zealand, with an average of 2,010 individuals living in each area unit.

<sup>6</sup> The addresses recorded on the census form are not always sufficient for assigning an LMA to either the current or previous residence. We drop individuals with incomplete addresses from our analysis.

organisation in Māori society, and is generally a territorial entity. It fits within the traditional hierarchy, based on kinship and descent, of waka (founding canoe), iwi (tribe), hapu (sub-tribe) and whanau (family). Iwi do not have to conform to any particular specifications in terms of size or other characteristics and are an evolving set.<sup>7</sup>

We drop from our analysis sample Māori who do not report an iwi affiliation. Māori without an iwi affiliation are a heterogeneous group including individuals reporting Māori ethnicity but not Māori ancestry, Māori who report an iwi affiliation that cannot be classified by SNZ, Māori who do not answer the iwi affiliation question, and Māori who truly do not have an iwi affiliation. Most importantly for our analysis, we cannot calculate social networks for these individuals. For the remaining individuals, we focus on the rohe of their first affiliation.<sup>8</sup> We use data collected by Te Puni Kōkiri (the New Zealand Ministry of Māori Affairs) from each iwi on what they consider to be their territorial area (i.e. rohe).<sup>9</sup> This information can be matched using geocoding software to an individual's usual location as measured in the census. This allows us to code whether an individual currently lives in his rohe. Similarly, we can determine whether an individual lived in his rohe five years earlier.

We also use the locations of iwi members to create measures of the strength of an individual's iwi network in his current LMA. Our primary measure of network strength is calculated as the number of iwi members as a fraction of the total population of the LMA

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<sup>7</sup> For example, SNZ periodically reviews its list of iwi, considering new possibilities for iwi in terms of a number of guidelines. At the time of the 2001 census, it recognised approximately 95 individual iwi. Of these, 13 had more than ten thousand members, 14 had between five and ten thousand, 32 had between one and five thousand and 36 had fewer than one thousand members.

<sup>8</sup> The majority of Māori who provide an affiliation provide only one. For the remainder, we have considered a number of possible approaches for calculating multiple measures of social networks, but have not implemented these yet.

<sup>9</sup> These data were provided to us by TPK. Of the 111 iwi that Te Puni Kōkiri recognises, geographical information is currently unavailable for 9. We drop individuals who are affiliated with these iwi. We also drop individuals who are affiliated with iwi based on the South Island since the rohe for the largest South Island iwi, Ngāi Tahu, covers almost the entire South Island. We further exclude TPK iwi that cannot be mapped to iwi in the census, leaving us with 80 iwi for our analysis.

(ln), where the total population includes people of all ethnicities. This is intended to capture the probability that a random person encountered in the LMA belongs to the same iwi.

### **3 Empirical strategy**

To investigate who is more likely to live in his traditional iwi area, we estimate a probit regression where the dependent variable is an indicator for the individual currently living in his rohe. We control for individual characteristics of interest, including age, education, ethnicity, and family characteristics, and account for differences in rohe sizes by either controlling for the fraction of Māori of other iwi living in the individual's rohe or including iwi fixed effects. To investigate the determinants of living in an area where one has strong iwi networks, we run similar OLS regressions where the dependent variable is strength of iwi network in the current LMA.

We compare the labour market outcomes of Māori living in their rohe to those living in other areas using probit regressions for being employed and OLS regressions for hourly income conditional on being employed. Our focus is on the coefficient for a dummy variable for living in one's rohe, controlling for individual characteristics. We include iwi fixed effects to allow for different iwi to have different average unobservable characteristics, and run specifications with and without LMA fixed effects. Including LMA fixed effects allows us to control for the fact that certain rohe may be in areas with weaker labour markets. Regressions that include LMA fixed effects compare outcomes of Māori from different iwi who currently live in the same LMA (and thus face the same labour market opportunities) but only some of whom are in their rohe. To investigate the relationship between labour market outcomes and living in an area with a strong iwi network, we add to these regressions a control for iwi network strength and its interaction with living in one's rohe.

Māori who currently live in their rohe (or similarly an area where they have a strong network) may be self-selected on unobservable characteristics that affect labour market

outcomes and may also benefit from (or face costs of) their local networks. To attempt to disentangle these effects, we study the outcomes of such individuals after they have left their rohe. Specifically, we consider the sample of all Māori who currently do not live in their rohe and compare the outcomes of those who a) have moved between LMAs in the past five years and lived in their rohe five years ago, b) have moved between LMAs in the past five years and did not live in their rohe five years ago, and c) have not moved between LMAs in the past five years. The comparison between the first two groups is of primary interest. Neither group is currently affected by any causal impact that living in one's rohe has on labour market outcomes. Since we include LMA fixed effects and so hold labour market opportunities fixed, any difference in labour market outcomes is driven by different unobservable characteristics, such as ability. To the extent that the selection of migrants out of rohe areas mirrors the selection of migrants out of non-rohe areas, a comparison between these two types of migrant is informative about the selection of individuals who choose to live in their rohe. The difference between the magnitude of this selection effect and the difference in outcomes for those who live in their rohe can thus be attributed to the causal impact of living in one's traditional area on labour market outcomes.

## **4 Results**

### *4.1 Who is more likely to live in the traditional area of his iwi?*

We begin by examining which characteristics predict whether Māori are likely to live in their rohe. In Table 1, we present the results of probit regressions that predict whether an individual lives in the rohe (traditional area) of his first iwi affiliation. The columns of the table vary the controls included in the regression. Note that none of these relationships should be interpreted as causal because endogeneity is a distinct possibility. For instance, Māori with degrees may choose not to live in their rohe because other locations offer higher returns to

their skills, but those who plan to live away from their rohe may pursue higher qualifications because their location choice means this investment will yield higher returns.

In the regression sample, 23 percent of Māori live in the rohe of their first iwi affiliation. Across specifications, we see that highest qualification is strongly negatively correlated with living in the rohe: relative to an individual with no formal qualifications, an individual with school qualifications is roughly 3.5 percentage points less likely to live in his rohe, one with post-school qualifications is 4 percentage points less likely, and one with a degree is over 9.5 percentage points less likely. Ethnic background is also strongly related. People who give Māori as their only ethnicity are 8.5 percentage points more likely to live in their rohe than those who claim multiple ethnicities.

Marital status is also correlated with living in one's rohe, though the magnitude of the relationship is weaker. The never married and those who have been widowed are similarly likely to live in their rohe, while the legally or defacto married and those who are divorced or separated are 2.0 to 2.5 percentage points less likely to live in their rohe. On the other hand, family structure is strongly related to living in one's rohe. Relative to a man who is part of a couple without dependent children, one in a couple with dependent children is 3.6% more likely to live in his rohe, and a single father with dependent children is 8% more likely to live in his rohe. Although again these relationships cannot be interpreted causally, they do suggest that an important reason one might choose to live in one's rohe relates to the availability of support from whanau in raising children.

One point to note is that none of the coefficients in these regressions change much when iwi fixed effects are included, which suggests that the relationships hold within iwi and are not driven by members of certain iwi having different average background characteristics and also being more likely to live in their rohe.

In Table 2, we move on to investigate whether certain characteristics of rohe are related to iwi members being disproportionately likely to live in their rohe. These regressions omit iwi fixed effects, which are collinear with the rohe characteristics we are investigating, but control for the probability an iwi member would live in his rohe by pure chance by including as a RHS variable the fraction of the Māori population of other iwi that lives in the rohe. The coefficients from this model should thus be interpreted as the relationship between rohe characteristics and the probability that an iwi member lives in the area conditional on how attractive that area is for Māori in general.

In columns 1 to 4, we control for several alternative measures of the urbanization of the rohe: population density, the population of the largest town in the rohe (ln), the fraction of the total rohe population that lives in a town of 30 thousand people or more, and the average distance of the population of the rohe from a town of 30 thousand people or more. Only population density and distance from town are statistically significantly related to living in the rohe. The coefficient on population density suggests that an increase in rohe population density from the level of the West Coast Region (1 person per square km) to the level of the Auckland Region (240 people per square km) corresponds to a 10 percent increase in the probability an iwi member lives in the rohe. This coefficient is significant at the 10% level. The coefficient on distance from town suggests that a 1 km increase in the average distance of rohe inhabitants from town corresponds to a 2 percentage point decrease in the probability an iwi member lives in the rohe.

In column 5 we instead control for the fraction of the employed European population that has a tertiary qualification, which is intended to proxy for the demand for skilled workers in the rohe labour market. This variable is not significantly related to living in the rohe. Next, in column 6, we include two controls for the strength of the labour market in the rohe, namely the fraction employed of Europeans aged 20 or over, and the fraction employed of Māori

aged 20 or over. Both variables are strongly correlated with living in the rohe but, perhaps surprisingly, although the coefficient on Māori employment is positive as expected, the coefficient on European employment is negative. The magnitude of the coefficient on Māori employment suggests that a 5 percentage point increase in employment corresponds to a 4 percentage point decrease in the probability of living in the rohe.

Column 7 shows that opportunities for higher education in the rohe, as measured by minimum distance to a university or polytechnic, are not strongly correlated with living in the rohe.<sup>10</sup> Finally, column 8 shows that when the population density, distance from town and employment rate variables are all included in the same regression, the only robust relationship is between local employment opportunities and whether an individual lives in his rohe.

#### *4.2 Who is more likely to live in an area with a stronger concentration of his iwi members?*

We next examine which individual characteristics are associated with living in a LMA with a large concentration of individuals from the same iwi. Māori may choose to live in their rohe because they feel a connection with the physical area, but they also may benefit, economically or otherwise, from the presence of friends and whanau. Table 3 presents results from OLS regressions where the dependent variable is iwi concentration in the individual's LMA of residence, defined as members of the individual's iwi in the LMA as a proportion of the total population of the LMA (ln).

These results largely mirror the results of the regressions for living in one's rohe: age is not strongly correlated with living in an area with a high concentration of one's iwi members; highest qualification is strongly negatively related; sole Māori ethnicity is strongly positively related; the (defacto) married, divorced or separated are less likely than the single to live in

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<sup>10</sup> We use information from the Tertiary Education Commission on the location of all universities and polytechnic schools in New Zealand available at <http://www.educationcounts.govt.nz/directories/list-of-tertiary-providers> to calculate the distance from the location of each iwi's rohe to the nearest university or polytechnic.

such an area; and those with dependent children, especially single parents, are more likely to live in such an area. It is worth mentioning that the similarity of these sets of results is not solely driven by a high correlation between rohe and areas of iwi concentration: the correlation between these variables is less than 0.5.

#### *4.3 How do the economic outcomes of Māori who live in their rohe differ?*

The economic outcomes of Māori who live in their rohe may differ from those of other Māori with the same observable characteristics for several reasons. First, rohe may tend to be in geographic areas with more limited economic opportunities. We can remove the effect of this mechanism by including LMA fixed effects in our regressions, so that we compare Māori who live in their rohe with Māori of other iwi who live in the same area, but for whom it is not their rohe. Second, Māori may value living in their rohe, intrinsically or because of benefits that do not translate into better economic outcomes, and thus may be willing to accept lower incomes in order to live in them. At the same time, there may be economic benefits from living in one's rohe, such as strong social networks that increase access to work opportunities. Third, Māori who choose to live in their rohe may be unobservably different to those who do not in terms of their earning potential, perhaps because they have lower innate ability, or are at a time in their lives when maximizing income is not a priority.

Here we investigate how the employment outcomes and incomes of Māori who live in their rohe differ from the outcomes of those who do not, without attempting to disentangle the mechanism of the relationship. Table 4 looks at how the probability of being employed differs for Māori living in their rohe. Seventy-one percent of the sample is employed.

The basic specification without marital status, family type or LMA fixed effects, presented in column 1, suggests that Māori who live in their rohe are 9.5 percentage points less likely to be employed than members of their iwi who live elsewhere. When we introduce LMA fixed effects, as in column 2, this effect falls to 3.3 percentage points, indicating that

over two-thirds of the difference in employment outcomes between Māori who live in their rohe and those who do not is caused by the average Māori facing a weaker employment environment in his rohe than elsewhere. However, the remaining 3.3 percentage points corresponds to 4.6 percent of the employment rate in the sample, which is a non-trivial magnitude.

Columns 3 to 6 of Table 4 replicate columns 1 and 2 with additional controls for marital status or family type. In the specifications with LMA fixed effects, these controls reduce the coefficient on living in one's rohe further, to a minimum of 2.5 percentage points in column 4. This suggests that Māori who live in their rohe are less likely to be employed partly because they are at states in their personal or family lives that are correlated with a lower probability of employment.

Overall, these results suggest that the decision to live in one's rohe is closely tied in to family events that are correlated with lower employment probability, but Māori who live in their rohe are still significantly less likely to be employed than observably identical Māori in the same area for whom it is not their rohe.

In Table 5, we go on to investigate how the hourly earnings of employed Māori differ for those who live in their rohe. These regressions tell the same story as the employment regressions: employed Māori who live in their rohe earn 1.5 to 2 percent less than observably identical Māori in the same LMA but for whom it is not their rohe. When we compare Māori of the same iwi without fixing LMA, the "home penalty" to hourly earnings is again much larger, at 6.7 to 7.2 percent.

#### *4.4 How do the outcomes of Māori who live near many members of their iwi differ?*

In Table 6, we investigate how employment and hourly income differ for Māori who live in an LMA with a high concentration of members of their iwi. Māori in these areas may have better outcomes because their iwi networks help them to find employment opportunities, or

worse outcomes because they are competing for jobs with more individuals who are similar to themselves. They may also be willing to give up economic opportunities for other benefits of living in these areas, and so have poorer outcomes, or have unobservable characteristics that mean they would tend to have poorer outcomes no matter where they lived.

We consider three different definitions of iwi concentration. The first is iwi members as a proportion of the total LMA population (ln), the second iwi members in the individual's 10-year age band as a proportion of the total LMA population (ln), and the third iwi members with the individual's education level as a proportion of the total LMA population (ln).

In each case, when we control for iwi concentration but not whether an individual lives in their rohe, the coefficient on iwi concentration is negative and significant, and suggests that a 10 percent increase in iwi concentration corresponds to a 0.6 percent decrease in the probability of being employed and a 0.6 percent decrease in hourly earnings conditional on employment. However, when we simultaneously control for iwi concentration and whether an individual lives in their rohe, we see this negative relationship is almost entirely driven by Māori who live in their rohe having poorer outcomes. Furthermore, we find no evidence that the relationship between outcomes and iwi concentration is different depending on whether an individual lives in their rohe.

The only iwi concentration definition for which the significant coefficient on iwi network survives controlling for living in a rohe is the third, which considers iwi members with the same educational level. These regressions suggest that, on top of any "home penalty" for being in a rohe, individuals have poorer economic outcomes if they live in LMAs with many members of their iwi with similar skills to them. Although we cannot interpret these relationships causally, they could suggest a mechanism whereby iwi members compete for limited jobs with others who are similar to them.

#### *4.5 Does the “rohe penalty” come from selection? Suggestive evidence*

In this section, we provide suggestive evidence on the role of selection in explaining the poorer labour market outcomes of Māori who live in their rohe. Any difference that is caused by the self-selection of individuals who choose to live in their rohe would persist if these individuals lived in a non-rohe area, but any difference caused by actually living in one’s rohe would not. Although we are unable to match individuals across censuses and cannot observe this counterfactual, we can use information contained in the census to approximate it. Specifically, each census includes a question on location five years earlier. We can thus identify individuals who previously lived in their rohe and observe their outcomes when this is no longer the case.

Specifically, we compare the outcomes of Māori who have moved out of their rohe in the previous five years with the outcomes of those who have moved out of a non-rohe area, and also with non-migrants’ outcomes. We consider moves that involve a change in labour market only, because these longer-distance moves are more likely to relate to changes in employment opportunities. Although migrants who leave an area are unlikely to be representative of those who remain in the area, to the extent that the selection of migrants leaving a rohe area is similar to the selection of migrants leaving a non-rohe area, a comparison of rohe-leavers and other migrants will also be informative about the difference between rohe-stayers and other area stayers. Importantly, this methodology allows us to compare those who recently lived in their rohe with those who did not in the same labour market, but when neither is currently being affected by living in their rohe. We thus interpret differences in labour market outcomes of rohe-leavers relative to other migrants as suggestive of the magnitude of the selection effect associated with living in one’s rohe.

Table 7 presents results from probit regressions of employment that compare rohe-leavers with other migrants and non-migrants. We restrict the sample to those not currently

living in their rohe. In the specifications that include LMA fixed effects, which compare individuals living in the same area, we see rohe-leavers are 1.7 to 2.1 percentage points less likely to be employed. In comparison, Māori who currently live in their rohe are 2.5 to 3.3 percentage points less likely to be employed than those who do not (Table 4). Comparisons of these magnitudes suggest that the types of individuals who choose to live in their rohe have unobservable characteristics that make them about 2 percentage points less likely to be employed regardless of where they live, and the causal effect of living in their rohe is that they are a further 1 percentage point less likely to be employed. The negative treatment effect is surprising if we expect employment benefits from being in an area with a high concentration of members of one's iwi. One potential explanation is that the marginal utility of leisure is higher for Māori in their rohe, so they choose slightly lower levels of labour market participation.

Table 8 presents the results from equivalent OLS regressions predicting hourly earnings among the employed. In every specification, the difference in hourly earnings between rohe-leavers and other migrants is marked: it ranges from 9.3 to 9.9 percent. When compared with the modest hourly earnings differences between Māori currently in their rohe and others, which range from 1.5 to 2.5 percent (Table 5), these magnitudes suggest that both the selection and causal effects of living in one's rohe on hourly earnings are large, but that they mostly cancel each other out. Māori who choose to live in their rohe appear to have unobservable characteristics that make their hourly earnings about 9.5 percent lower, but the benefit from living in the rohe is around an 8 percent higher earnings rate.

## **5 Conclusions**

In this paper, we examine how networks affect the internal mobility and labor market outcomes of the Māori ethnic group. In general, the effects of social networks on outcomes are challenging to estimate because it is difficult to distinguish the effects of having a large

peer group in one location from the factors that caused the peer group to congregate at that location in the first place. Our main contribution is that, by focusing on outcomes for Māori in New Zealand and using their traditional tribal ties to specific geographical regions as a measure of social networks, we are able to focus on exogenously determined social networks.

We use unit record data from the 1996, 2001, and 2006 censuses to examine three related questions on the interaction between social networks and outcomes for Māori. First, we examine what characteristics predict whether Māori are likely to live in their rohe and in areas with larger populations of Māori from the same iwi. Second, we examine the relationship between where Māori live, in particular whether they live in their rohe and how many other Māori of the same iwi live in the area, and their labour market outcomes, in particular employment and wages. Third, we evaluate whether any measured differences are likely to reflect selection among Māori who choose to live in particular areas or a causal impact of social networks on a particular outcomes.

Our main findings are as follows. First, Māori who choose to live either in their rohe or an area where they have a strong iwi network are negatively selected on education. The relationship between family structure and living in one's rohe suggests family reasons are an important determinant of location choice. Second, we find living in one's rohe is associated with about a 3 percentage point lower probability of employment, and a 1.5 to 2 percent lower hourly income, conditional on employment. These magnitudes are statistically significant, though economically modest. Similarly, labour market outcomes are poorer for those living in an area where they have a strong iwi network, though this effect can be fully explained by such areas being more likely to be rohe. Third, our results suggest that strong negative selection into living in one's rohe disguises a large positive impact of being in the rohe on hourly earnings for workers. On the other hand, we find limited evidence living in a rohe has more than a very modest causal negative impact on employment. Hence, our results

suggest that rohe networks mainly help individuals find higher quality jobs as opposed to employment more generally.

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**Table 1: Less qualified, single, sole Maori with children are more likely to live in their rohe***Probit regression with dependent variable: Lives in the rohe (traditional area) of his iwi*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	0.002 (0.002)	-0.002 (0.002)	-0.003* (0.002)
Age squared (/100)	-0.000 (0.002)	0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)	0.004** (0.002)	0.004*** (0.002)
Qualifications: omitted category no qualifications						
School qualifications	-0.035*** (0.008)	-0.037*** (0.007)	-0.034*** (0.008)	-0.036*** (0.007)	-0.035*** (0.008)	-0.037*** (0.008)
Post-school qualifications	-0.040*** (0.011)	-0.043*** (0.011)	-0.038*** (0.011)	-0.041*** (0.010)	-0.040*** (0.011)	-0.043*** (0.010)
Degree	-0.095*** (0.013)	-0.100*** (0.011)	-0.094*** (0.013)	-0.099*** (0.011)	-0.094*** (0.013)	-0.099*** (0.011)
Specify Maori ethnicity only	0.085*** (0.007)	0.085*** (0.006)	0.084*** (0.006)	0.084*** (0.006)	0.084*** (0.007)	0.085*** (0.006)
Fraction of Maori population of other iwi living in rohe	1.510*** (0.099)		1.510*** (0.099)		1.510*** (0.100)	
Marital status: omitted category never married						
Legally married			-0.021** (0.009)	-0.021** (0.009)		
Defacto			-0.020*** (0.005)	-0.019*** (0.005)		
Divorced or separated			-0.026*** (0.005)	-0.025*** (0.005)		
Widowed			0.001 (0.013)	-0.000 (0.013)		
Family type: omitted category couple without dependent children						
Couple with dependent children					0.036*** (0.004)	0.036*** (0.004)
Single parent with dependent children					0.081*** (0.009)	0.080*** (0.010)
Single without dependent children					0.011*** (0.004)	0.012*** (0.004)
Single or couple, unknown children dependency					0.087*** (0.016)	0.085*** (0.016)
Dummy variables for missing qualifications and missing marital status	Yes	Yes	Yes	Yes	Yes	Yes
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Iwi fixed effects		Yes		Yes		Yes
<i>Pseudo R-Squared</i>	0.076	0.101	0.076	0.102	0.078	0.103
<i>Successes</i>	33,111	33,111	33,111	33,111	33,111	33,111
<i>Observations</i>	142,881	142,881	142,881	142,881	142,881	142,881

Notes: This table presents the marginal effects and their standard errors estimated from a probit regression where the dependent variable is an indicator for the individual living in the rohe (traditional area) of his first iwi affiliation. The sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. Successes and observations have been randomly rounded to base 3 for confidentiality reasons. Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 2: Iwi members are disproportionately likely to live in their rohe if it has a high rate of Maori employment***Probit regression with dependent variable: Lives in the rohe (traditional area) of his iwi*

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population density in rohe (000s/km <sup>2</sup> )	0.419*							-0.010
	(0.239)							(0.305)
Population of largest town in rohe (ln)		0.003						
		(0.011)						
Rohe does not contain a town		-0.041						
		(0.104)						
Fraction of rohe population living in a town of 30k+			0.025					
			(0.052)					
Average distance of rohe population from town of 30k+				-0.020**				-0.008
				(0.008)				(0.012)
Rate of tertiary qualifications among employed Europeans in rohe					0.196			
					(0.276)			
Fraction employed of Europeans aged 20+ in rohe						-0.654***		-0.621***
						(0.204)		(0.215)
Fraction employed of Maori aged 20+ of other iwi in rohe						0.854***		0.769***
						(0.195)		(0.215)
Minimum distance from rohe to university or polytechnic (ln)							0.003	
							(0.004)	
Fraction of Maori population of other iwi living in rohe	1.304***	1.416***	1.439***	1.262***	1.430***	1.300***	1.556***	1.229***
	(0.123)	(0.214)	(0.177)	(0.133)	(0.162)	(0.077)	(0.130)	(0.101)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pseudo R-Squared</i>	0.079	0.079	0.078	0.079	0.078	0.083	0.078	0.083
<i>Successes</i>	33,111	33,111	33,111	33,111	33,111	33,111	33,111	33,111
<i>Observations</i>	142,881	142,881	142,881	142,881	142,881	142,881	142,881	142,881

Notes: This table presents the marginal effects and their standard errors estimated from a probit regression where the dependent variable is an indicator for the individual living in the rohe (traditional area) of his first iwi affiliation. The sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. *Individual characteristics* include age, age squared, qualifications as Table 1, family type as in Table 1, and a dummy variable for specifying Maori ethnicity only. Successes and observations have been randomly rounded to base 3 for confidentiality reasons.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 3: Less qualified, single, sole Maori with children are more likely to live in a labour market area with a high concentration of their iwi members**

*OLS regression with dependent variable: Iwi members in the labour market area as a percentage of total population (ln)*

Variable	(1)	(2)	(3)
Age	0.008 (0.006)	0.013** (0.006)	-0.010* (0.006)
Age squared (/100)	-0.006 (0.006)	-0.010* (0.006)	0.018*** (0.006)
Qualifications: omitted category no qualifications			
School qualifications	-0.246*** (0.043)	-0.242*** (0.042)	-0.243*** (0.044)
Post-school qualifications	-0.264*** (0.042)	-0.258*** (0.040)	-0.263*** (0.041)
Degree	-0.619*** (0.075)	-0.613*** (0.074)	-0.611*** (0.075)
Specify Maori ethnicity only	0.391*** (0.050)	0.388*** (0.049)	0.389*** (0.049)
Marital status: omitted category never married			
Legally married		-0.069*** (0.022)	
Defacto		-0.059*** (0.018)	
Divorced or separated		-0.130*** (0.018)	
Widowed		0.074* (0.043)	
Family type: omitted category couple without dependent children			
Couple with dependent children			0.182*** (0.019)
Single parent with dependent children			0.392*** (0.046)
Single without dependent children			0.048*** (0.016)
Single or couple, unknown children dependency			0.402*** (0.048)
Dummy variable for missing qualifications	Yes	Yes	Yes
Dummy variable for missing marital status		Yes	
Census year fixed effects	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes
Iwi fixed effects	Yes	Yes	Yes
<i>R-Squared</i>	0.360	0.361	0.364
<i>Observations</i>	142,593	142,593	142,593

Notes: This table presents the coefficients and standard errors from an OLS regression where the dependent variable is Maori with the same first iwi affiliation in the labour market area (LMA) as a percentage of the total population of the LMA (ln). The sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi and those not in an identifiable labour market area. Observations have been randomly rounded to base 3 for confidentiality reasons.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 4: Maori who live in their rohe are less likely to be employed, even compared with other Maori in the same LMA***Probit regression with dependent variable: Employed*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
<b>Lives in rohe (traditional area) of first iwi affiliation</b>	<b>-0.095***</b> <b>(0.015)</b>	<b>-0.033***</b> <b>(0.005)</b>	<b>-0.095***</b> <b>(0.017)</b>	<b>-0.025***</b> <b>(0.005)</b>	<b>-0.096***</b> <b>(0.015)</b>	<b>-0.031***</b> <b>(0.005)</b>
Age	0.031*** (0.002)	0.032*** (0.002)	0.022*** (0.002)	0.023*** (0.002)	0.031*** (0.002)	0.032*** (0.002)
Age squared (/100)	-0.036*** (0.003)	-0.037*** (0.003)	-0.028*** (0.003)	-0.029*** (0.003)	-0.037*** (0.003)	-0.038*** (0.003)
Qualifications: omitted category no qualifications						
School qualifications	0.140*** (0.004)	0.138*** (0.004)	0.127*** (0.004)	0.125*** (0.004)	0.131*** (0.004)	0.129*** (0.004)
Post-school qualifications	0.157*** (0.004)	0.157*** (0.003)	0.137*** (0.004)	0.136*** (0.003)	0.146*** (0.004)	0.145*** (0.003)
Degree	0.200*** (0.003)	0.198*** (0.003)	0.183*** (0.003)	0.178*** (0.003)	0.190*** (0.003)	0.186*** (0.003)
Specify Maori ethnicity only	-0.063*** (0.003)	-0.061*** (0.003)	-0.046*** (0.004)	-0.043*** (0.004)	-0.048*** (0.004)	-0.045*** (0.004)
Marital status: omitted category never married						
Legally married			0.277*** (0.003)	0.280*** (0.003)		
Defacto			0.185*** (0.003)	0.186*** (0.003)		
Divorced or separated			0.065*** (0.004)	0.065*** (0.004)		
Widowed			0.043*** (0.008)	0.049*** (0.007)		
Family type: omitted category couple without dependent children						
Couple with dependent children					-0.022*** (0.004)	-0.017*** (0.004)
Single parent with dependent children					-0.359*** (0.005)	-0.353*** (0.005)
Single without dependent children					-0.223*** (0.003)	-0.222*** (0.004)
Single or couple, unknown children dependency					-0.046*** (0.017)	-0.032** (0.014)
Dummy variable for missing qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Dummy variable for missing marital status			Yes	Yes		
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Iwi fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LMA fixed effects		Yes		Yes		Yes
<i>Pseudo R-Squared</i>	0.061	0.074	0.118	0.132	0.108	0.120
<i>Successes</i>	101,253	101,223	101,253	101,223	101,253	101,223
<i>Observations</i>	142,881	142,851	142,881	142,851	142,881	142,851

Notes: This table presents the marginal effects and their standard errors estimated from a probit regression where the dependent variable is being employed. The sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. Successes and observations have been randomly rounded to base 3 for confidentiality reasons.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 5: Employed Maori who live in their rohe earn lower wage rates, even compared with other Maori in the same LMA**

OLS regression with dependent variable: Hourly earnings (ln)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
<b>Lives in rohe (traditional area) of first iwi affiliation</b>	<b>-0.067***</b>	<b>-0.020***</b>	<b>-0.067***</b>	<b>-0.015**</b>	<b>-0.072***</b>	<b>-0.022***</b>
	<b>(0.018)</b>	<b>(0.007)</b>	<b>(0.019)</b>	<b>(0.007)</b>	<b>(0.018)</b>	<b>(0.007)</b>
Age	0.040***	0.042***	0.030***	0.032***	0.033***	0.034***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Age squared (/100)	-0.042***	-0.043***	-0.033***	-0.035***	-0.032***	-0.033***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Qualifications: omitted category no qualifications						
School qualifications	0.162***	0.156***	0.155***	0.148***	0.162***	0.155***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Post-school qualifications	0.198***	0.191***	0.184***	0.176***	0.193***	0.186***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)
Degree	0.497***	0.476***	0.481***	0.459***	0.495***	0.473***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Specify Maori ethnicity only	-0.077***	-0.075***	-0.062***	-0.059***	-0.068***	-0.065***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
Marital status: omitted category never married						
Legally married			0.265***	0.269***		
			(0.008)	(0.008)		
Defacto			0.161***	0.164***		
			(0.008)	(0.007)		
Divorced or separated			0.129***	0.132***		
			(0.009)	(0.009)		
Widowed			0.231***	0.236***		
			(0.023)	(0.023)		
Family type: omitted category couple without dependent children						
Couple with dependent children					0.056***	0.063***
					(0.006)	(0.006)
Single parent with dependent children					-0.021	-0.013
					(0.014)	(0.014)
Single without dependent children					-0.118***	-0.114***
					(0.008)	(0.008)
Single or couple, unknown children dependency					0.032*	0.053***
					(0.016)	(0.017)
Dummy variable for missing qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Dummy variable for missing marital status			Yes	Yes		
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Iwi fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LMA fixed effects		Yes		Yes		Yes
<i>Pseudo R-Squared</i>	0.083	0.100	0.101	0.118	0.093	0.111
<i>Observations</i>	93,846	93,846	93,846	93,846	93,846	93,846

Notes: This table presents the coefficients and standard errors from an OLS regression where the dependent variable is hourly earnings (ln). Hourly earnings are calculated as annual earnings/(48 x weekly hours). The sample includes those with positive earnings only. It includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. Observations have been randomly rounded to base 3 for confidentiality reasons. Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 6: Maori who live in LMAs with high concentrations of their iwi members do not show strongly different employment or earnings outcomes**

Iwi concentration measure:	ln(iwi members/total population)			ln(iwi members in age group /total population)			ln(iwi members with same education level/total population)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Panel A: Probit regression with dependent variable: Employed</b>									
Iwi concentration	-0.006*** (0.002)	-0.001 (0.001)	-0.000 (0.001)	-0.006*** (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.007*** (0.001)	-0.003** (0.001)	-0.002* (0.001)
Lives in rohe (traditional area) of first iwi affiliation		-0.023*** (0.006)	-0.028* (0.016)		-0.023*** (0.005)	-0.023 (0.022)		-0.018*** (0.006)	-0.039** (0.017)
Iwi concentration x Lives in rohe			-0.002 (0.004)			-0.000 (0.004)			-0.004 (0.003)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LMA fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pseudo R-Squared</i>	0.137	0.137	0.137	0.137	0.137	0.137	0.136	0.137	0.137
<i>Successes</i>	100,941	100,941	100,941	100,218	100,218	100,218	100,338	100,338	100,338
<i>Observations</i>	142,494	142,494	142,494	141,567	141,567	141,567	141,801	141,801	141,801
<b>Panel B: OLS regression with dependent variable: Hourly earnings (ln)</b>									
Iwi concentration	-0.006** (0.002)	-0.003 (0.003)	-0.003 (0.003)						
Lives in rohe (traditional area) of first iwi affiliation		-0.011 (0.009)	-0.007 (0.007)						
Iwi concentration x Lives in rohe			-0.004 (0.005)						
Other controls	Yes	Yes	Yes						
LMA fixed effects	Yes	Yes	Yes						
<i>R-Squared</i>	0.119	0.120	0.120						
<i>Observations</i>	93,621	93,621	93,621						

Notes: Panel A of this table presents the marginal effects and their standard errors estimated from a probit regression where the dependent variable is being employed. Panel B presents the coefficients and standard errors from OLS regressions where the dependent variable is hourly earnings (ln), calculated as (annual earnings)/(48 x weekly hours). In both panels, the sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation. Panel B includes only those with positive incomes. Age groups for the iwi concentration measure are 30-39, 40-49 and 50-59; educational groups are no qualifications (including missing qualifications), school qualifications, post-school qualifications, and degree. *Other controls* include age, age squared, qualifications as in Table 1, a dummy variable for Maori ethnicity only, marital status as in Table 1, family type as in Table 1, census year fixed effects, number of iwi affiliations fixed effects, and iwi fixed effects.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 7: Maori who recently migrated from their rohe have lower employment than those who migrated from other areas***Probit regression with dependent variable: Employed*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
<b>Migrant category: omitted category moved from a non-rohe area</b>						
<b>Moved from a rohe area</b>	<b>-0.028***</b> <b>(0.007)</b>	<b>-0.021***</b> <b>(0.007)</b>	<b>-0.023***</b> <b>(0.007)</b>	<b>-0.017***</b> <b>(0.006)</b>	<b>-0.024***</b> <b>(0.007)</b>	<b>-0.017**</b> <b>(0.007)</b>
<b>Did not move between LMAs</b>	<b>0.073***</b> <b>(0.003)</b>	<b>0.072***</b> <b>(0.003)</b>	<b>0.059***</b> <b>(0.003)</b>	<b>0.055***</b> <b>(0.003)</b>	<b>0.056***</b> <b>(0.003)</b>	<b>0.054***</b> <b>(0.003)</b>
Age	0.027*** (0.002)	0.028*** (0.002)	0.018*** (0.002)	0.019*** (0.002)	0.028*** (0.002)	0.028*** (0.002)
Age squared (/100)	-0.032*** (0.003)	-0.033*** (0.003)	-0.025*** (0.003)	-0.026*** (0.003)	-0.034*** (0.003)	-0.034*** (0.003)
Qualifications: omitted category no qualifications						
School qualifications	0.128*** (0.006)	0.126*** (0.006)	0.116*** (0.005)	0.112*** (0.005)	0.120*** (0.005)	0.117*** (0.005)
Post-school qualifications	0.141*** (0.003)	0.140*** (0.003)	0.122*** (0.003)	0.120*** (0.003)	0.130*** (0.003)	0.128*** (0.003)
Degree	0.181*** (0.004)	0.178*** (0.005)	0.163*** (0.004)	0.159*** (0.005)	0.170*** (0.004)	0.166*** (0.005)
Specify Maori ethnicity only	-0.051*** (0.003)	-0.048*** (0.003)	-0.035*** (0.004)	-0.032*** (0.004)	-0.036*** (0.004)	-0.033*** (0.004)
Marital status: omitted category never married						
Legally married			0.256*** (0.003)	0.257*** (0.003)		
Defacto			0.166*** (0.003)	0.167*** (0.003)		
Divorced or separated			0.059*** (0.004)	0.059*** (0.004)		
Widowed			0.030*** (0.010)	0.034*** (0.009)		
Family type: omitted category couple without dependent children						
Couple with dependent children					-0.022*** (0.003)	-0.017*** (0.003)
Single parent with dependent children					-0.360*** (0.006)	-0.354*** (0.006)
Single without dependent children					-0.203*** (0.004)	-0.202*** (0.004)
Single or couple, unknown children dependency					-0.057** (0.023)	-0.047** (0.021)
Dummy variable for missing qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Dummy variable for missing marital status			Yes	Yes		
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Iwi fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LMA fixed effects		Yes		Yes		Yes
<i>Pseudo R-Squared</i>	0.055	0.067	0.110	0.123	0.100	0.112
<i>Successes</i>	73,308	73,278	73,308	73,278	73,308	73,278
<i>Observations</i>	97,956	97,926	97,956	97,926	97,956	97,926

Notes: This table presents the marginal effects and their standard errors estimated from a probit regression where the dependent variable is being employed. The sample includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation, and who do not currently live in the rohe of their first iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. Migrants are those who live in a different labour market area currently relative to 5 years ago. Migrants are distinguished by whether 5 years ago they lived in an area unit that is part of their rohe. Successes and observations have been randomly rounded to base 3 for confidentiality reasons.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.

**Table 8: Maori who recently migrated from their rohe have lower wage rates than those who migrated from other areas**

OLS regression with dependent variable: Hourly earnings (ln)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
<b>Migrant category: omitted category moved from a non-rohe area</b>						
Moved from a rohe area	<b>-0.099***</b> (0.016)	<b>-0.099***</b> (0.015)	<b>-0.093***</b> (0.016)	<b>-0.094***</b> (0.015)	<b>-0.096***</b> (0.015)	<b>-0.097***</b> (0.014)
Did not move between LMAs	<b>0.075***</b> (0.007)	<b>0.060***</b> (0.006)	<b>0.066***</b> (0.007)	<b>0.048***</b> (0.006)	<b>0.062***</b> (0.007)	<b>0.045***</b> (0.006)
Age	0.037*** (0.004)	0.039*** (0.004)	0.028*** (0.004)	0.030*** (0.004)	0.030*** (0.004)	0.032*** (0.004)
Age squared (/100)	-0.040*** (0.005)	-0.041*** (0.005)	-0.031*** (0.005)	-0.033*** (0.005)	-0.031*** (0.005)	-0.032*** (0.004)
Qualifications: omitted category no qualifications						
School qualifications	0.173*** (0.005)	0.166*** (0.006)	0.166*** (0.005)	0.157*** (0.005)	0.173*** (0.005)	0.164*** (0.006)
Post-school qualifications	0.211*** (0.006)	0.202*** (0.007)	0.196*** (0.007)	0.187*** (0.007)	0.206*** (0.007)	0.197*** (0.007)
Degree	0.513*** (0.009)	0.489*** (0.008)	0.496*** (0.009)	0.470*** (0.008)	0.510*** (0.009)	0.484*** (0.008)
Specify Maori ethnicity only	-0.077*** (0.004)	-0.075*** (0.004)	-0.062*** (0.004)	-0.060*** (0.004)	-0.068*** (0.004)	-0.066*** (0.004)
Marital status: omitted category never married						
Legally married			0.259*** (0.010)	0.266*** (0.010)		
Defacto			0.159*** (0.010)	0.164*** (0.010)		
Divorced or separated			0.132*** (0.010)	0.135*** (0.010)		
Widowed			0.243*** (0.033)	0.251*** (0.033)		
Family type: omitted category couple without dependent children						
Couple with dependent children					0.053*** (0.007)	0.059*** (0.007)
Single parent with dependent children					-0.018 (0.016)	-0.010 (0.015)
Single without dependent children					-0.105*** (0.010)	-0.104*** (0.009)
Single or couple, unknown children dependency					0.043* (0.022)	0.064*** (0.022)
Dummy variable for missing qualifications	Yes	Yes	Yes	Yes	Yes	Yes
Dummy variable for missing marital status			Yes	Yes		
Census year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of iwi affiliations fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Iwi fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LMA fixed effects		Yes		Yes		Yes
<i>Pseudo R-Squared</i>	0.090	0.106	0.107	0.124	0.099	0.115
<i>Observations</i>	68,538	68,538	68,538	68,538	68,538	68,538

Notes: This table presents the coefficients and standard errors from an OLS regression where the dependent variable is hourly earnings (ln). Hourly earnings are calculated as annual earnings/(48 x weekly hours). The sample includes those with positive earnings only. It includes NZ-born males aged 30-59 who state Maori as an ethnicity and give at least one iwi affiliation, and who do not currently live in the rohe of their first iwi affiliation. The sample years are 1996, 2001 and 2006. We drop individuals who state affiliation with a South Island iwi. Migrants are those who live in a different labour market area currently relative to 5 years ago. Migrants are distinguished by whether 5 years ago they lived in an area unit that is part of their rohe. Observations have been randomly rounded to base 3 for confidentiality reasons.

Standard errors are clustered at the first iwi level. Asterisks denote significance at: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01.