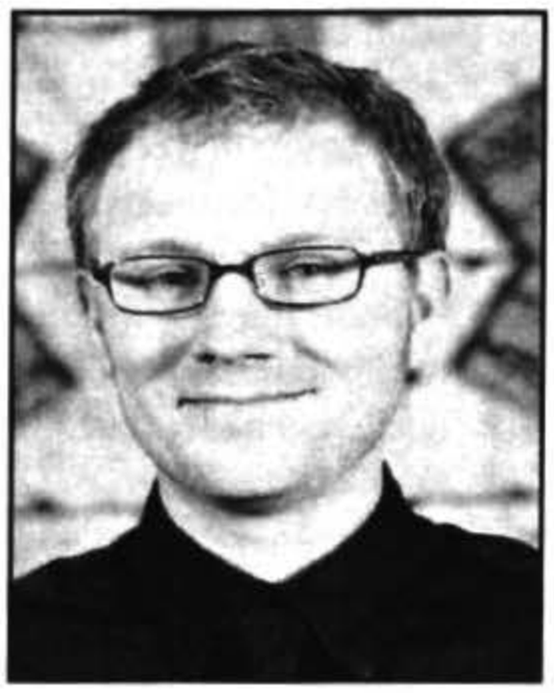
INTERNAL MIGRATION AND REGIONAL ADJUSTMENT: SOME PRELIMINARY ISSUES



David Maré and Jason Timmins[1]

Motu Economic and Public Policy Research

Abstract

In this paper we examine the link between local labour market adjustment and internal migration. We use census data to provide a range of labour market indicators, and measures of movements of people between locations. We then consider the relationship between internal migration and regional labour market adjustment, examining the importance of accounting for persistent regional differences, international migration, and how similar locations are. We provide some preliminary estimates of labour market - migration links, building on the foundation of a simple gravity-model relationship.

Keywords: *Labour market adjustment, internal migration, gravity model, indicators*

There has been a recent resurgence in interest and concern about regional issues in New Zealand. The re-establishment of the role of Minister of Industry and Regional Development by the current government is a clear signal of this strengthened focus. The broad aim of the regional development programme is "to facilitate and promote sustainable regional development to help regions respond to local opportunities".

This paper examines the link between regional labour markets and the movements of people within New Zealand. Migration is one of the potential ways that regions might adjust to economic changes. Migration flows may act as an 'automatic stabiliser' for regions, allowing people to improve their well-being by moving to regions that are faring well. Migration also has the potential to either strengthen or dilute policy efforts to assist people in struggling regions (eg: those with high unemployment/ low income). Regional development policies may attract people with skills, capital, and ideas into assisted areas, boosting longer term growth prospects. However, if the benefits of regional development policy accrue primarily to people who move in to an area to take advantage of the assistance offered, any improvement may fail to raise the living standards of the initial residents.

This paper is not intended to resolve the broad range of complex tradeoffs inherent in regional development policy. Rather, it will shed light on whether the movement of people is an important concern for the design of regional policies, and improve our understanding of one important component of regional labour market dynamics.

In the following section, we outline the sort of links between migration and labour markets that we will subsequently search for. We then describe the data that we use to summarise the extent of migration flows and regional adjustment. We then present some preliminary modelling of migration flows, before concluding, and providing some suggestions for further research.

The Link Between Migration and Labour Markets

People change locations for a wide variety of reasons. The labour market is one of the important factors, especially for longer distance moves. Economic theory provides a characterisation of the migration decision that emphasises the way that labour market considerations can influence migration decisions. In the simplest version of such a model, each person chooses to locate in the area where they will be most well-off. Starting from a situation where nobody wishes to move, we can use the logic of the model to examine the migration response to a 'regional shock'. Suppose that consumers develop a strong taste for something that is produced only in one region. As firms in that region expand production, they will want to increase employment, and we would expect the labour market to change in a way that makes that region more attractive to workers from other regions (eg: wages may rise, unemployment may drop). At least some workers from other regions will be induced to move into the affected region. This migration will offset the wage increase and unemployment decline in the affected region. It will also lead to higher wages and lower unemployment in the regions where migrants are coming from, as firms there are forced to compete with the affected region for workers. This adjustment will continue until once again nobody wishes to move, at which point the favourable impact of the initial shock has been spread across all regions, with higher wages and/ or lower unemployment everywhere.

This model is, of course, a simplification of the real world. In practice, there are plausible reasons to expect only slow

or partial adjustment. These include:

- fixed mobility costs: If there are costs of moving between locations, people will not move unless the differences in the attractiveness of local labour markets are large enough to outweigh the costs. There may therefore be sustained differences in attractiveness, and hence in indicators such as unemployment and wage rates.

- convex adjustment costs: If adjustment is more costly if it is done all at once rather than gradually, mobility flows in response to regional shocks may have an extended impact. Such costs may arise, for instance, because of the high costs of rapidly expanding housing or infrastructure in the receiving region.

- uncertainty: Adjustment may be slow because people want to be sure that differences in attractiveness will last. Adjustment in response to a transitory shock will be much smaller than adjustment to a permanent shock.

- productive amenities: There may be sustained differences in labour market indicators because regions differ in dimensions other than those measured. These could arise for consumption reasons or for production reasons. For instance, people may be willing to stay in a region with a favourable climate, despite the fact that it has high unemployment. For the high unemployment rate to be maintained, it must be the case that firms choose not to create jobs in the region. There must therefore be a difference in regionally-specific productivity across regions – in this case lower productivity in the high unemployment region.

- demographics: Some demographic groups are less mobile than others. Adjustment by means of outflows will therefore be slower for regions that have immobile populations.

The stronger are these effects, the less we can rely on regional migration to aid regional adjustment to labour market shocks.

Developing a model of regional labour market adjustment, as outlined above, does not ensure that the links that are highlighted by the model are dominant, or even significant forms of adjustment, or that labour market adjustment is the most important motivation for migration decisions. Those are empirical questions. The empirical literature on regional labour markets confirms that the relationships captured by the model are indeed important, and that understanding them helps us understand regional adjustment.

The remainder of this paper summarises and analyses some key empirical patterns of internal migration and regional adjustment in New Zealand and the link between them.

Data Description

The mobility data has been drawn from the 1996 and 1991 census of population and dwellings. The 1996 and 1991 census asks for current and previous census (5 years ago) addresss. From these two questions a change of address, and therefore a move, can be identified. An origin-destination table, produced by Statistics New Zealand (SNZ), provides gross movements of people in and out of Area Units within New Zealand. An Area Unit (AU) is a SNZ defined spatial unit roughly equivalent to a city suburb and normally contains 3,000–5,000 people, but AUs can be considerably larger and contain fewer people in rural areas. There are 1,766 area units defined for New Zealand. For this project, we have excluded area units with very small populations because of problems with rounding. Many of the excluded units are offshore islands. Area units can be aggregated into Territorial Local Authorities and Regional Councils to allow examination of flows between large administration zones.

Census data contains mobility information of everyone in New Zealand at the time of the census. We therefore observe people who entered New Zealand in the five years prior to a census, but not those who left New Zealand over that period. The mobility data that we use contains information on movements only of people who were in New Zealand at the times of both the current and previous censuses (1986 and 1991 for the 1991 census, and 1991 and 1996 for the 1996 census). The analysis therefore excludes flows arising from international migration. This exclusion is discussed further below. The origin-destination table provides previous residence information at Area Unit level and for overseas countries. Current residence, however, is only provided for New Zealand (at Area Unit level).

The census and dwelling dataset is available aggregated to meshblocks, which can be combined to create AUs, TLAs and RCs. This allows the data to be matched with the migration data described above and provide characteristics for each administrative zone.

Patterns of Regional Migration and Regional Adjustment

The main focus of this paper is the link between internal migration and regional labour market adjustment. Before examining evidence for this link, we first present in this section information separately on the extent of internal migration flows and the extent of regional adjustment.

How Much Internal Migration Is There?

Existing studies from the Waikato University Population Studies Centre provide a good summary of inter-regional migration patterns over the 1981-1996 period. Goodwin and Bedford (1997) for instance analyse gross and net migration rates separately by region, and for selected demographic sub-groups.

Table 1 shows gross migration rates for different definitions

of mobility, using the dataset described above. A clear message from the table is that it matters a lot what definition of a move is used. For instance, the first row shows that 39.5 percent of the 1996 population were living in an area unit different from the one they reported living in 5 years earlier. From the second row, we see that only 21.2 percent of the population had moved across a territorial local authority boundary. The third row reports the comparable figure for regional council boundaries - only 10.4 percent had moved from a different regional council. In general, the larger the area, the lower the measured migration rate. Different ways of defining mobility rates produce different estimates, each of which reveals something about migration patterns. Most moves are relatively short distance moves, which probably reflect residential moves more than they do labour market factors. Short distance residential moves may also serve as a substitute for commuting. Our focus on the links between internal migration and labour market adjustment lead us to choose measures of migration that exclude many of these short moves, so as to more clearly identify moves that are likely to be more closely linked to labour market considerations.

Table 1. Percentage of Moves (1991–1996) Within and Between Different (Administration) Zones

	Within (%)		Between (%)	Total (%)
	Non-movers	Movers		
Census Area Unit	60.5	n/a	39.5	100
Territorial Local Authority	60.5	18.3	21.2	100
Regional Council	60.5	29.1	10.4	100
Area of 20 km radius	60.5	**24.3**	**15.2**	100

Note: The figures above only include moves that can be traced back to a 1991 Area Unit.

The final row of Table 1 shows migration rate estimates based on a Euclidean distance definition. Only 15.2 percent of the population moved more than 20 kilometres, accounting for 39 percent (421,701) of all the moves between AUs. Figure 1 shows in more detail the distribution of the number of moves and the distance of moves and shows clearly the preponderance of short-distance moves.

An obvious question to ask is whether these flow rates are large or small relative those of other countries. Differences in regional size and population density across countries make exact comparison unlikely, but the comparisons that have been made tell a consistent story. Greenwood (1997, Tables 1 and 2) makes international comparisons for 1971 and 1981, and finds that mobility rates in New Zealand are relatively high – similar to high rates in Canada and the USA, and higher than rates in Europe. Similarly, OECD (2000, Table 2.12) shows that in 1995 only Japan, Canada and USA had higher gross migration rates than New Zealand. The OECD study also shows that New Zealand had a relatively low ratio of net to gross migration, suggesting that there are relatively large two way flows between regions.

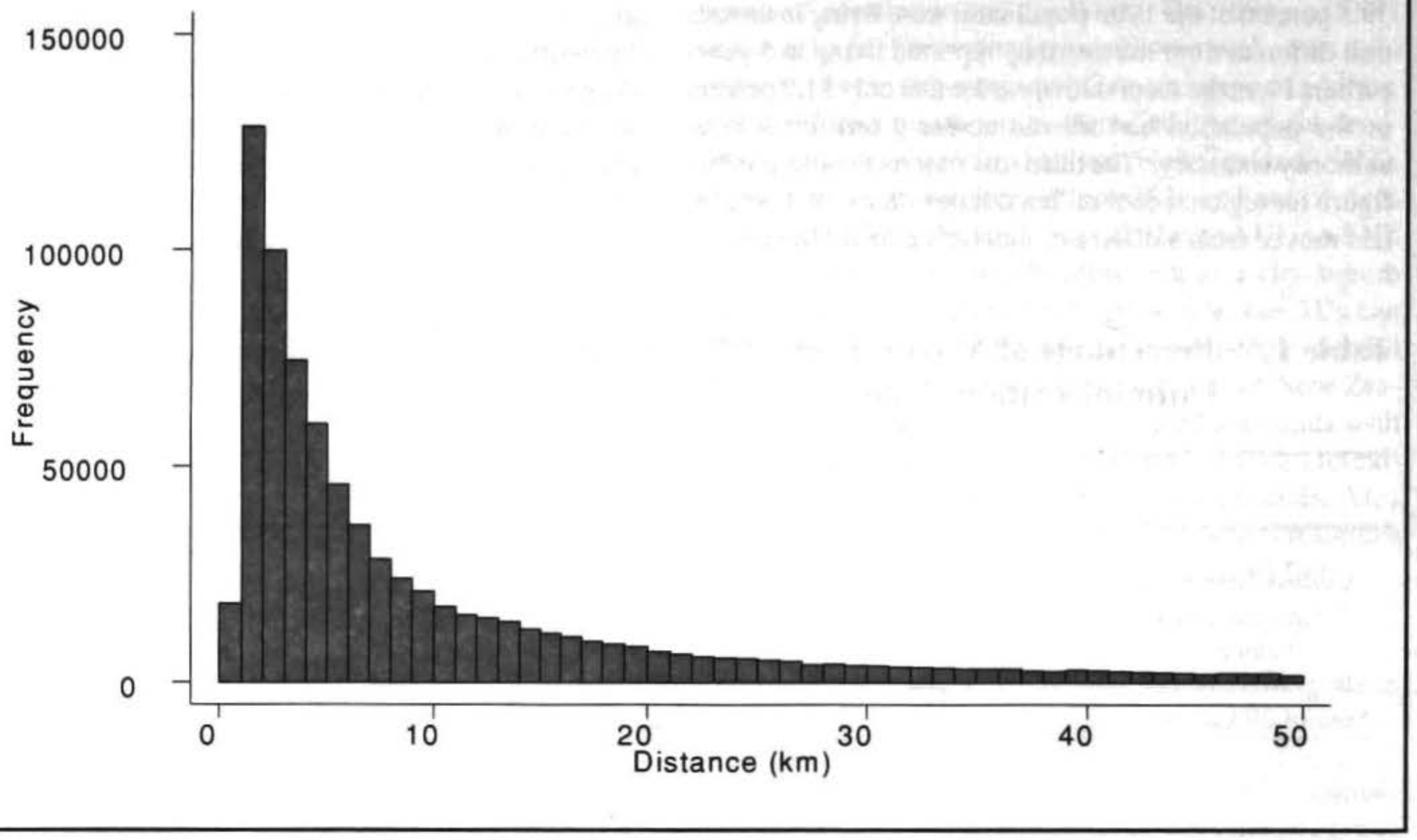
International Migration

As noted in the description of the data, the data set that we are using for this paper excludes migration flows to and from countries other than New Zealand. This exclusion was made because of the obvious lack of census data on people who had left New Zealand between consecutive censuses, and the lack of consistent information on "regional" characteristics for other countries. Excluding international flows is potentially a weakness in our empirical analysis if flows across New Zealand's border are a significant means of regional labour market adjustment. The open border between Australia and New Zealand makes Trans-Tasman migration a feasible option for people seeking better labour market prospects in the neighbouring country.

Figure 2 analyses the relative sizes of internal and international migration inflows, and the relationship between them. At the Area Unit level, overseas inflows do not exceed internal inflows (Figure 2a), ie. internal inflows are a greater proportion of total inflows, however, the picture changes at the Regional Council level (Figure 2b).

The Auckland region is unique because it is the only region where overseas inflows out–weigh internal inflows (Figure 2b). The Wellington and Canterbury regions have the next largest international inflow component, however, internal flows still dominate. Figures 2c and 2d explore the international inflows in more detail. The two largest (gross numbers) overseas inflows are from Australia and the United Kingdom respectively. It is argued that due to weak perceived barriers between NZ and these two countries (both immigration and cultural) these flows are important. But Figure 2 suggests that on their own Australia and the United Kingdom are not as important as internal flows (even in Auckland). This is not surprising as wrapped up in Australia and UK inflows will be many (predominantly?) return Kiwi migrants (working holiday etc.), thus the inflows are absorbed across all NZ regions. However, when Australia and UK inflows are removed, we find that

Figure 1. Number of Moves between Area Units (1991-1996) by Distance



overseas inflows are heavily concentrated in Auckland (Wellington and Canterbury loose their importance as international destinations).

Overall, international migration seems to be a fairly constant proportion of local population, with the exception of Auckland. This understatement of flow rates will therefore be most pronounced for areas with low internal inflow rates. The bias is even more pronounced for Auckland, which not only has a low internal inflow rate, but also a high external inflow rate. Estimates of external outflows, calculated by James Newell, show that the pattern of external outflow rates is similar to that of external inflow rates, although outflows are less concentrated in Auckland Wellington and Christchurch than are the inflows.

The omission of external flows in the analysis in the remainder of this paper is a concern, and one that we will need to find some resolution of in future work. Further empirical work will help us to identify any biases that might arise as a result.

How Much Regional Adjustment Is There?

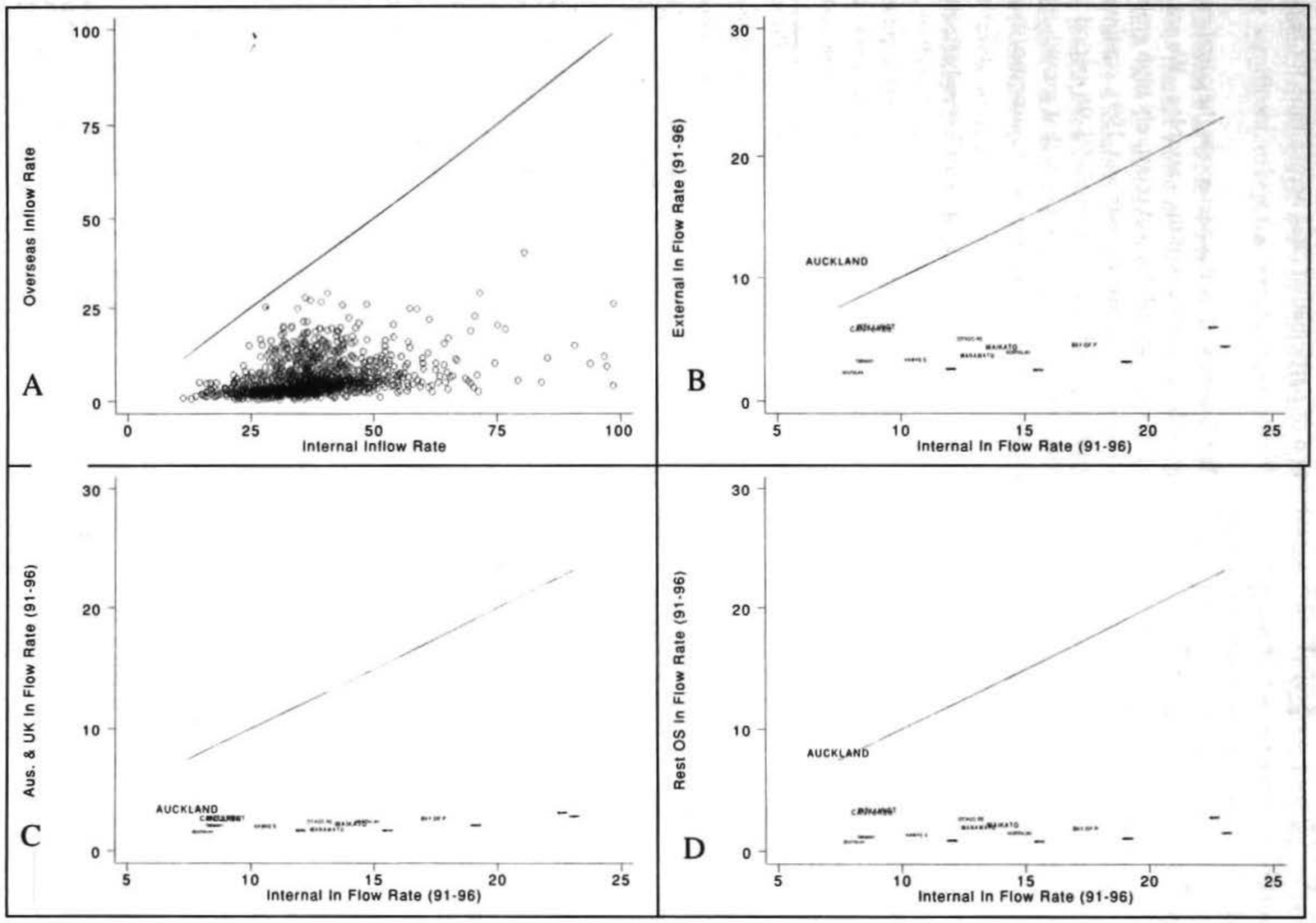
We wish to examine the relationship between internal migration and regional labour market adjustment, yet there is not universal agreement on what constitutes regional labour market adjustment. To many commentators, regional adjustment occurs when differences between regions become less. This view implies that the equilibrium - when no further adjustment is needed - is one in which all regions are the same. Alternatively, we might accept that there are stable long-run differences between regions. In this case, regional adjustment entails restoring long-run relativities after a regional shock.

In this section, we consider two types of evidence on the amount of regional adjustment - persistence and convergence. The four panels of Figure 3 illustrate the range of patterns that we are looking for in the data. The horizontal axis represents time and the vertical axis could be any labour market outcome. Each of the three lines represents one of three regions. In the first row of the figure (labelled "persistence"), the relative order of outcomes is maintained, so that a region that performs relatively well in one period also does so in other periods. The two graphs labelled "no persistence" show a pattern where the order is not maintained. In the convergence column of Figure Three, outcomes are becoming more similar across time, whereas the two graphs on the right show divergence, where the gap between well performing and poorly performing regions widens.

First, we present results for how persistent relative local labour market outcomes are across time. We use as an indicator of this the correlation between labour market outcomes for locations over time. Table Two presents such correlations for five labour market indicators. The three panels of Table Two relate to three different levels of spatial aggregation.

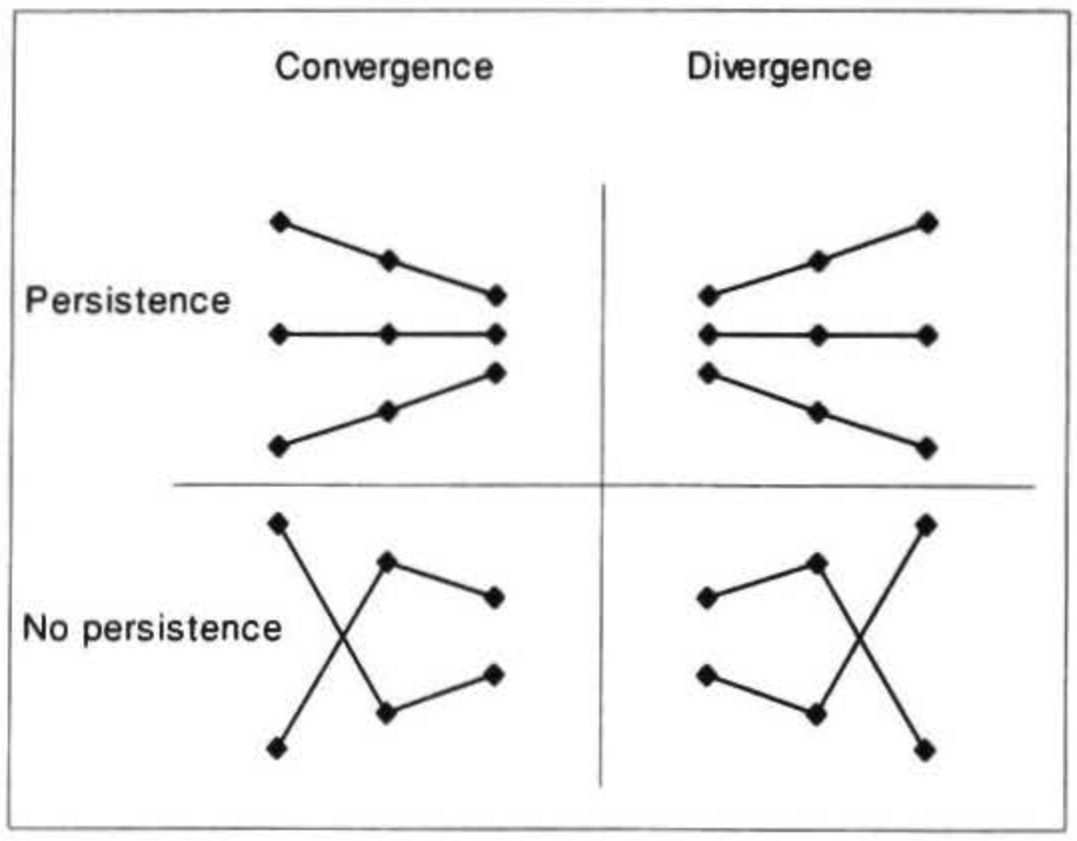
The first panel of Table 2 shows high correlations for all indicators between 1986 and 1991, between 1991 and 1996, and for the longer period between 1986 and 1991. Area Units that had high employment rates in 1986 tended to have high employment rates in 1991. A similar pattern is observed when comparing 1996 to 1991. The correlations of 1996 indicators with 1986 indicators are generally weaker than those between the shorter 1986-91 and 1991-96 periods, suggesting that persistence is less pro-

Figure 2. International Vs Internal Regional Inflows



The relationship between New Zealand internal and international inflows at (A) Area Unit, (B) Regional Council, (C) Regional Council (includes all internal inflows, but only international inflows from Australia and the UK), and (D) Regional Council (includes all internal inflows and all international inflows, excluding inflows originating in Australia and the UK).

Figure 3. Patterns of Convergence and Persistence



nounced over longer time periods.

The second and third panels of Table Two show comparable results for TLAs and Regional Councils. One of the patterns to emerge is that persistence is weaker between 1986 and 1991 than in the following five years. This earlier period was a period of significant change and contraction, which appears to have altered the pattern of relative labour market outcomes across regions. The only correlation that is not high and significant is the 1991-96 correlation of participation rates across time for regional councils.

The final row of each panel reports the correlation between growth rates in each of the variables. We are looking at whether locations that had relatively high growth rates of an indicator between 1986 and 1991 continued to have relatively high growth in the 1991-96 period. In the first panel of Table Two, it appears that growth rates are not persistent for employment, unemployment and

Table 2. Persistence of Population and Labour Market Indicators Correlations Over Time

(A): Area Unit Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population (% of NZ pop)
86–91	0.78*	0.73*	0.72*	0.87*	0.98*
91–96	0.88*	0.84*	0.82*	0.92*	0.98*
86–96	0.72*	0.70*	0.64*	0.78*	0.95*
Growth Rates					
8691–9196	-0.39*	-0.18*	-0.38*	0.18*	0.46*

(B): TLA Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population (% of NZ pop)
86–91	0.86*	0.88*	0.80*	0.88*	1*
91–96	0.93*	0.92*	0.89*	0.93*	1*
86–96	0.74*	0.89*	0.63*	0.81*	1*
Growth Rates					
8691–9196	0.08	-0.15	0.07	0.00	0.73*

(C): Regional Council Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population (% of NZ pop)
86–91	0.75*	0.84*	0.62*	0.93*	1*
91–96	0.96*	0.95*	0.93*	0.99*	1*
86–96	0.59*	0.81*	0.45	0.91*	1*
Growth Rates					
8691–9196	0.29	0.29	0.16	0.09	0.86*

Notes:

1. * = significant at 5%.
2. Persistence in growth rates between 86–91 and 91–96.

participation rates, but that median income growth and population share growth are.

It is likely that some of the apparent reversal of fortunes implied by the negative correlations of growth rates at the area unit level are due to random fluctuations due to the smallness of the areas. As the level of spatial aggregation increases, we find stronger evidence of persistence in growth rates. Growth rates are positively correlated for regional councils, although the correlations are not statistically significant, except for .population share.

Having established that there is a positive correlation of relative labour market outcomes across time for spatial units, we turn now to indicators of convergence - do differences between locations get smaller over time? We regress the proportional change (log difference) in each labour market indicator on the initial (logged) level. Table Three reports coefficients from such regressions for various years and levels of spatial aggregation. A negative coefficient indicates that areas that began with a high level grow less, so they 'lose ground' to areas with lower but faster growing levels. A positive coefficient indicates divergence - the areas with initially high levels have faster growth, and those with low levels have slower growth, leading to a widening gap between them.

The results in Table Three show stronger signs of convergence in 1991-96 than in the preceding five years, with the exception of unemployment. National and regional unemployment rates rose strongly between 1986 and 1991. The pattern of correlations suggest that the proportional growth in unemployment rates was greatest for initially low-unemployment areas. Between 1991 and 1996, when unemployment rates fell, it appears that the greatest falls were in the areas that had relatively low unemployment in 1991.

Comparing across the different spatial levels, we find more evidence of convergence for area units than for the larger areas, possibly again because of the reversals of random variation arising from small size. There is no significant evidence of convergence at the TLA or Regional Council level. Where coefficients are significant, they suggest that TLAs and Regional Councils are becoming less alike.

The preliminary evidence that we have just presented on persistence and convergence does not fully answer our question about how much regional adjustment there is. It does suggest that there are sustained differences between different spatial units that indicate either that adjustment to equalise levels is too slow to show up clearly in the decade time span we have considered, or that there are equilibrium differences in levels that do not necessarily require adjustment.

Links between Internal Migration and Regional Labour Market Outcomes

In this section, we present some preliminary evidence on the links between internal migration and regional labour market outcomes. Figure Four shows the expected relationship. The horizontal axis shows any favourable labour market outcome (eg: wage rates, employment rates, employment growth). The vertical axis shows migration flows. We expect that inflows are positively related to good labour market outcomes - people move to areas with stronger labour markets. Conversely, outflows are lower when labour market outcomes are better. Overall, we expect that net flows are positively related to good labour market conditions.

Before presenting our multivariate analysis of the relationship, we examine first the simple correlations between selected labour market indicators and each of three migration flow measures (inflows, outflows and net flows) at three levels of spatial disaggregation. Figure Five summarises the results. The relationships are clearly different at different levels of aggregation.

The indicators shown in Figure Five are the employment rate, the participation rate, the share of national population, and per capita income. For each of these indicators, we would expect a positive correlation with net migration and inflows, and a negative correlation with outflows. There are significant positive correlations with net migration and inflow rates at the area unit and TLA levels. The correlation at the regional council level, while positive, is not significant. The expected negative correlation with outflow rates holds only at the area unit level.

The observed patterns suggest that the link between labour market conditions and net migration is due more to a link with inflow rates than with outflow rates. We speculate that people may leave locations for non-labour market reasons, but their choice of destination is more closely linked to labour market prospects. The exception is that people appear less likely to leave area unit that are doing well. The relationships at regional council level are not significant, suggesting that internal migration may be aiding labour market adjustment more at the sub-regional level.

We also carry out a multivariate analysis of migration-labour market links. Our approach is to estimate a regression model of gross flows between regions. We have chosen a specification based on a gravity model relationship, which is a standard foundation for such analyses. Its attractiveness stems in part from its simplicity, and in part from the fact that it requires only aggregate area data. In particular, gravity models can be estimated using the sort of data that we have from the New Zealand census.

The most simple gravity models relate the flow of people from area i to area j (M_{ij}) to the attractiveness of each area, as proxied by population size (P_i and P_j), and the distance

Table 3. Convergence Indicators

(A): Area Unit Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population(% of NZ pop)
86–91	0.20*	-0.19*	0.05*	0.01	-0.03*
91–96	-0.22*	-0.03	-0.25*	-0.06*	-0.02*
86–96	-0.01	-0.09*	-0.17*	-0.12*	-0.07*

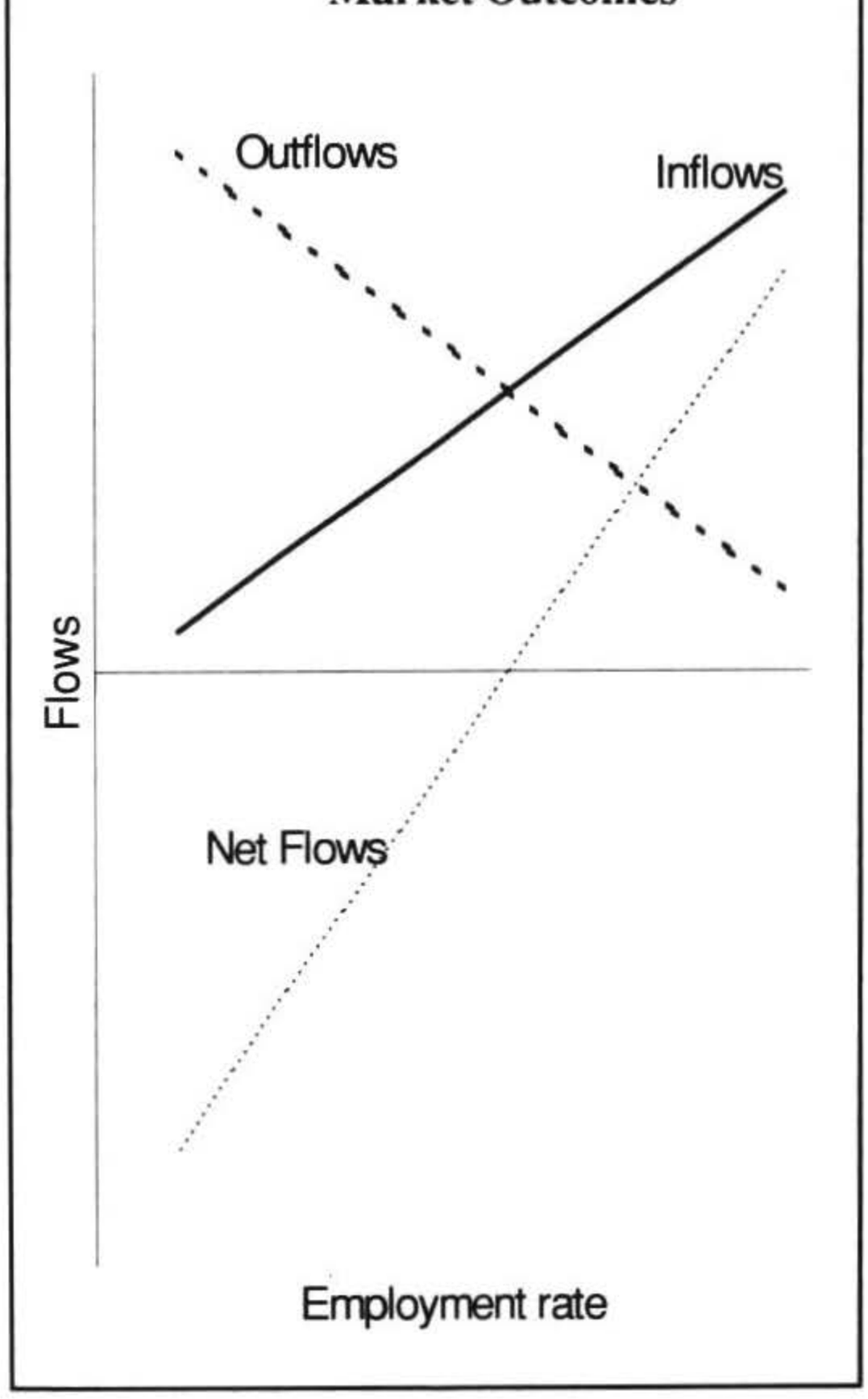
(B): TLA Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population (% of NZ pop)
86–91	0.48*	-0.03	0.22*	0.01	0.02
91–96	-0.03	0.25*	-0.08	0.08	0.01
86–96	0.33*	0.35*	0.00	0.09	0.03*

(C): Regional Council Relationships

Levels	Employed (E/WAP)	Unemployed (U/LF)	Participation (LF/WAP)	Median Income	Population (% of NZ pop)
86–91	0.52	0.02	0.15	0.11	0.01
91–96	-0.01	0.34*	-0.03	-0.05	0.00
86–96	0.25	0.38	-0.12	0.04	0.01

Figure 4. Migration and Labour Market Outcomes



between the areas (D). The form of the relationship is based on the formula[ii] for the Newtonian law of gravitation:

This simple relationship performs well in modelling general patterns of mobility. It has been criticised for its lack of economic and behavioural foundations but it serves to factor out patterns in the data that arise primarily because of the scale and spatial configuration of regions.

The basic gravity model can be extended by adding other characteristics of the origin and destination areas,

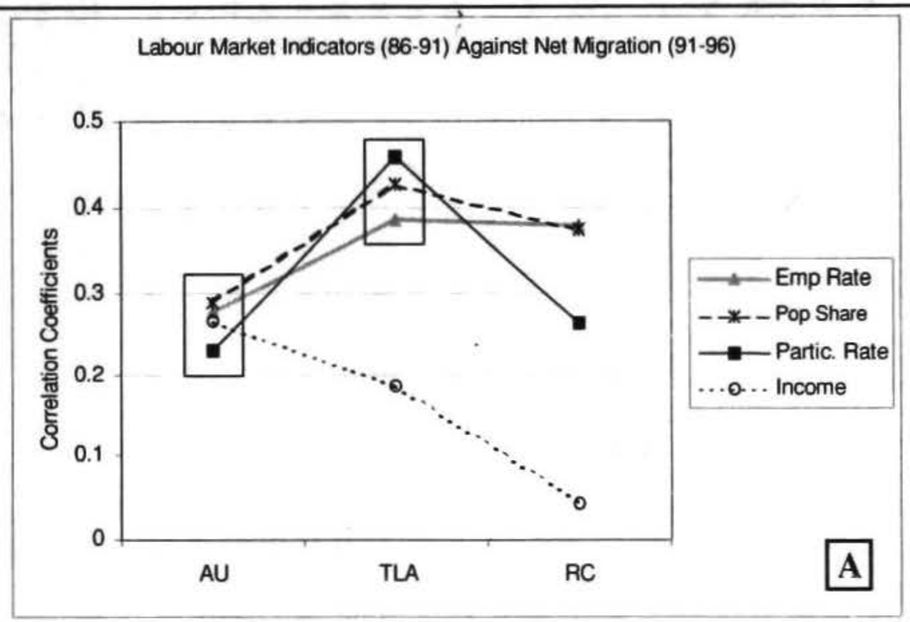
$$M_{ij} = GP_i^{\alpha_1} P_j^{\alpha_2} D_{ij}^{\alpha_3} X_i^{\beta_1} X_j^{\beta_2}$$

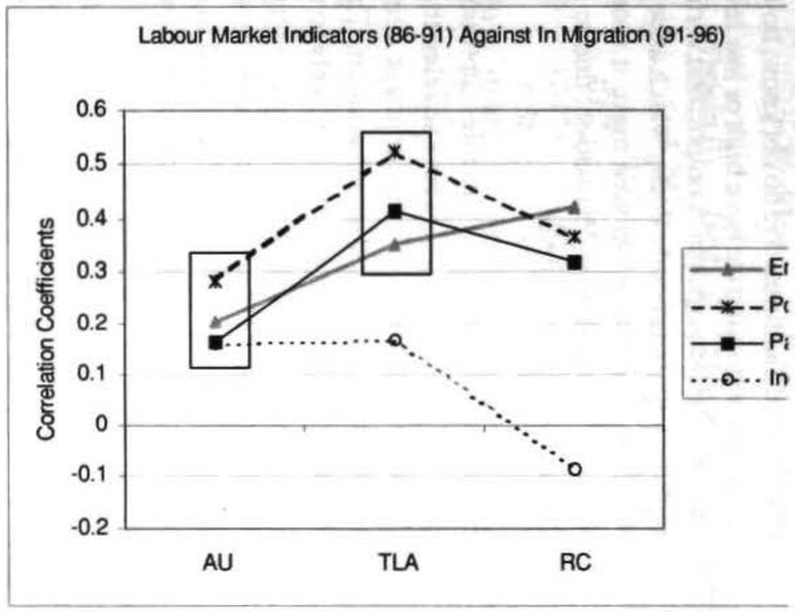
the exponents of which indicate the 'attractiveness' of area attributes in the sense of making the area a good place to leave (β_1) or to move to (β_2). Commonly added attributes include income or wage rate, unemployment rate, weather, housing prices, heating costs, or fiscal variables.

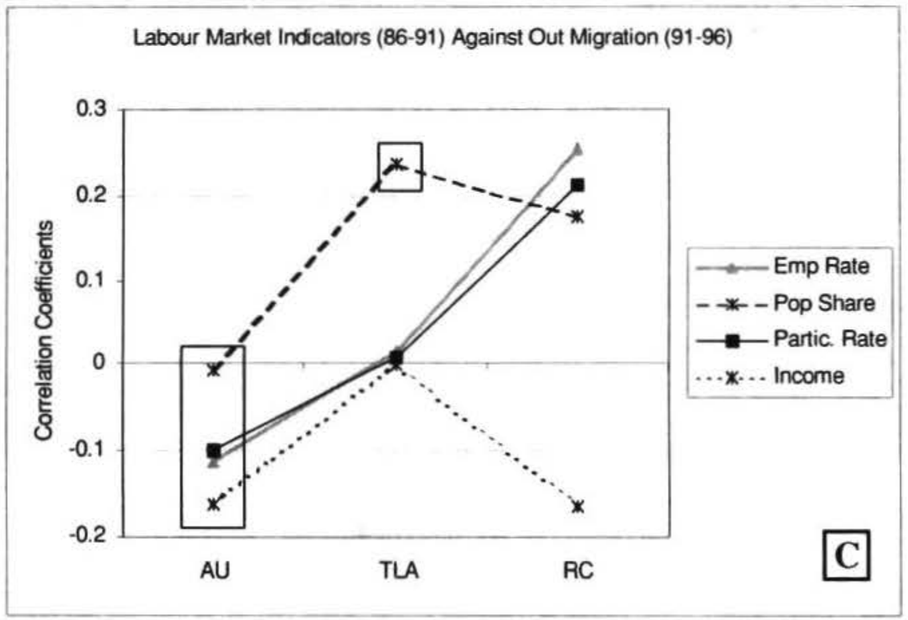
Table Four reports estimates of a simple gravity relationship. The relationship is estimated using regional data. Each observation is a pair of regions and the dependent variable is the gross flow from the region labelled 'i' to the region labelled 'j'. The coefficients are of the expected sign and size, and the explanatory power of the relationship is high. The relationship is also very stable across the two periods considered. The third column pools data from the two periods and includes a period dummy to allow for different intercepts.

The distance elasticity of migration is around -1.1, implying that geographic distance deters migration. Regions with larger populations have higher inflows and outflows,

Figure 5. Correlations of Migration Flows with Labour Market Indicators







Notes:

1. The data points enclosed in boxes are significant at 5%
2. AU = Area Unit, TLA = Territorial Local Authority and RC = Regional Council.

Table 4. Modelling Migration Flows with a Gravity Model

Dependent variable = Mij (log of migration moves between i (origin) and j (destination)

	(1) 86–91	(2) 91–96	(3) Pooled, inc. time period dummy
(log) Distance (distij)	-1.14*** (0.05)	-1.11*** (0.05)	-1.13*** (0.04)
(log) Pop (popt0i)	0.90*** (0.04)	0.91*** (0.03)	0.91*** (0.02)
(log) Pop (popt0j)	0.90*** (0.04)	0.83*** (0.03)	0.86*** (0.02)
(log) Area (areat0i)	0.31*** (0.06)	0.29*** (0.06)	0.30*** (0.04)
(log) Area (areat0j)	0.24*** (0.06)	0.28*** (0.06)	0.26*** (0.04)
_cons	-13.41*** (0.92)	-13.38*** (0.91)	-13.45*** (0.65)
Adj R–squared	0.865	0.864	0.866
N	240	239	479

Notes: 1. Standard Errors are in parentheses;
*=Significant at 10%, **= at 5% and ***= at 1%
2. All variables are logs

as can be seen by the positive and large coefficients on the two population variables. For the 1991-96 flows, the coefficient on origin population is larger than the coefficient on destination population, implying that there were net inflows to smaller regions.

The area variables are included to test the role of density, which was found to be important in earlier modelling of net migration rates (Kerr et al (2000)). The coefficients in Table 4 suggest that, controlling for population, areas that are more spread out have higher inflow and outflow rates, and that less dispersed (more dense) populations attract net inflows. The earlier work by Kerr et al at the level of area units found that net inflows were stronger into areas surrounding dense areas than into the dense areas themselves.

Table 5 presents estimates of an extended gravity model, with labour market and demographic attributes added. The appendix to this paper describes the variables that we use in our analyses. Labour market and demographic variables are measured as at the beginning of the period in order to avoid problems of endogeneity.

Labour market variables are the unemployment rate, the employment rate, and median income. We also include demographic composition variables capturing the proportion of the region's population that are in various age, ethnicity, and qualification groups. We know that people with different characteristics have different propensities to migrate, and these variables are intended to capture some of this heterogeneity. The measure is however imperfect. The characteristics are observed at the regional level, and may therefore not reflect the characteristics of movers. For instance, the coefficient on the origin proportion of the population with no qualifications (No Qual) has a significant positive coefficient, meaning that gross outflows are higher from regions where a high proportion of people have no qualifications. We do not know, however, whether the people who migrate have high or low levels of qualifications. The demographic composition variables may also capture neighbourhood effects, which arise when population characteristics of an area make it more (or less) attractive as a migration destination, due to some form of external effect or spillover.

Finally, we also add three variables capturing how similar each pair of regions is. The variables that we use are Duncan dissimilarity indices for ethnic composition, one digit industry, and one-digit occupation. The coefficients indicate whether people are more likely to move to other areas that are similar to their own, or to ones that are different. We might expect people to move to similar regions because they would be more likely to fit in, because their knowledge, information and behaviours would be more in line with those in their destination.

The first two columns contain estimates for the 1986-91 period. Comparing these results with Table Four reveals that adding in the additional covariates does not alter the distance elasticity estimate much, but it does change the other gravity-relationsip coefficients, and leads to a sizeable increase in standard errors. The increase in explanatory power achieved by adding 29 variables is an increase in the adjusted R-squared from 87 percent to 92 percent. The added variables account for about 40 percent of the variation not explained by the simple gravity relationship.

The evidence for a labour market influence on migration flows at the regional council level is weak at best. Few of the coefficients are significant, and the pattern of signs is not stable. This is true for regressions for the two separate subperiods (regressions 4 and 5), for the pooled subperiods (regression 6), and the pooled subperiods, with allowance made for permanent differences in levels of variables across regions (regression 7). Regression 7 includes dummy variables for origin and destination regions, and is thus identified on the basis of deviations from region-specific means. This specification would be appropriate if there are permanent differences between regions, and regional adjustment entailed restoring regions to stable relative positions.

One of the few coefficients that is consistently significant is that on dissimilarity of ethnicity mix. Flows appear to be higher between regions that have similar ethnicity mixes. People also appear to prefer moving to regions that have similar occupation mixes.

Table 5. Migration Estimates

Dependent variable = Mij (log of migration moves between i (origin) and j (destination)

	(4) 86–91		(5) 91–96		(6) Pooled, inc. time period dummy		(7) Pooled, inc. time period and regional dummies	
	Origin (i)	Dest. (j)	Origin (i)	Dest. (j)	Origin (i)	Dest. (j)	Origin (i)	Dest. (j)
Distance (distij)	-1.29*** (0.05)		-0.99*** (0.05)		-1.16*** (0.04)		-1.25*** (0.04)	
Pop (popt0)	0.07 (0.41)	0.60*** (0.19)	-0.06 (0.41)	0.96*** (0.19)	0.71*** (0.08)	1.54 (3.32)	0.89*** (0.08)	2.93 (3.33)
Area (areat0)	-0.38 (0.46)	0.62* (0.38)	-0.92** (0.46)	0.16 (0.38)	0.30*** (0.08)	-1.01 (20.75)	0.25*** (0.08)	11.72 (20.75)
Unemp (uet0r)	-0.10 (1.88)	2.51 (2.36)	1.20 (1.88)	0.52 (2.36)	0.93** (0.48)	0.08 (1.04)	0.18 (0.48)	-0.91 (1.04)
Emp (ewat0r)	-2.71 (10.55)	1.25 (8.94)	5.60 (10.55)	-4.89 (8.94)	0.23 (2.02)	2.08 (10.91)	-2.99 (2.02)	-2.08 (10.91)
Income (mit0)	-4.62 (5.27)	3.32 (3.34)	-11.21** (5.27)	1.92 (3.34)	1.07 (1.04)	0.36 (9.78)	0.65 (1.04)	-2.27 (9.78)
Aged 15–24 (pt0pt24)	3.97 (6.18)	-6.18 (7.76)	10.20* (6.18)	6.35 (7.75)	1.43 (1.37)	-1.28 (5.77)	1.31 (1.37)	4.77 (5.77)
Aged 25–54 (pt0pt54)	3.25 (10.54)	-21.54 (20.73)	12.19 (10.54)	6.49 (20.72)	-0.37 (3.43)	-15.37 (24.02)	-2.87 (3.42)	27.21 (24.02)
Aged 55–64 (pt0pt64)	22.47 (14.90)	-7.23 (5.60)	35.96** (14.90)	-4.53 (5.59)	0.40 (1.62)	0.15 (4.79)	-1.83 (1.61)	2.20 (4.79)
Aged 65+ (pt0pt65)	-9.63* (5.29)	-0.25 (1.98)	-14.12*** (5.29)	3.42* (1.98)	-0.36 (0.73	-3.87 (6.11)	0.60 (0.73)	3.82 (6.11)
Euro (pteut0)	1.48 (4.67)	-3.38 (2.22)	8.57* (4.67)	-2.10 (2.22)	-2.29*** (0.79)	3.75 (13.51)	-1.72** (0.79)	-11.96 (13.49)
Maori (ptmat0)	0.18 (0.95)	-1.33 (1.00)	1.36 (0.95)	-0.07 (1.00)	-0.54** (0.22)	-1.13 (2.97)	-0.56*** (0.22)	3.25 (2.97)
Pacific Isl. (ptpit0)	0.69*** (0.21)	0.55*** (0.20)	0.76*** (0.21)	0.36* (0.20)	0.35*** (0.09)	-0.17 (1.27)	0.35*** (0.09)	-0.60 (1.27)
Asian (ptast0)	1.38 (1.05)	-0.59 (0.53)	2.16** (1.05)	-1.62*** (0.53)	-0.38** (0.17)	0.02 (1.12)	-0.80*** (0.17)	-0.62 (1.12)
Other (ptot0)	1.23*** (0.46)	0.17 (0.31)	1.28*** (0.46)	-0.11 (0.31)	0.15 (0.11)	-0.01 (0.36)	-0.11 (0.11)	-0.12 (0.36)
No Qual (pcnqt0)	10.34** (5.84)	-2.67 (2.79)	12.84** (5.84)	-2.98 (2.79)	0.78 (0.71)	10.79 (183.23)	-2.64*** (0.71)	68.88 (183.24)
Ethnicity (t0ethd)	-0.05*** (0.02)		-0.41*** (0.05)		-0.10*** (0.02)		-0.08*** (0.02)	
Industry (t0indd)	0.01 (0.02)		0.21 (0.15)		0.00 (0.02)		0.01 (0.02)	
Occupation (t0occd)	-0.14 (0.09)		-0.24* (0.13)		-0.11* (0.06)		-0.18*** (0.06)	
cons	-134.19 155.17		66.29 (145.25)		16.03 (27.69)		-443.24 (1474.06)	
Adj R–squared	0.92		0.94		0.92		0.92	
N	240		239		479		479	

Notes: 1. Standard errors are in parentheses; * = Significant at 10%, ** = at 5% and *** = 1%.
All variables are logs

Conclusions

In this paper we have used data from the 1991 and 1996 censuses to examine the dimensions of internal migration and regional adjustment in New Zealand, and to estimate the link between them at a regional council level.
New Zealand's gross migration rates appear to be relatively high by international standards, yet there is still a good deal of persistence in relative labour market outcomes, at the levels of area units, territorial local authorities, and regional councils.

At the regional council level, we found very little evidence of a systematic relationship between labour market changes and internal migration flows. Our descriptive statistics suggest that the link may be stronger at lower levels of spatial aggregation. There appears to be more adjustment occurring at TLA and area unit levels. This suggests that internal migration may aid adjustment of local labour markets within regional councils but not between them. Examining the relationships at Area Unit or TLA level remains a task for future research.

In the context of regional development policy, the conclusion from our work is that internal migration cannot be relied on to dissipate spatial shocks at the regional level. On the positive side, spatially targeted policies are more likely to benefit workers in the targeted regions than workers elsewhere. Of course, a full assessment of the impact of spatially targeted policies needs to look more broadly than just the labour market, and consider mobility of other factors of production.

Future Research

This paper was intended to outline some preliminary issues relevant for further investigations into the relationship between internal migration and regional labour market adjustment. Within the paper, we have identified a number of issues that warrant further investigation, including:

- the treatment of international migration
- re-examining descriptive statistics allowing for permanent differences between regions (ie: measuring labour market characteristics relative to area-specific means rather than national means)
- examining persistence over a longer time period.

Valuable extensions to the work in this paper would include:

- Investigate the links between migration and labour market adjustment in more detail at the sub-regional level.
- Examine links between regional/ local labour market adjustment and potential adjustment mechanisms other than migration (looking at labour market and non-labour market forms of adjustment such as housing markets, prices, and capital flows).
- Delve into the pattern of short-distance moves which we have excluded from our analysis, and consider the way that short-distance mobility and commuting are substitutes.
- Examine the probability of migration using unit record data, which would allow better controls for selection bias and heterogeneity. There is likely to be heterogeneity not only in the propensity to migrate, but also in the responsiveness of migration to labour market prospects. Unit record data would also enable migration decisions to be examined as household rather than individual decisions.
- case studies or regional studies of specific labour market 'shocks' and the migration response to them.

Notes

1 Motu Economic and Public Policy Research, 19 Milne Terrace, Island Bay, Wellington. www.motu.org.nz.

2 Cabinet paper "Implementing the Regional Development Programme" available as http://www.med.govt.nz/irdev/asst_prog/impregdev03.html.

3 For a good general discussion of the literature on internal migration and the importance of the labour market, see Greenwood (1997), or OECD (2000).

4 This is only one of the possible reasons for a rise in labour demand.

5 Sjaasted (1962) emphasised the intertemporal nature of migration decisions by analysing migration decisions in the context of human capital investments.

6 For a fuller discussion, see Roback (1982).

7 Fixed period questions (as above) tend to underestimate geographic turnover and are unable to capture the following return and repeated migration (Poot, 1986).

8 Only 82.8 percent of individuals in the 1996 census can be traced to an area unit at the time of the previous census: 0.7 percent and 4.4 percent respectively could be traced only to regional council or TLA; 6.5 percent were living overseas in 1991, and 5.5 percent did not respond to the question about prior location.

9 James Newell of MERA has derived estimates of

international outflows at the regional level but not yet at other levels of aggregation.

10 The national border does, however still appear to be an impediment to movement – seee Poot (1995)

11 Note however that Figure Two uses data on inflows between 1991 and 1996, when there was an unusually high inflow of international migrants, especially from countries other than Australia and the United Kingdom.

12 A different relationship between the growth rates of 86–91 and 91–96 for income growth is observed when using per capita income. Median income did not present a particularly strong relationship, however, per capita income was found to be negative and the relationship strengthened as the spatial unit was increased from AU to RC. We have, at present, no explanation for the difference.

13 The patterns of per capita income differ from the patterns of median income, as noted earlier.

14 The Newtonian Law of Gravitation replaces M with "gravitational force", and constrains $\alpha_1 = 1^{ij}$, $\alpha_2 = 1$, $\alpha_3 = -2$.

15 We also estimated a two-stage least squares model using beginning-of-period variables to instrument for end-of-period values but this produced results that were no clearer than the results using lagged values, so have not been presented.

16 See the appendix for a description of these indices.

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Appendix

Table A1: Variable Definitions

i = origin
j = destination
t0 = lagged variable – 1986 (for 1986–1991 flow) and 1991 (for 1991–1996 flow)

Variable name	Definition
mij	(log) Migration flow between i and j
Distij (1)	(log) Distance between i and j
areat0i	(log) Area (km^2) of i/j
popt0i	(log) Population of i/j at t0
pcnqt0i	(log) % with no qualifications of i/j at t0
uet0ri	(log) % Unemployed of i/j at t0
ewat0ri	(log) % gainfully employed of i/j at t0
mit0i	(log) Median Income of i/j at t0
pt0pt15i	(log) % of pop aged <15 of i/j at t0
pt0pt24i	(log) % of pop aged 15–24 of i/j at t0
pt0pt54i	(log) % of pop aged 25–54 of i/j at t0
pt0pt64i	(log) % of pop aged 55–64 of i/j at t0
pt0pt65i	(log) % of pop aged >65 of i/j at t0
pteut0i	(log) % of pop = European of i/j at t0
ptmat0i	(log) % of pop = Maori of i/j at t0
ptpit0i	(log) % of pop = Pacific Islands of i/j at t0
ptast0i	(log) % of pop = Asian of i/j at t0
ptot0i	(log) % of pop = Other of i/j at t0
t0ethd (2)	(log) Difference in ethnic composition between i/j for time t0
t0indd (2)	(log) Difference in industry composition between i/j for time t0
t0occd (2)	(log) Difference in occupation composition between i/j for time t0

Notes

The variable distij was derived from centroids (mean centre weighted by population density) calculate, d for each of the 16 regions.

The socio–economic composition difference variables were calculated using: where x = region, k = industry/occupation/ethnicity share, i = origin unit, j = destination unit.

Authors

Dave Maré
Motu Economic and Public Policy Research
19 Milne Terrace
Island Bay
Wellington
Dave.Mare@motu.org.nz

Jason Timmins
Motu Economic and Public Policy Research
19 Milne Terrace
Island Bay
Wellington
Jason.timmins@motu.org.nz