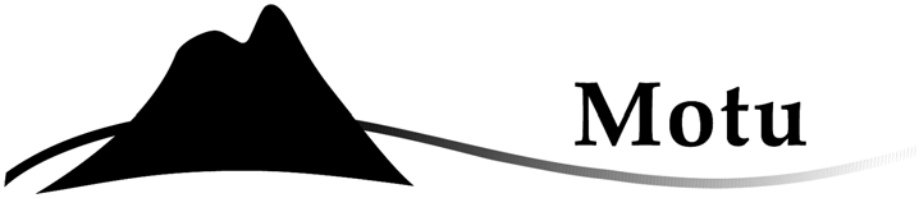

The Impact of Immigration on the Geographic Mobility of New Zealanders

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Abstract

This paper uses data from the New Zealand Census to examine how the supply of recent migrants in particular skill groups affects the geographic mobility of the New Zealand-born and earlier migrants. We identify the impact of recent migration on mobility using the 'area-analysis' approach, which exploits the fact that immigration is spatially concentrated, and thus a change in the local supply of migrants in a particular skill group should have an impact on the mobility of similarly skilled non-migrants in that local labour market. Overall, our results provide little support for the hypothesis that migrant inflows displace either the NZ-born or earlier migrants with similar skills in the areas that new migrants are settling. If anything, they suggest that there are positive spillovers between recent migrants and other individuals that encourage individuals to move to or remain in the areas in which similarly skilled migrants are settling. Thus, it appears unlikely that internal mobility moderates any potential impacts of immigration on labour or housing markets in New Zealand.

JEL classifications: J61, R23

Keywords: Immigration, Mobility, New Zealand, Labour Market Areas

1 Introduction

Twenty-three percent of New Zealand's population is foreign-born and forty percent of migrants have arrived in the past ten years. Newly arriving migrants tend to settle in spatially concentrated areas and this is especially true in New Zealand. For example, almost 60% of migrants arriving in NZ between 1996 and 2001 lived in either Central or South Auckland at the time of the 2001 census. A further 10% lived in Wellington and 8% lived in Christchurch. These large contingents of new arrivals may encourage previously settled individuals in these areas to move elsewhere for a number of reasons. First, inflows of recent migrants may make employment more difficult to find and/or depress wages for the employed (Borjas 1999). Second, housing prices or rents might increase in response to these inflows, encouraging individuals to move to new areas (Saiz 2006). Third, individuals may have general preferences to live in neighbourhoods that do not have large numbers of recent migrants (Bayer and McMillan 2005) and/or may pre-emptively leave an area before recent migrants have a chance to affect either the labour or housing market.

In this paper, we use data from the 1996 and 2001 Census to examine how the supply of migrants in particular skill-groups affects the geographic mobility of the New Zealand-born and of earlier migrants. We identify the impact of recent migrants on the geographical mobility of other individuals using the 'area-analysis' approach, which exploits the fact that immigration is spatially concentrated, and thus a change in the local supply of migrants in a particular skill group should have an impact on outcomes of similarly skilled individuals in that local labour market. This empirical approach allows us to examine whether settled individuals are displaced by new migrants and whether the NZ-born and earlier migrants respond differently to these inflows.

A large literature examines the impact of immigration on labour market outcomes for non-migrants (see Longhi et. al. 2005; 2006 for a meta-analysis of many of these papers). A

majority of these papers have found immigration to have a limited impact. However, it has been argued that a spatial comparison of the labour market outcomes of non-migrant workers in different localities may not provide valuable information about the economic impact of immigration, because immigration may affect all areas of the country, not just the ones that actually receive immigrants (Borjas et. al. 1996, 1997; Borjas 2003). One way that this will occur is if the supply of new migrants to local labour markets encourages outward migration of non-migrants and earlier migrants. Thus, the results in this paper allow us to judge whether internal mobility is likely to moderate the labour market impacts of immigration in New Zealand.

A few papers examine the impact of immigration on the geographic mobility of non-migrants in the US. As with the labour market-impact literature, overall, these studies provide inconclusive evidence, with some finding strong effects (Borjas 2005; Filer 1992; and Frey 1995), and other reporting little connection (Card 2001; and Kritz and Gurak 2001). Besides being inconclusive, it is difficult to know whether these findings are readily transferable to New Zealand, which unlike the US, has a small open-economy, a large-scale and highly structured immigration system that focuses mainly on higher-skilled migrants, little low-skilled illegal immigration, and a highly mobile population both internally and internationally (Poot and Cochrane 2004; Maré and Timmins 2005; Maré and Choy 2001). Previous work has shown that institutional differences may be particularly important in determining the impact that immigration has on a host country (Angrist and Kugler 2003; Borjas 1999). Thus, it is highly likely that an examination New Zealand data is required in order to understand the impact of immigration on New Zealanders.

2 Data and Sample Characteristics

2.1 Data Sources and Variable Definitions

This paper uses unit record data for the entire usually resident New Zealand population from the 1996 and 2001 Census.[1] The Census collects information on an individual's country of birth and their year of first arrival in New Zealand.[2] Individuals are classified as being either New Zealand-born, a recent migrant or an earlier migrant, where recent migrants are all individuals who first arrived in New Zealand 0-5 years ago and were born in a foreign country and earlier migrants are all other individuals born in a foreign country. Information is also collected 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). This location information is coded to the relatively fine census 'area unit' level, allowing us to identify local labour market areas (LMAs).[3] In practice, we utilize the LMAs defined in Newell and Papps (2001) using an algorithm that ensures that most people who live in one LMA work in it, and most people who work in one LMA live in it.[4] Focusing on functional local labour market areas has major advantages over using administratively defined geographic areas, as migration between LMAs is typically related to employment mobility, whereas migration within a LMA more strongly reflects residential factors (Maré and Timmins 2005).

[1] We also have access to the 1986 and 1991 Census data, but chose to focus on the 1996 and 2001 for three reasons: first, New Zealand underwent a period of comprehensive market-oriented economic reform from 1984-93 which would likely contaminate any results from the early time-period (Evans et al. 1996); second, the occupational classification system was changed between the 1991 and 1996 Census in a way that makes it impossible to create a consistent series over-time even at an aggregated level; and third, the 1991 Census did not ask foreign-born individuals their year of first arrival in New Zealand making it impossible to separate recent from earlier migrants in this Census.

[2] Country of birth is a write-in question. All responses are coded to a particular country or region, if the answer is incomplete.

[3] 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.

[4] Appendix A contains further information on how LMAs are created and a map of the 140 LMAs in New Zealand. There is an additional 'overseas' LMA.

We restrict our analysis throughout to individuals aged 25-54 with non-missing country of birth and years in New Zealand, if foreign-born.[5] We focus on this age group to exclude students and individuals nearing retirement. We also drop a small number of individuals for whom the address recorded on the census form is not sufficient for assigning an LMA to the current residence.[6] Out of the total analysis population of 1.45 million individuals in the 1996 Census, 80% are NZ-born, 5% recent migrants and 15% earlier migrants. For the 2001 Census, out of a total analysis population of 1.51 million, 79% are NZ-born, 6% recent migrants and 16% earlier migrants.

2.2 Sample Characteristics

Table 1 presents the demographic characteristics of the three sample groups (recent migrants, earlier migrants and NZ-born) in the 1996 and 2001 Census. As in most countries, recent migrants are younger than the non-immigrant population (for example, 48% are less than thirty-five versus 37% of the NZ-born in 1996 and 45% versus 34% in 2001). But unlike the US where most immigrants are low skilled, in New Zealand, recent migrants are much more qualified than the NZ-born, with 34% of recent migrants in 1996 (32% in 2001) having university degrees versus 9% of the NZ-born (12% in 2001). This is reflected throughout the qualification distribution, with few migrants having no qualifications compared to the NZ-born.[7] This comes as no big surprise given that NZ operates a highly structured immigration system that focuses mainly on higher-skilled migrants.

The source country distribution of recent immigrants is fairly stable over the ten-years examined here, but there is evidence that immigrants from the Pacific and South America, Africa, and the Middle East are becoming more common and those from the British Isles,

[5] 5% and 4% of individuals aged 25-54 are missing country of birth or years in New Zealand in the 1996 and 2001 Census, respectively.

[6] Less than 1% of prime-age individuals have an undefined current address. As discussed below, we include individuals for whom the LMA of their previous residence is undefined.

Western Europe and North America, and North-East Asia are becoming less common.[8] Comparing recent migrants to earlier migrants, we can see that this reflects an ongoing evolution of migrant source countries (with the exception of the Pacific Islands, which had large scale immigration to NZ in the 1950s and are only now again becoming an important source of migrants to NZ).

Table 2 presents the labour force characteristics of the three sample groups in each year. Employment rates are much lower among recent migrants compared to both earlier migrants and the NZ-born, confirming previous findings by Winkelmann & Winkelmann (1998) and Boyd (2003). For example, only 55% of recent migrants are employed in 1996 compared with 76% of earlier migrants, and 78% of the NZ-born. This gap has narrowed in 2001, with 62% of recent migrants employed versus 77% of earlier migrants and 80% of the NZ-born. These differences persist if we focus on full-time employment or full-time wage/salary employment, but are generally smaller in magnitude.[9] Migrants and non-migrants work in similar occupations and industries (at a highly aggregated level). The only meaningful differences are that migrants are more likely to be in professional occupations and the business and property services industry and are less likely to be in agriculture, fishery, or

[7] A large number of migrants have missing qualifications in 1996 because of the way that foreign qualification were coded in this census. We general treat these individuals as being in their own qualification group, but also test the robustness of our results to this assumption.

[8] The Pacific Islands include Melanesia, Micronesia, and Polynesia (excluding Hawaii); the British Isles include the United Kingdom and Ireland; Western Europe and North America includes all European countries not assigned to the British Isles or Eastern Europe, the US, Canada and Bermuda; the Former Soviet Union and Eastern Europe includes Greece, Cyprus, the countries of the former Yugoslavia, all former Eastern Bloc countries and all former republics of the Soviet Union (including those in the Baltics, Caucasus, and Central Asia); the Americas, Africa and Middle East includes all countries in Central and South America, the Caribbean, North Africa, Sub-Saharan Africa, and the Middle East (including Turkey); South-East Asia includes Myanmar, Cambodia, Laos, Thailand, Viet Nam, Brunei, Indonesia, Malaysia, Philippines, Singapore, and East Timor; North-East Asia includes China, Hong Kong, Macau, Mongolia, Taiwan, Japan and the Koreas; and South Asia includes Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

[9] Full-time wage/salary workers are individuals who report working more than 30 hours per week at their main employer (defined as the employer at which they work the most hours) and report being a paid employee (as opposed to being an employer of others in their own business, otherwise self-employed, or an unpaid family worker).

forestry (occupation or industry) and other blue-collar professions (e.g. trades and plant and machine operators) and industries (e.g. construction).

Table 3 presents the distribution of qualifications for recent migrants from different countries of birth in each year (as well as, the distribution for the NZ-born). Countries are grouped in regions and ordered from the most to least common source region of recent migrants. There is a large variation in the qualification distribution for recent migrants from different regions. For example, 56% of recent migrants from the Pacific Islands have at most school qualifications and only 6% have university degrees in 1996 (60% and 7%, respectively, in 2001), while only 19% of recent migrants from South Asia have at most school qualifications and 63% have university degrees in 1996 (28% and 53%, respectively, in 2001). These differences are largely related to the different immigration categories under which individuals from different countries are migrating (mainly family versus skilled migration). Immigrants from different countries also settle in different places in New Zealand for various reasons. As will be discussed in more detail below, we use this variation to create supply-pull instruments for where different immigrants are most likely to settle.

3.3 Defining Skill-Groups

Throughout this paper, we examine the impact of inflows of recent migrants on the NZ-born and earlier migrants in the same skill-group and location. One important question that we need to address is then how to define skill-groups. As in Cohen-Goldner and Paserman (2004), we consider multiple definitions. Our first definition follows the human capital approach taken in Borjas (2003) and groups individuals in 30 age/qualification skill-groups (age and qualification compositions are tabulated in Table 1).[10] This approach assumes that the productivity of different individuals is determined solely by their human capital. One

[10] Borjas (2003) uses education and potential experience to define human capital groups. Because our data only identifies qualifications and not years of education, our groups will be the same whether we use age or potential

potential problem with using age and qualifications to create skill-groups is that human capital acquired in foreign countries may not translate to similar skill levels in NZ.

Thus, our second definition follows the methodology used in Card (2001) and creates 4 skill-groups defined as each individual's predicted probability of working in each of the following aggregated occupations: 1) Legislators, Administrators, Managers, and Professionals, 2) Technicians, Associate Professionals, Clerks, and Trades Workers, 3) Agriculture, Fishery and Forestry Workers, 4) Service and Sales Workers, Plant and Machine Operators, and Elementary Occupations.[11] These predicted probabilities are calculated from a multinomial logit occupational choice model estimated at the national level separately by gender for the NZ-born and immigrants as a function of observed characteristics, such as education, age, ethnicity, years in New Zealand and country of origin.[12] Predicted occupations are used to group individuals rather than actual occupations for two reasons. First, an individual's actual occupation is partially determined by the demand for particular occupations in particular locations and we want to produce skill-groups that are not influenced by local demand patterns. Second, it would not be possible to assign a skill-group to individuals that are not currently employed. The main downside in using predicted

experience to classify individuals (e.g. all individuals with a certain qualification would have to be coded with the same years of education).

[11] This particular aggregation was chosen by estimating multinomial logit occupational choice models at more disaggregated levels and examining the relationship between actual occupation and predicted occupation for each individual, with the goal of finding an aggregation that minimised misclassifications. Agriculture, Fishery and Forestry Workers, while less than 10% of all workers, tend to work in very specific labour markets. The three remaining occupation groups each employ around 30% of workers.

[12] Specifically, separate models are estimated for the NZ-born and non-NZ-born by gender for all individuals employed and reporting a non-missing occupation. The following covariates are included for the NZ-born models: qualifications, a quartic in age, ethnicity, qualifications interacted with ethnicity and a quartic in age, marital status, household type (couple with or w/o children, single parent, or non-couple), census year, and indicator variables for whether an individual lives in Auckland, Wellington, or Christchurch. For immigrants, the following additional covariates are included: a quadratic for years in NZ, a quadratic for years in NZ interacted with qualifications, indicators for whether the individuals moved to NZ earlier than at age 6, than at age 16, or than at age 25, an interaction of these variables with qualifications, and one-digit country of birth. Predicted probabilities of working in each of the four occupations are then generated using the relevant model and each individual's characteristics, but setting the location variables to zero (e.g. treating all individuals as if they live outside the three major cities). These predicted probabilities are then totalled over each LMA and year to generate counts of the number of individuals predicted to be in occupation skill-group i in LMA j in year t.

occupations is that they add noise to our estimates in the sense that some individuals are assigned to the wrong skill-group.

The distribution of nativity groups across these four predicted occupational groups is summarised in Table 4. Migrants are more likely to be predicted to be in the Managers/ Professionals occupational group and are less likely to be in either the Agricultural or Technicians/Clerks/Trades occupation group than the NZ-born in both 1996 and 2001. Recent migrants, in particular, are much more likely to be predicted to be in the Managers/Professionals occupational group and less likely to be predicted to be in Technicians/Clerks/Trades occupational groups than the NZ-born. This is true in both census years even though relatively more NZ-born individuals are predicted to be in the Managers/ Professionals occupational group in 2001 than in 1996.

3 Descriptive Evidence

3.1 Descriptive Evidence

We begin by examining the relationship between the inflows of recent migrants and the geographic mobility of the NZ-born and of earlier migrants. Figure 1 maps the settlement decisions across LMAs of recent migrants in 1996 and 2001, with darker areas indicating a greater inflow rate of recent migrants. The inflow rate of recent migrants is defined as the number of recent migrants in a LMA as enumerated in the census divided by the total population of that LMA five-years prior to the census. While it is possible to measure this five-year's prior population using the previous census, we choose instead to use the concurrent census to enumerate the location of all individuals five-years prior to the census based on their response to the question asking their address at the time of the previous census.[13] We take this approach because it provides internally consistent measures of flows

[13] The nature of this data means we are unable to track forward the movements of all people living in any one area at an earlier time, but instead must look backwards and examine the location five years ago of all individuals currently in a particular location. It is not possible to calculate the probability that a person living in a certain location moves, as

(e.g. everyone currently in an LMA is either new to that LMA or lived there in the previous census), particularly once we begin calculating flow rates for different demographic groups, which may change over time for individuals.[14]

Examining Figure 1, we see a large spatial variation in the settlement decisions of recent migrants, ranging from an inflow rate of 0.0015 in Kapuni to 0.115 in Queenstown in 1996 and from 0.0015 in Teviot to 0.133 in Central Auckland in 2001. As expected, inflow rates are particularly high in the urban centres of Auckland, Hamilton, Wellington, and Christchurch, but perhaps unexpectedly, are all also high in parts of Northland, the Coromandel, and the throughout the west coast of the South Island. If inflows of new migrants lead to the displacement of individuals already settled in particular areas we should see a negative correlation between inflow rates and population growth in local labour markets. This is precisely what we examine next.

Figure 2 graphs the net population growth in each human capital defined skill-group in each LMA versus the inflow rate of recent migrants in the same skill-group and LMA in 1996 (upper panels) and 2001 (lower panels), where net population growth is defined as the total population of a particular skill-group in a particular LMA in a particular census divided by the total population of a particular skill-group in that LMA five-years prior to the census, as measured in the concurrent census. The left panels present the results when all skill-groups are pooled together, the centre panels present the results only for the skill-groups with the lowest education level (e.g. the 6 age-groups with no qualifications), and the right panels present the results only for the skill-groups with the highest education levels. The size of the

some of the people previously living in that location will not have filled out a census form five years later for various reasons. For example, they may have died, moved overseas, or failed to fill out their census forms in enough detail for their previous addresses to be ascertained.

[14] The main downside is that approximately 11% of individuals do not provide a valid previous census address. Comparing flow rates using the two methods, it appears that the majority of individuals who do not report a previous address are, in fact, at the same location now as five years ago, and thus we code all individuals with invalid previous addresses as being in the same LMA five-years ago. We also test that our results are robust to treating these individuals as being new to the LMA and find that they are qualitatively unchanged.

plot circles are proportional to the population of each skill-group in a particular LMA five-years prior to the census and the solid line in each graph is the best linear fit of the data, with each point weighted by the population of each skill-group in a particular LMA five-years prior to the census.[15] If there is no mobility among earlier migrants and the NZ-born, all points should be located on a line with an intercept and slope of 1 (e.g. a LMA with a 0.10 inflow rate of recent migrants in skill-group j will have net population growth of 1.10 in that skill-group) and, if displacement is common, we would expect to see most observations below this reference line (included as a dashed line on each graph).

The graphs show no evidence of recent migrants leading to increased mobility among the NZ-born and earlier migrants. Pooling all skill-groups, we find that most points are on or above the reference line indicating that most skill-groups/LMAs have overall population growth that exceeds the inflow of new migrants in both 1996 and 2001. This is the case even when examining skill-groups/LMAs that have inflows of recent migrants that increase the local population of that skill group by more than 50 percent. Separately examining low and high education skill-groups, we find that the overall population growth for low education skill-groups is, on average, equal to the inflow of recent immigration in these skill-groups, while for high education skill-group, overall population growth exceeds the inflow of recent immigration in these skill-groups. While this descriptive evidence is informative, we might expect to find no evidence of displacement even if it is, in fact, occurring, if immigrants are drawn to settling in areas of New Zealand that are also attractive to the NZ-born. We now turn to a regression analysis that allows us to control for fixed characteristics of LMAs and

[15] All summary statistics and regressions are variance weighted because the number of individuals in each LMA ranges from less than 500 in eight LMAs to over 100,000 in four LMAs and there is a large variation in the relative size of different skill-groups within LMA/years. If the variances of the estimated flow rates are inverse proportional to the sample sizes for each skill-group/LMA group cell, then weighted estimates are more efficient (eg. these are population weighted regressions).

skill-groups to better address this concern, and to take account of endogenous location choice.

4 Regression Analysis

4.1 Empirical Model

In this section, we report results from OLS and instrumental variables regression models that take the form:

$$Y_{slt} = \gamma R_{slt} + Z_{slt}\beta + \alpha_s + \alpha_l + \alpha_t + \alpha_{sl} + \alpha_{st} + \alpha_{lt} + e_{slt} \quad (1)$$

where s indexes human capital or predicted occupation skill-groups, l indexes LMAs, and t indexes time, Y_{slt} is one of nine measures of internal mobility described below, R_{slt} is the inflow rate for recent migrants as defined above, Z_{slt} is a vector are variables that control for differences in observable sociodemographic characteristics across skill-groups, LMAs, and time,[16] α_s is a skill group fixed effect, α_l is a LMA fixed effect, α_t is a time fixed effect, and α_{sl}, α_{st}, and α_{lt} are interactions between these fixed effects. The coefficient of interest in this model is γ, which measures the average impact of a change in the inflow of recent migrants on the mobility of competing NZ-born and earlier migrants, controlling for observable differences in LMAs/skill-groups/time-periods, unobservable fixed differences in local labour markets, skills groups and time-periods, unobservable time-varying differences in local labour markets and skills groups, and unobservable spatially varying differences in skill groups.[17]

[16] Specifically, when examining the internal mobility of the NZ-born, we control for the average age and age-squared, and percent female, in each of five ethnic groups, married, and living in each of four household type among the NZ-born in the same skill-group living in that LMA five-years previous to the current census. Similar, when examining the internal mobility of earlier migrants, we control for the same characteristics among earlier migrants in the same skill-group living in that LMA five-years previous to the current census. Finally, we control for both sets of characteristics when examining overall population growth. We also control for the percentage of the population in the same skill-group living in that LMA five-years previous to the current census that is NZ-born.

[17] LMA fixed effects control for local attributes that attract or repel both natives and immigrants and are allowed to vary over time and skill-groups, but not both dimensions simultaneously. Skill-group fixed effects control for differential mobility of individuals in these groups and are allowed to vary over time and across LMAs, but not

The estimates from this model are unbiased if there are not skill-group specific demand shocks in particular local labour markets in particular time-periods. However, if immigrants are attracted to local labour markets with the strongest employment or wage growth for their skill-group in a particular time-period, OLS estimates of (1) will be biased. Thus, we also follow the approach taken in Card (2001) and, in some regressions, instrument the inflow rate of recent migrants to a local labour market area with the concentration of past immigrants from the same country of birth in that area.[18] Newly arriving immigrants tend to settle in areas inhabited by earlier immigrants from the same source country (Bartel 1989). If this pull-factor is independent from the local demand for individuals with particular skill-levels, instrumental variables will produce consistent estimates of equation (1) even if there are skill-group specific local demand shocks.

Figure 3 graphs the actual inflow rate of recent migrants in each human capital defined skill-group in each LMA versus the predicted inflow rate of recent migrants based on the geographical location of past immigrants from different countries in the same skill-group and LMA in 1996 (upper panels) and 2001 (lower panels). As in Figure 2, the left panels present the results when all skill-groups are pooled together, the centre panels present the results only for the skill-groups with the lowest education level, and the right panels present the results only for the skill-groups with the highest education levels. Again, the size of the plot circles are proportional to the population of each skill-group in a particular LMA five-years prior to the census and the solid line in each graph is the best linear fit of the data, with each point

both dimensions simultaneously, and year fixed effects control for aggregate changes in mobility in and are allowed to vary across skill groups and LMAs, but not both dimensions simultaneously.

[18] Formally, let RM_{gt} represent the number of recent migrants from source country g in census t, and let λ_{glt} represent the fraction of earlier migrants from country g that is observed living in LMA l five-years prior to the current census. Finally, let τ_{gst} represent the fraction of recent migrants from source country g that is in skill-group s in census t. In the absence of demand factors, the number of recent migrants from country g in skill-group s who would be expected to move to LMA l in census t is $\tau_{gst} * \lambda_{glt} * RM_{gt}$. Summing over all countries, we can calculate the component of the recent migrant inflows in each skill-group and LMA that occurs because of an individuals desire to live near other migrants from their home country. In practice, we group individuals into the nine source country groups tabulated in Table 1 for calculating this instrument.

weighted by five-years prior skill-group/LMA population. If the location of past immigrants from different countries perfectly predicts the settlement pattern of recent migrants then all points should be located on a line with an intercept of 0 and slope of 1 (the dashed line on each graph).

These graphs show that the location of past immigrants from different countries is an excellent predictor of the settlement pattern of recent immigrants. Observations for most skill-group/LMAs with larger population lie very close to the reference line and this is the case of both immigrants with no qualifications and those with university qualifications. The unreported first-stage regression results from the instrumental variable models show that, overall, predicted inflows of recent migrants are strongly related to actual inflows. For example, predicted inflow rates alone explain 28% of the variation in actual inflow rates when using human capital skill groups and 19% of the variation when using skill-groups defined by predicted occupation (e.g. these are the partial R-squareds from the first-stage regressions). In both cases, the F-stat on the predicted inflow rate is well over 75 where a F-stat of less than 17 indicates potential problems with weak instruments in our model (Stock and Yogo 2002).

4.2 Main Results

We present results for nine measures of internal mobility: (1) the inflow rate for the NZ-born from within NZ; (2) the inflow rate for the NZ-born from abroad; (3) the outflow rate for the NZ-born to rest of NZ; (4) the net population change for the NZ-born; (5) the inflow rate for earlier migrants from within NZ; (6) the inflow rate for earlier migrants from abroad; (7) the outflow rate for earlier migrants to the rest of NZ; (8) the net population change for old migrants; and (9) total population growth. Each flow rate is calculated as the number of qualifying individuals in a particular skill-group in a particular LMA in a particular census divided by the total NZ-born or non-NZ-born population of a particular skill-group in that

LMA five-years prior to the census, as measured in the concurrent census. Inflows live in a LMA now but lived in different LMA 5-years ago (with the abroad LMA accounted for separately), outflows live in different LMA now but lived in the observation LMA 5-years ago, and net population change is calculated as total inflows minus total outflows.[19]

Table 5 presents summary statistics for these nine outcomes separately for each year and the two definitions of skill-groups. These summary statistics are variance weighted by the population of each skill-group in a particular LMA for the examined sub-group 5-years ago (e.g. the NZ-born, earlier migrants, or total population). The number of observations here and in the regressions equal the number of skill groups (4 predicted occupations or 30 human capital groups) multiplied by the number of LMAs (140) for each census. When examining human capital defined skill-groups, 69 skill-group/LMA/census observations are dropped for the NZ-born outcomes and 1,536 observations are dropped for the earlier migrant outcomes, because no individuals were in these groups five-years prior to the census and thus flow rates cannot be calculated. On average, inflows of recent migrants are 5-6% of the previous population of each skill-group/LMA and have increased a small amount between 1991-1996 and 1996-2001. The overall adult population of each skill-group/LMA has increased by 9-10% over each five-year period and this growth rate has remained steady over the ten years being examined. However, internal mobility has increased over time, with inflow and outflow rates roughly 2.5% higher in 1996-2001 than in 1991-1996.

Table 6 presents the results from estimating equation (1) for each of the nine outcomes and two skill-group measures. The outcomes are presented across the columns in this table. The first four panels present the results for the human capital skill-groups and the remaining four for the skill-groups defined by predicted occupation. Panel A in each set presents the

[19] It is worth noting that total population growth does not equal the net population change for the NZ-born plus the net population change for old migrants plus the inflow rate of recent migrants, because the denominator differs for each of these measures.

results from estimating equation (1) without any of the fixed effects besides a dummy variable for the census year. These results will be biased if different skill-groups have different mobility rates or if different LMAs face different demand shocks and these differences are unrelated to the observable characteristics of each LMA/skill-group/year. But, they provide a useful frame of reference for judging how adding additional fixed effects to the model affects the results.

The results from this no-fixed effects specification show that LMA/skill-groups with larger migrant inflows also have larger inflows of the NZ-born and earlier migrants, greater population growth for both these groups, and greater overall population growth. The evidence for outflows is more mixed with the results for human capital skill-groups showing a positive, but weak, relationship between recent migrant inflows and the outflow of the NZ-born and earlier migrants and the results for predicted occupation skill-groups showing a strong negative relationship between recent migrant inflows and the outflow of the NZ-born and a strong positive relationship between recent migrant inflows and the outflow of earlier migrants. Examining the coefficients for the final outcome, these results indicate that each new migrant in a particular skill-group in a particular LMA is associated with an overall increase of 1.42-1.54 individuals in that skill-group and LMA.

Panel B in each set of estimates presents the results from estimating the model in panel A with the addition of skill-group and LMA fixed-effects. When using the predicted occupation skill-groups, these results are equivalent to those presented in Card (2001), except we are pooling two census years instead of using only one. These results will be unbiased if all differences between skill-groups and LMAs are time-invariant and there are no demand shocks that affect only particular skill-groups in particular LMAs. The impact of recent migrants on the inflow rate of the NZ-born and earlier migrants is now smaller for human capital skill-groups and larger for predicted occupation skill-groups, with a significant

positive relationship found between the inflow of recent migrants and the inflow of the NZ-born and earlier migrants. We now find negative coefficients for the impact of recent migrant inflows on the outflows of the NZ-born when using human capital skill groups, but insignificant impacts when using predicted occupation skill-groups. Negative coefficients indicate that an increase in recent migrants in a particular skill-group in a particular LMA is related to less out-migration from that area of people in the same skill-group. Combining these changes, these results indicate that each new migrant in a particular skill-group in a particular LMA is associated with an overall increase of 1.36-1.47 individuals in that skill-group and LMA.

Panel C in each set of estimates presents the results from estimating the full model described in (1), which includes, in addition to the variables in previous regressions, LMA by year, skill-group by year, and skill-group by LMA fixed effects. Importantly, LMA by year fixed effects allow the attractiveness of LMAs to change over time, LMA by skill-group fixed effects allow the attractiveness of LMAs to differ across skill-groups, and skill-group by year fixed effects allow for changes over time in the differential mobility of skill groups. The results from this fully specified model will be unbiased as long as there are no skill-group specific demand shocks in particular LMA/years. The impact of recent migrants on the inflow rate of the NZ-born and earlier migrants is again smaller, but still significant for human capital skill-groups, but is slightly larger for the NZ-born and no longer significant for earlier migrants for predicted occupation groups. In general, we now find no impact of inflows of recent migrants on outflows of the NZ-born and earlier migrants, except for a negative impact on the outflow of earlier migrants using predicted occupation skill-groups. Both sets of results show that increased inflows of recent migrants are positively correlated with population growth among the NZ-born and each new migrant in a particular skill-group

in a particular LMA is associated with an overall increase of 1.18-1.54 individuals in that skill-group/LMA.

Panel D presents the results from our final specification which is identical to what is estimated in panel C, except that the predicted inflow rates of recent migrants based on the concentration of past immigrants from the same country of birth in that area is used to instrument for the actual inflow rate of recent migrants. If this pull-factor is independent of the local demand for individuals with particular skill-levels, instrumental variables will produce consistent estimates of equation (1) even if there are skill-group specific demand shocks in particular LMA/years. None of our main conclusions are altered when we instrument for inflow rates of recent migrants, although the overall relationship between inflows of recent migrants and population growth is now more positive, with each new migrant in a particular skill-group in a particular LMA associated with an overall increase of 1.53-1.91 individuals in that skill-group and LMA.

4.3 Robustness Analyses

It is difficult to know what the proper level of geographic aggregation is for examining whether recent migrants displace non-migrants. In Table 7, we present the results from estimating the fully specified model in (1) using both OLS and instrumental variables (eg. the specifications in panel C and D of Table 5) at two increasingly aggregated geographical areas. First, we examine a second definition of functional labour market areas also defined by Newell and Papps (2001) using travel-to-work data, but with a higher containment threshold. New Zealand is divided into 58 LMAs using this definition. Second, we examine mobility between 16 regional councils (RC), which are purely administrative areas, but are typically the most disaggregated areas identified in NZ survey data.[20]

[20] The 16 regional councils are: Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, Manawatu/Wanganui, Wellington, Nelson, Tasman, Marlborough, West Coast, Canterbury, Otago, and Southland.

None of our main conclusions are altered when we re-estimate our regression models assuming that competition occurs in more aggregated functional labour markets. Here, our OLS estimates indicate that each new migrant in a particular skill-group in a particular LMA is associated with an overall increase of 1.12-1.42 individuals in that skill-group and LMA and our IV estimates indicate that each new migrant is associated with an overall increase of 1.42-1.65 individuals. However, when we examine mobility between regional councils, our results are less consistent; when examining predicted occupation skill-groups, the results are very similar to those for more disaggregated areas, but when we examine human capital skill-groups, we find evidence that increased inflows of recent migrants leads to increased outflows and an overall decline in the population of the NZ-born. In this specification, we find that that each new migrant in a particular skill-group in a particular RC is associated with an overall increase of 0.85-0.92 individuals in that skill-group/RC or alternatively phrased 0.08-0.15 individuals are displaced by each migrant. However, given that RCs are arbitrary geographic areas that do not reflect where people actually work and live and that these results are not robust to using either skill-group definition, we do not feel that these findings truly indicate that there is an internal mobility response to recent immigrants.

In unreported results, we also test a variety of modifications to our main specification. We re-estimate the fully specified model i) without variance-weighting, ii) treating individuals with missing data on their residential location five-years ago as being new to an area and iii) dropping individuals with missing qualifications. In each case, we find no evidence of displacement of the NZ-born or earlier immigrants by recent immigrants. Overall, our results provide little support for the hypothesis that migrant inflows displace either the NZ-born or earlier migrants with similar skills in the areas that migrants are settling. If anything, they suggest that there are positive spillovers between recent migrants

and other individuals that encourage individuals to move to or remain in the areas in which similarly skilled migrants are settling.

5 Conclusions

In this paper, we use data from the 1996 and 2001 Census to examine how the supply of migrants in particular skill groups affects the geographic mobility of the New Zealand-born and of earlier migrants. We identify the impact of recent migrants on the geographical mobility of non-migrants using the 'area-analysis' approach, which exploits the fact that immigration is spatially concentrated, and thus a change in the local supply of migrants in a particular skill group should have an impact on outcomes of similarly skilled non-migrants in that local labour market. This empirical approach allows us to examine whether settled individuals are displaced by new migrants and whether the NZ-born and earlier migrants respond differently to inflows of new migrants.

A large literature examines the impact of immigration on labour market outcomes for non-migrants and finds little impact. However, it has been argued that a spatial comparison of the labour market outcomes of non-migrant workers in different localities may not provide valuable information about the economic impact of immigration, because immigration may affect all areas of the country, not just the ones that actually receive immigrants. One way that this will occur is if the supply of new immigrants to local labour markets encourages outward migration of non-migrants. Thus, the results in this paper allow us to judge whether internal mobility is likely to moderate the labour market impacts of immigration in New Zealand.

Our empirical model controls for observable differences in LMAs/skill-groups/time-periods, unobservable fixed differences in local labour markets, skills groups and time-periods, unobservable time-varying differences in local labour markets and skills groups, and unobservable spatially varying differences in skill groups and use an instrumental variables

approach to isolate a pull-factor that is potentially independent from skill-group specific local demand shocks. We also examine whether our results are robust to defining skill-groups using age and qualifications versus taking a more complex approach and estimating each individual's predicted occupation and to how we defined local geographical areas.

Overall, our results provide little support for the hypothesis that migrant inflows displace either the NZ-born or earlier migrants with similar skills in the areas that migrants are settling. If anything, they suggest that there are positive spillovers between recent migrants and other individuals that encourage individuals to move to or remain in the areas in which similarly skilled migrants are settling. Thus, it appears unlikely that internal mobility moderates any potential impacts of immigration on labour or housing markets in New Zealand.

References

Angrist, Joshua and Adriana Kugler. 2003. "Protective or Counter-Productive? Labor Market Institutions and the Effect Immigration on EU Natives." *Economic Journal* 113 (June): F302-F331.

Bartel, Anne P. 1989. "Where Do the New U.S. Immigrants Live?" *Journal of Labor Economics* 7 (October): 371–91.

Bayer, Patrick J. and Robert McMillan. 2005. "Racial Sorting and Neighborhood Quality." *NBER Working Paper* 11813 (December).

Borjas, George J. 2005. "Native Internal Migration and the Labor Market Impact of Immigration." *NBER Working Paper* 11610 (September).

Borjas, George J. 2003. "The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market" *Quarterly Journal of Economics* 118 (November). no. 4: 1335-74.

Borjas, George J. 1999. "The Economic Analysis of Immigration." in *Handbook of Labor Economics Vol. 3A*, eds. Orley Ashenfelter and David Card, North-Holland, 1697-1760.

Borjas, George J., Richard Freeman, and Lawrence Katz. 1997. "How Much Do Immigration and Trade Affect Labor Market Outcomes?" *Brookings Papers on Economic Activity* 1: 1–67.

Borjas, George J., Richard Freeman, and Lawrence Katz. 1996 "Searching for the Effect of Immigration on the Labor Market." *American Economic Review* 86 (May). no. 2: 246–51.

Boyd, Caroline. 2006. "Migrants in New Zealand: An Analysis of Labour Market Outcomes for Working Aged Migrants Using 1996 and 2001 Census Data," *Department of Labour Report,* NZ Department of Labour, Wellington, available online at www.dol.govt.nz.

Card, David. 2001. "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration." *Journal of Labor Economics* 19. no. 1: 22-64.

Filer, Randall K. 1992. "The Impact of Immigrant Arrivals on Migratory Patterns of Native Workers." In *Immigration and the Work Force: Economic Consequences for the United States and Source Areas*, ed. George J. Borjas and Richard B. Freeman, 245-69. Chicago: University of Chicago Press.

Frey, William H. 1995. "Immigration and Internal Migration 'Flight' from U.S. Metro Areas: Toward a New Demographic Balkanization." *Urban Studies* 32. no. 4-5: 733-57.

Kritz, Mary M. and Douglas T. Gurak. 2001. "The Impact of Immigration on the Internal Migration of Natives and Immigrants." *Demography* 38. no. 1: 133-45.

Longhi, Simonetta, Peter Nijkamp and Jacques Poot. 2005. "A Meta-Analytic Assessment of the Impact of Immigration on Wages." *Journal of Economic Surveys* 19. no. 3: 451-477.

Longhi, Simonetta, Peter Nijkamp and Jacques Poot. 2006. "The Impact of Immigration on the Employment of Natives in Regional Labour Markets: A Meta-Analysis." *IZA Discussion Paper 2044*.

Maré, David C. and Jason Timmins. 2005 "Migration and Local Labour Markets in New Zealand." *Motu Working Paper*.

Maré, David C. and Choy, W-K. 2001. "Regional Labour Market Adjustment and the Movement of People." *Treasury Working Paper* 01/08.

Papps, Kerry L. and James O. Newell. 2002. "Identifying Functional Labour Market Areas in New Zealand: A Reconnaissance Study Using Travel-to-Work Data." *IZA Discussion Paper* 443 (February).

Saiz, Albert. 2006. "Immigration and Housing Rents in American Cities." *IZA Discussion Paper* 2189 (June).

Stock, James H. and M. Yogo. 2002. "Testing for Weak Instruments in Linear IV Regression." *NBER Technical Working Paper* 284.

Winkelmann, Liliana and Rainer Winkelmann. 1998. "Immigrants in the New Zealand Labour Market: a Cohort Analysis Using 1981, 1986 and 1996 Census Data," *Labour Market Bulletin,* 1998:1&2, pp. 34-70.

Figure 1: The Settlement Decisions of Recent Migrants in 1996 and 2001 (Darker Red = Greater Inflow Rate)

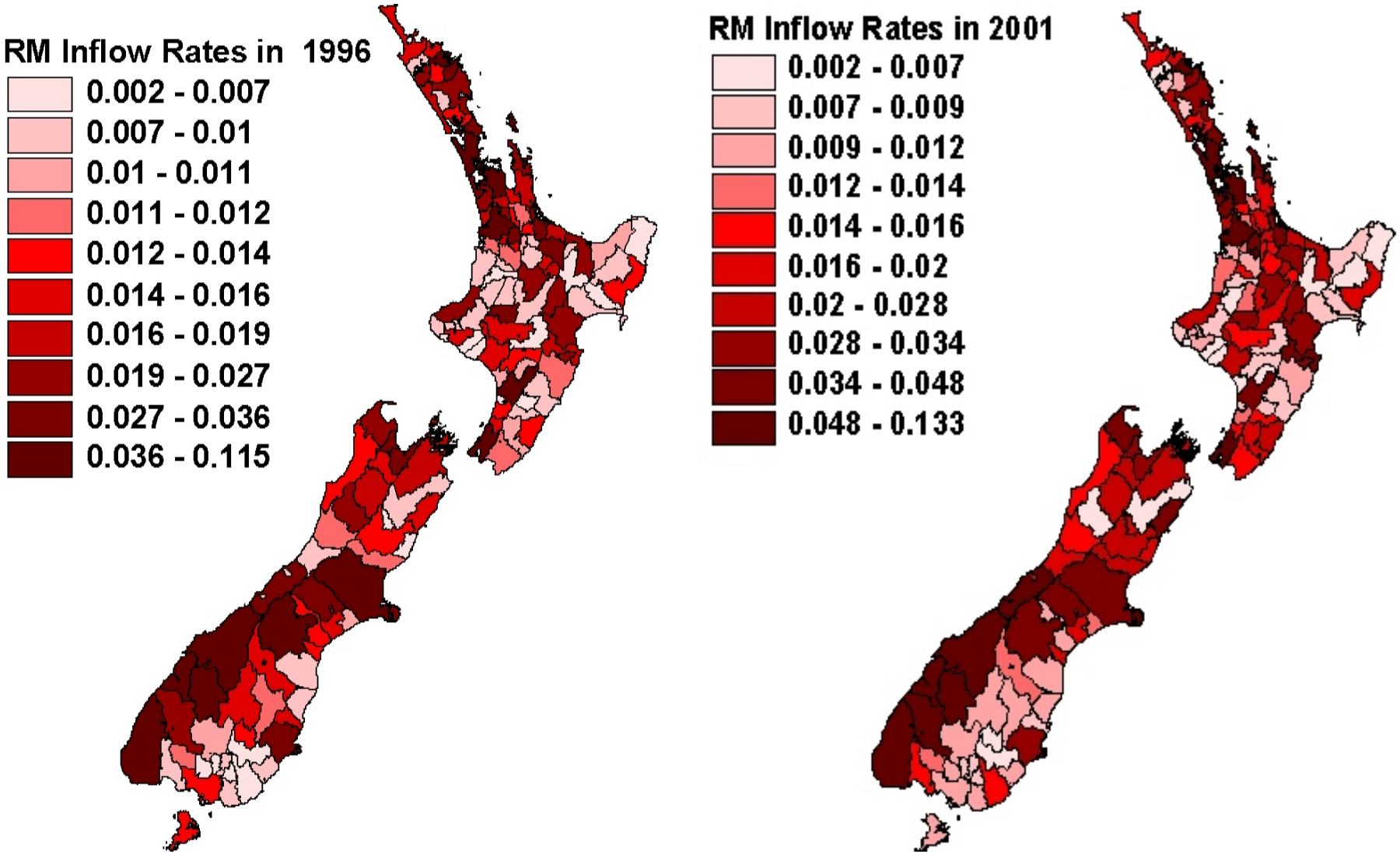
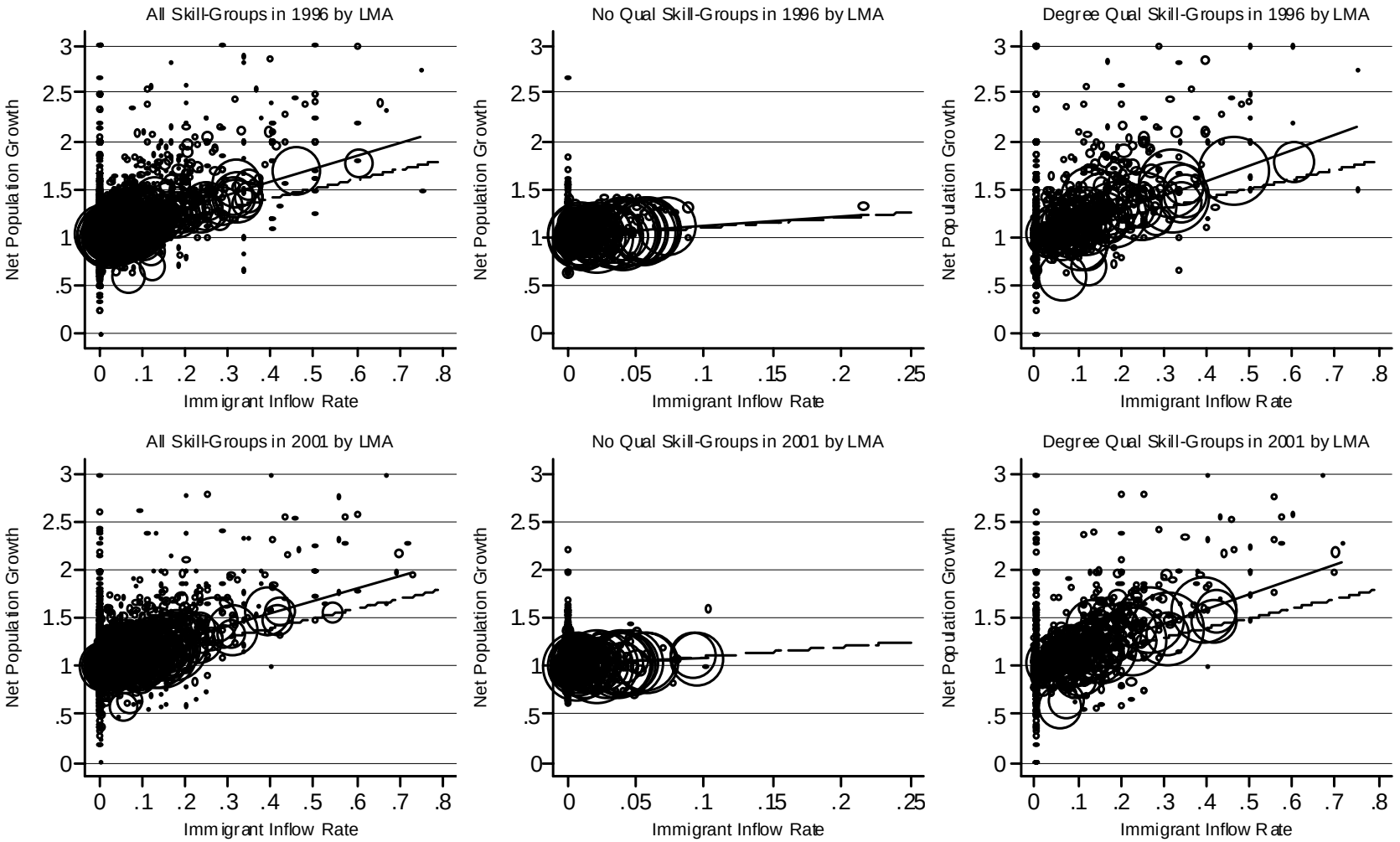
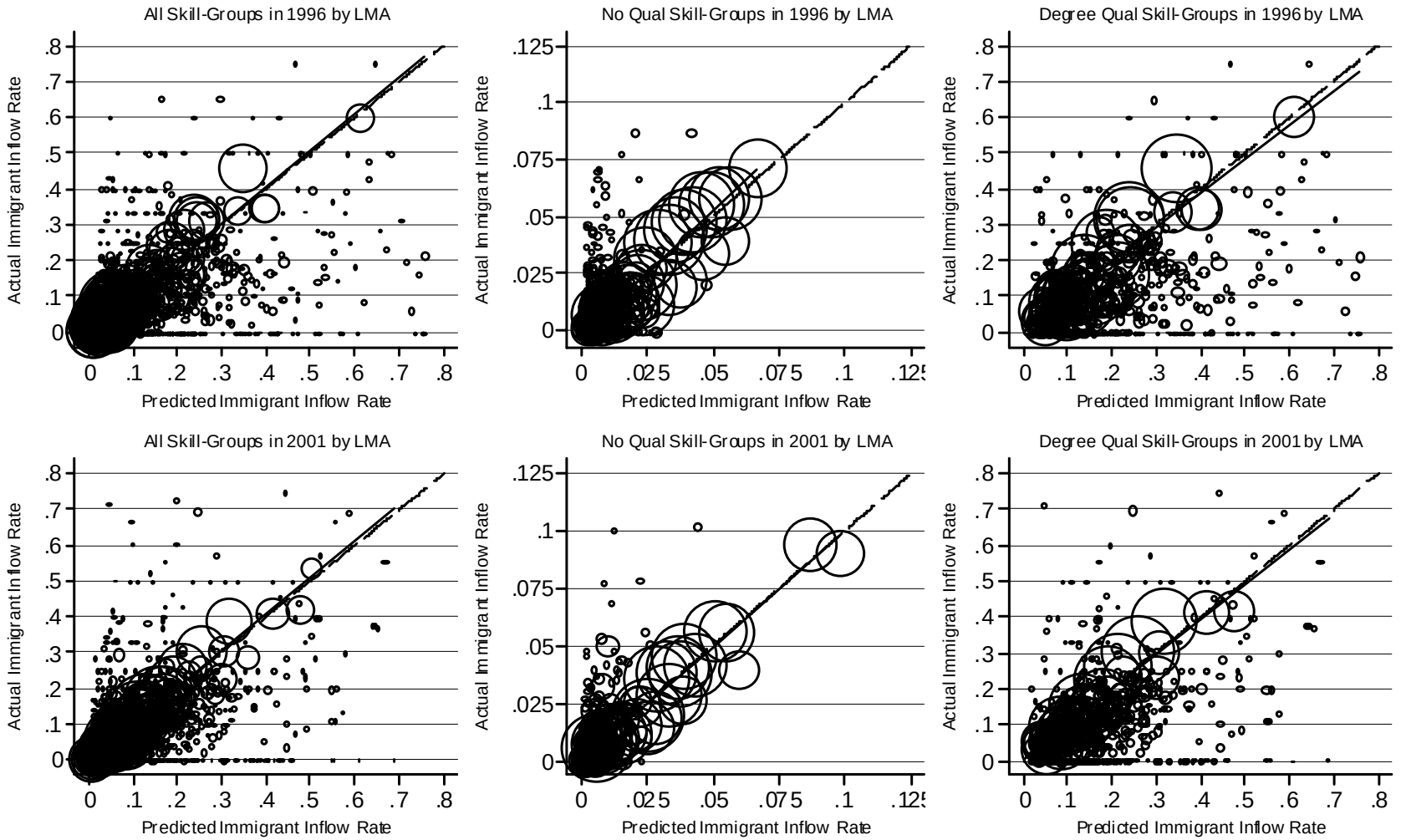


Figure 2: The Relationship between the Inflow of Recent Migrants and the Net Population Growth in each Skill Group and LMA



The size of the circles are proportional to the population of each Skill-Group in each LMA five years prior
The dashed line has a slope of 1 and the solid line is the best linear fit

Figure 3: Actual and Predicted Inflows of Recent Migrants in each Skill-Group and LMA



The size of the circles are proportional to the population of each Skill-Group in each LMA five years prior
The dashed line has a slope of 1 and the solid line is the best linear fit

Table 1: Demographic Characteristics of Migrants and the New Zealand Born in 1996 and 2001

	1996			2001		
	Recent Migrants	Earlier Migrants	New Zealand Born	Recent Migrants	Earlier Migrants	New Zealand Born
25-29	22%	12%	18%	21%	9%	16%
30-34	26%	16%	19%	24%	14%	18%
35-39	20%	17%	19%	22%	19%	18%
40-44	16%	18%	17%	16%	19%	18%
45-49	11%	20%	15%	10%	19%	16%
50-54	5%	17%	12%	6%	20%	14%
Missing Qualifications	21%	15%	9%	8%	7%	7%
No Qualifications	11%	25%	31%	6%	15%	23%
School Qualifications	17%	23%	27%	37%	39%	34%
Post-School Qualifications	16%	22%	23%	17%	20%	24%
Degree Qualifications	34%	15%	9%	32%	20%	12%
Australia	7%	7%		5%	7%	
Pacific Islands	6%	23%		12%	22%	
British Isles	19%	42%		17%	35%	
Western Europe & North America	10%	10%		8%	9%	
Former Soviet Union & Eastern Europe	5%	1%		4%	2%	
Americas, Africa & Middle East	10%	4%		16%	5%	
South-East Asia	7%	6%		9%	7%	
North-East Asia	29%	5%		21%	9%	
South Asia	7%	3%		9%	4%	
Percent of Population	5%	15%	80%	6%	16%	79%
Individuals	66,510	219,210	1,161,339	87,447	237,498	1,189,881

Note: Recent migrants first arrived in New Zealand in the five years prior the census. All other migrants are classified as earlier migrants. The Pacific Islands include Melanesia, Micronesia, and Polynesia (excluding Hawaii); the British Isles include the United Kingdom and Ireland; Western Europe and North America includes all European countries not assigned to the British Isles or Eastern Europe, the US, Canada and Bermuda; the Former Soviet Union and Eastern Europe includes Greece, Cyprus, the countries of the former Yugoslavia, all former Eastern Bloc countries and all former republics of the Soviet Union (including those in the Baltics, Caucasus, and Central Asia); the Americas, Africa and Middle East includes all countries in Central and South America, the Caribbean, North Africa, Sub-Saharan Africa, and the Middle East (including Turkey); South-East Asia includes Myanmar, Cambodia, Laos, Thailand, Viet Nam, Brunei, Indonesia, Malaysia, Philippines, Singapore, and East Timor; North-East Asia includes China, Hong Kong, Macau, Mongolia, Taiwan, Japan and the Koreas; and South Asia includes Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

Table 2: Labour Force Characteristics of Migrants and the New Zealand Born in 1996 and 2001

	1996			2001		
	Recent Migrants	Earlier Migrants	New Zealand Born	Recent Migrants	Earlier Migrants	New Zealand Born
Employed	55%	76%	78%	62%	77%	80%
Employed Full-Time	45%	63%	63%	51%	63%	65%
Employed Full-Time Wage and Salary	35%	47%	47%	42%	47%	49%
Legislators, Administrators and Managers	14%	15%	14%	12%	15%	14%
Professionals	21%	16%	13%	24%	19%	15%
Technicians and Associate Professionals	15%	13%	12%	12%	12%	12%
Clerks	10%	13%	13%	10%	12%	13%
Service and Sales Workers	12%	11%	11%	13%	12%	12%
Agriculture, Fishery and Forestry Workers	4%	4%	10%	3%	4%	8%
Trades Workers	7%	9%	9%	7%	8%	9%
Plant and Machine Operators	5%	9%	9%	6%	8%	9%
Elementary Occupations	5%	6%	6%	5%	5%	5%
Missing Occupation	7%	4%	3%	7%	5%	4%
Agriculture, Fishery and Forestry	4%	4%	10%	3%	4%	9%
Manufacturing, Mining, and Utilities	15%	19%	15%	13%	16%	14%
Construction	4%	5%	7%	4%	5%	7%
Wholesale Trade	7%	6%	6%	6%	6%	6%
Retail Trade	10%	10%	10%	10%	10%	10%
Accommodation, Cafes and Restaurants	6%	4%	3%	6%	4%	3%
Transport, Storage, and Communication	4%	5%	6%	4%	5%	6%
Finance and Insurance	3%	4%	4%	4%	4%	3%
Property and Business Services	14%	12%	10%	14%	13%	12%
Government Administration and Defense	3%	5%	5%	3%	4%	4%
Education	8%	8%	7%	10%	9%	8%
Health and Community Services	9%	8%	7%	11%	10%	9%
Cultural and Recreational Services	2%	2%	2%	2%	2%	2%
Personal and Other Services	3%	4%	4%	3%	4%	4%
Missing Industry	8%	5%	4%	7%	4%	3%
Percent of Employed Population	3%	15%	82%	5%	15%	80%
Employed Individuals	36,255	167,367	906,921	54,051	182,034	949,110

Note: Recent migrants first arrived in New Zealand in the five years prior the census. All other migrants are classified as earlier migrants. All characteristics besides the employment rate are calculated only for the employed population.

Table 3: Qualifications for Recent Migrants by Region of Birth in 1996 and 2001

	Missing Qualifications	No Qualifications	School Qualifications	Post-School Qualifications	Degree Qualifications	% of Recent Immigrants
1996 (# Recent Migrants = 66,510, # NZ Born = 1,161,339)						
NE Asia	25%	13%	19%	10%	32%	29%
British Isles	14%	7%	19%	29%	31%	19%
W Europe & North America	25%	5%	15%	17%	39%	10%
Americas, Africa & Middle East	16%	9%	13%	18%	44%	10%
Australia	20%	11%	21%	23%	25%	7%
SE Asia	23%	23%	14%	11%	29%	7%
S Asia	11%	7%	12%	8%	63%	7%
Pacific Islands	26%	33%	23%	12%	6%	6%
Former Soviet Union & E Europe	32%	2%	13%	13%	40%	5%
New Zealand	9%	31%	27%	23%	9%	
2001 (# Recent Migrants = 87,444, # NZ Born = 1,189,881)						
NE Asia	9%	5%	48%	10%	28%	21%
British Isles	3%	2%	31%	26%	38%	17%
Americas, Africa & Middle East	5%	4%	33%	26%	32%	16%
Pacific Islands	18%	18%	42%	16%	7%	12%
SE Asia	12%	12%	33%	9%	34%	9%
S Asia	7%	4%	24%	11%	53%	9%
W Europe & North America	5%	1%	36%	15%	44%	8%
Australia	3%	4%	41%	21%	32%	5%
Former Soviet Union & E Europe	7%	3%	42%	14%	34%	4%
New Zealand	7%	23%	34%	24%	12%	

Note: Recent migrants first arrived in New Zealand in the five years prior the census. See the note to Table 1 for more information on the countries in each group.

Table 4: Predicted Occupations of Migrants and the New Zealand Born in 1996 and 2001

	1996			2001		
	Recent Migrant	Earlier Migrant	New Zealand Born	Recent Migrant	Earlier Migrant	New Zealand Born
Legislators, Administrators, Managers, and Professionals	35%	29%	25%	36%	33%	28%
Technicians, Assoc. Professionals, Clerks, and Trades Workers	31%	35%	36%	31%	33%	35%
Service and Sales Workers, Plant and Machine Operators, and Elementary Occs	30%	31%	29%	30%	30%	29%
Agriculture, Fishery and Forestry Workers	4%	5%	10%	3%	4%	8%
Percent of Population	5%	15%	80%	6%	16%	79%
Individuals	66,510	219,210	1,161,339	87,447	237,498	1,189,881

Note: Recent migrants first arrived in New Zealand in the five years prior the census. All other migrants are classified as earlier migrants. Predicted occupations are derived from a multinomial logit occupational choice model estimated at the national level separately by gender for the NZ-born and immigrants as a function of observed characteristics (education, age, ethnicity, years in New Zealand and country of origin).

Table 5: Geographic Mobility by LMA and Year - Means (Standard Deviations)

	Age / Qualification Skill Groups		Predicted Occupation Skill Group	
	1996	2001	1996	2001
Inflow rate for Recent Migrants	0.050	0.063	0.050	0.063
	(0.070)	(0.072)	(0.038)	(0.047)
Predicted Inflow rate for Recent Migrants	0.050	0.063	0.050	0.063
	(0.065)	(0.066)	(0.031)	(0.042)
Inflow rate for NZ-born from within NZ	0.146	0.171	0.149	0.174
	(0.091)	(0.102)	(0.058)	(0.069)
Inflow rate for NZ-born from abroad	0.042	0.032	0.043	0.032
	(0.041)	(0.030)	(0.016)	(0.013)
Outflow rate for NZ-born to rest of NZ	0.147	0.172	0.149	0.173
	(0.076)	(0.084)	(0.054)	(0.062)
Net population change for NZ-born	0.041	0.031	0.043	0.033
	(0.092)	(0.094)	(0.064)	(0.072)
Inflow rate for earlier migrants from within NZ	0.126	0.140	0.130	0.143
	(0.115)	(0.121)	(0.067)	(0.079)
Inflow rate for earlier migrants from abroad	0.040	0.041	0.041	0.040
	(0.039)	(0.034)	(0.013)	(0.010)
Outflow rate for earlier migrants to rest of NZ	0.128	0.142	0.130	0.143
	(0.094)	(0.094)	(0.057)	(0.061)
Net population change for earlier migrants	0.037	0.039	0.041	0.041
	(0.122)	(0.121)	(0.059)	(0.062)
Total population growth	1.090	1.096	1.093	1.097
	(0.125)	(0.127)	(0.078)	(0.087)
Full Sample Size (Skill Group * LMA)	4,200	4,200	560	560
Sample Size for Impacts on NZ-Born	4,158	4,173	560	560
Sample Size for Impacts on Earlier Migrants	3,505	3,359	560	560

Note: All summary statistics are variance weighted by the skill-group population in each LMA for the examined sub-group 5-years ago.

Table 6: OLS and IV Regression Estimates of Impact of Immigration on Geographic Mobility

	Inflow rate for NZ-b from within NZ	Inflow rate for NZ-b from abroad	Outflow rate for NZ-born to rest of NZ	Net population change for NZ-b	Inflow rate for EM from within NZ	Inflow rate for EM from abroad	Outflow rate for EM to rest of NZ	Net population change for EM	Total population growth
I-A) OLS, Age-Education Skill Groups, Year Fixed Effect									
Inflow rate for Recent Migrants	0.313***	0.187***	0.045***	0.456***	0.366***	0.112***	0.094***	0.384***	1.424***
	(0.021)	(0.006)	(0.015)	(0.023)	(0.027)	(0.008)	(0.020)	(0.030)	(0.022)
R-squared	0.35	0.66	0.46	0.17	0.26	0.36	0.31	0.07	0.61
I-B) OLS, Age-Education Skill Groups, Skill-Group, LMA and Year Fixed Effects									
Inflow rate for Recent Migrants	0.266***	0.104***	-0.128***	0.498***	0.203***	0.028***	-0.061***	0.292***	1.465***
	(0.019)	(0.006)	(0.013)	(0.026)	(0.031)	(0.010)	(0.021)	(0.039)	(0.024)
R-squared	0.71	0.80	0.80	0.45	0.51	0.44	0.59	0.21	0.74
I-C) OLS, Age-Education Skill Groups, Skill-Group, LMA, Year, LMA*Year, Skill Group*Year and Skill Group*LMA Fixed Effects									
Inflow rate for Recent Migrants	0.173***	0.034***	0.033	0.174***	0.194**	-0.001	0.076	0.117	1.176***
	(0.038)	(0.012)	(0.023)	(0.048)	(0.083)	(0.028)	(0.053)	(0.103)	(0.044)
R-squared	0.91	0.93	0.95	0.84	0.77	0.73	0.84	0.66	0.93
I-D) IV, Age-Education Skill Groups, Skill-Group, LMA, Year, LMA*Year, Skill Group*Year and Skill Group*LMA Fixed Effects									
Inflow rate for Recent Migrants	0.803***	0.142***	0.004	0.942***	0.517***	0.091**	0.127	0.481***	1.909***
	(0.068)	(0.021)	(0.040)	(0.087)	(0.132)	(0.045)	(0.084)	(0.165)	(0.078)
Observations	8,324	8,324	8,324	8,324	6,324	6,324	6,324	6,324	8,356
II-A) OLS, Predicted Occupation Skill Groups, Year Fixed Effect									
Inflow rate for Recent Migrants	0.119	0.222***	-0.243***	0.584***	0.326***	0.145***	0.232**	0.239**	1.536***
	(0.086)	(0.014)	(0.086)	(0.094)	(0.108)	(0.016)	(0.092)	(0.108)	(0.114)
R-squared	0.50	0.78	0.42	0.47	0.50	0.57	0.44	0.26	0.70
II-B) OLS, Predicted Occupation, Skill-Group, LMA and Year Fixed Effects									
Inflow rate for Recent Migrants	0.307***	-0.012	-0.170	0.465***	0.470***	0.120***	-0.167	0.756***	1.362***
	(0.065)	(0.016)	(0.112)	(0.144)	(0.091)	(0.025)	(0.119)	(0.164)	(0.151)
R-squared	0.96	0.96	0.85	0.81	0.93	0.78	0.82	0.66	0.89
II-C) OLS, Predicted Occupation Skill Groups, Skill-Group, LMA, Year, LMA*Year, Skill Group*Year and Skill Group*LMA Fixed Effects									
Inflow rate for Recent Migrants	0.416***	-0.035	-0.042	0.422***	0.292	0.109*	-0.499***	0.900***	1.554***
	(0.106)	(0.027)	(0.076)	(0.146)	(0.198)	(0.056)	(0.158)	(0.280)	(0.142)
R-squared	1.00	1.00	1.00	1.00	0.99	0.98	0.99	0.98	1.00
II-D) IV, Predicted Occupation, Skill-Group, LMA, Year, LMA*Year, Skill Group*Year and Skill Group*LMA Fixed Effects									
Inflow rate for Recent Migrants	0.459**	0.045	0.587***	-0.084	0.105	0.074	-0.012	0.191	1.530***
	(0.205)	(0.053)	(0.159)	(0.287)	(0.327)	(0.092)	(0.263)	(0.464)	(0.268)
Observations	1,120	1,120	1,120	1,120	1,120	1,120	1,120	1,120	1,120

Note: All regressions are variance weighted by the skill-group population in each LMA for the examined sub-group 5-years ago. In the IV regressions, the inflow rate of recent migrants is instrumented by the predicted inflow rate based on past settlement patterns. All regression also control for the following characteristics of the examined sub-group 5-years ago in each LMA: average age, average age-squared, percent female, percent Maori, percent Pacifica, percent Asian, percent other ethnicity, percent married, percent couple with no children, percent couple with children and percent single parent.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table7: OLS and IV Regression Estimates of Impact of Immigration on Geographic Mobility at Different Levels of Aggregation

	Inflow rate for NZ-born from within NZ	Inflow rate for NZ-born from abroad	Outflow rate for NZ-born to rest of NZ	Net population change for NZ-born	Inflow rate for earlier migrants from within NZ	Inflow rate for earlier migrants from abroad	Outflow rate for earlier migrants to rest of NZ	Net population change for earlier migrants	Total population growth
I-A) OLS, Age-Education Skill Groups, 58 LMAs									
Inflow rate	0.149***	0.013	0.037	0.125**	0.123	0.018	0.117**	0.024	1.120***
for recent migrants	(0.039)	(0.015)	(0.026)	(0.054)	(0.084)	(0.031)	(0.057)	(0.109)	(0.049)
I-B) IV, Age-Education Skill Groups, 58 LMAs									
Inflow rate	0.371***	0.074***	0.028	0.417***	0.465***	0.032	0.171**	0.326**	1.419***
for recent migrants	(0.059)	(0.022)	(0.039)	(0.081)	(0.125)	(0.045)	(0.083)	(0.161)	(0.074)
Observations	3,480	3,480	3,480	3,480	3,376	3,376	3,376	3,376	3,480
II-A) OLS, Age-Education Skill Groups, Regional Councils									
Inflow rate	-0.097**	0.014	0.070*	-0.154**	0.080	0.012	0.098	-0.006	0.920***
for recent migrants	(0.043)	(0.020)	(0.036)	(0.068)	(0.078)	(0.039)	(0.060)	(0.107)	(0.066)
II-B) IV, Age-Education Skill Groups, Regional Councils									
Inflow rate	-0.073	-0.006	0.131***	-0.210**	0.200**	-0.088*	0.163**	-0.052	0.848***
for recent migrants	(0.055)	(0.025)	(0.046)	(0.086)	(0.099)	(0.050)	(0.076)	(0.136)	(0.082)
Observations	720	720	720	720	720	720	720	720	720
III-A) OLS, Predicted Occupation Skill Groups, 58 LMAs									
Inflow rate	0.219**	-0.031	0.055	0.133	0.322*	0.237***	-0.679***	1.239***	1.424***
for recent migrants	(0.103)	(0.027)	(0.082)	(0.138)	(0.172)	(0.056)	(0.153)	(0.269)	(0.144)
III-B) IV, Predicted Occupation Skill Groups, 58 LMAs									
Inflow rate	0.474**	-0.002	0.466***	0.007	0.472*	0.231***	-0.977***	1.680***	1.649***
for recent migrants	(0.188)	(0.048)	(0.155)	(0.249)	(0.250)	(0.081)	(0.225)	(0.394)	(0.254)
Observations	464	464	464	464	464	464	464	464	464
IV-A) OLS, Predicted Occupation Skill Groups, Regional Councils									
Inflow rate	0.092	-0.076**	0.245**	-0.229	0.283	0.274***	-1.260***	1.817***	1.516***
for recent migrants	(0.156)	(0.037)	(0.120)	(0.194)	(0.180)	(0.097)	(0.196)	(0.287)	(0.256)
IV-B) IV, Predicted Occupation Skill Groups, Regional Councils									
Inflow rate	0.539*	0.038	0.687***	-0.110	0.496**	0.174	-1.086***	1.756***	1.997***
for recent migrants	(0.284)	(0.068)	(0.228)	(0.335)	(0.229)	(0.123)	(0.248)	(0.361)	(0.429)
Observations	128	128	128	128	128	128	128	128	128

Note: All regressions are variance weighted by the skill-group population in each geographic area for the examined sub-group 5-years ago. In the IV regressions, the inflow rate of recent migrants is instrumented by the predicted inflow rate based on past settlement patterns. All regression also control for the following characteristics of the examined sub-group 5-years ago in each area: average age, average age-squared, percent female, percent Maori, percent Pacifica, percent Asian, percent other ethnicity, percent married, percent couple with no children, percent couple with children and percent single parent and skill-group, area, year, area*year, skill group*year and skill group*area fixed effects.

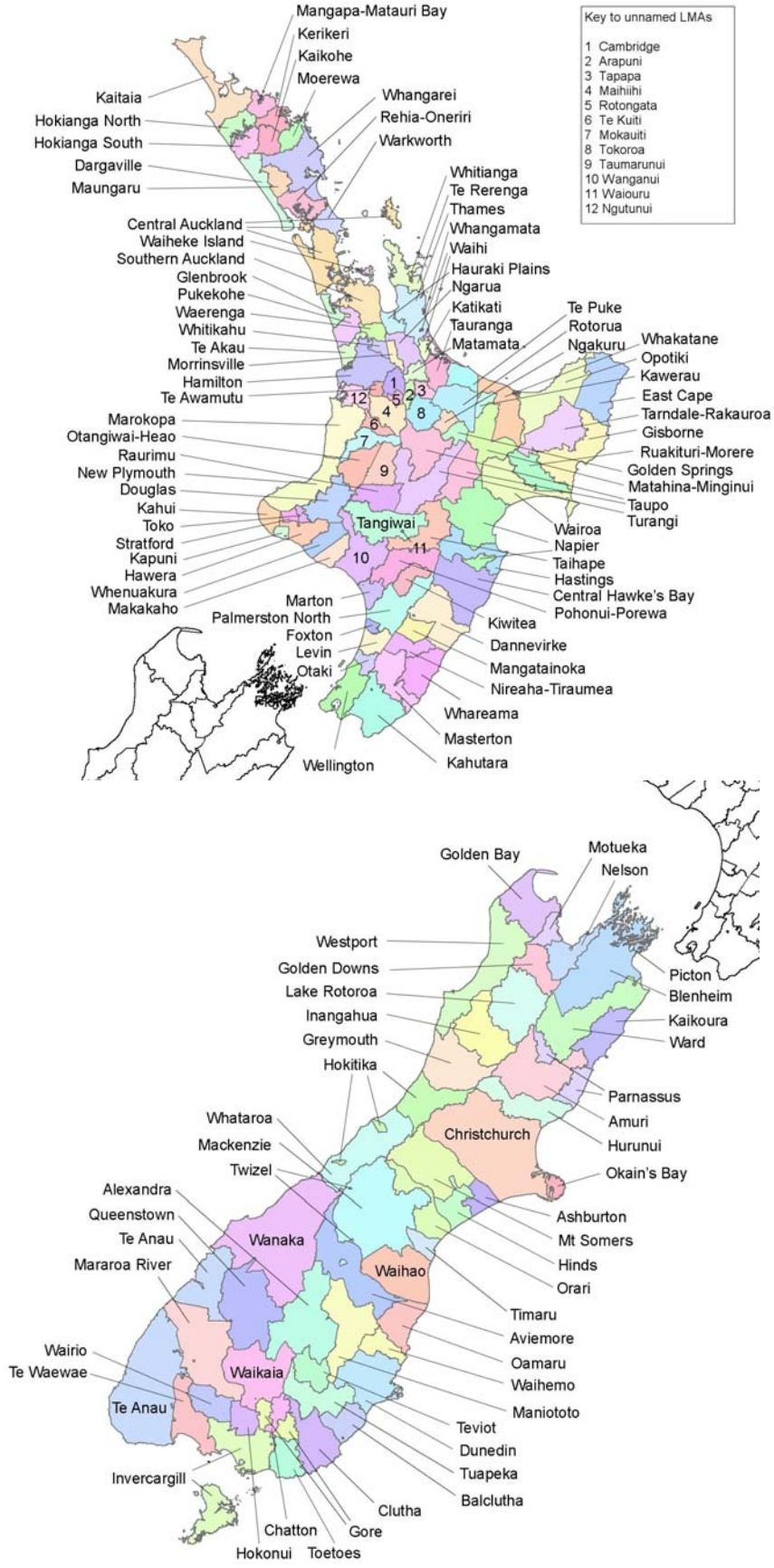
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A: Labour Market Areas

Newell and Papps (2001) create labour market areas (LMAs) using travel-to-work data at area unit level drawn from the 1991 census. We use the 140 LMAs defined by the preferred specification in their paper, which enforces a minimum employed population of 2,000 and 75% self-containment of workers (allowing for some trade-off between the two). These LMAs have an average size of approximately 1900 square kilometres. In main urban areas, LMAs generally encompass the urban area and an extensive catchment area. In rural areas, LMAs tend to consist of numerous small areas, each centred on a minor service centre.

The advantage of using functionally defined LMAs over administratively defined areas, such as territorial local authorities, is that migration between LMAs is generally associated with a change of job, whereas migration within a LMA is often motivated by residential factors. By disregarding migration within LMAs, we are able to largely isolate job-related migration. Administratively defined geographic areas are much less able separate these two types of migration.

Figure A1: New Zealand Labour Market Areas



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