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Urban influence and population change in New Zealand

Introduction

While the New Zealand population overall continues to grow, a large proportion of towns and communities in rural or peripheral areas exhibit near-certain stagnation (Cameron *infra*) or decline in their populations (Jackson & Brabyn *infra*).

This is in part due to declining fertility and ageing, and in part due to migration for economic or amenity-related reasons (Brabyn *infra*).

This is not, however, the fate of all such areas, as it has long been thought that rural areas can benefit from growth spill-overs from nearby urban agglomerations. These spill-overs arise as workers with strong preferences for rural or less dense urban environments, but who wish to avail themselves of the employment opportunities available in urban labour markets, locate in the rural areas contiguous with or close to urban areas and commute to work. As a secondary effect the presence of these 'commuters' in an area may support local growth via the demand for local goods and services they generate.

There has been a long tradition of conceptualising the relationship between urban and rural areas within a core-periphery framework. In particular, approaches inspired by the trade theories of Nobel Prize winner Gunnar Myrdal (1963) have gained wide popularity (Veneri & Ruiz 2016: 7-9). Myrdal differentiates between spread effects, the positive effects on peripheral localities, when they share in the growth and wealth of a primary-growth centre, and backwash effects, the negative effects on the periphery arising from interaction with the growth centre.

In terms of regional spatial processes Henry et al (1997) define spread-backwash effects as:

> *Spatially, spread-backwash processes may be defined as the complex set of processes including government income and expenditure flows, private capital flows, trade, migration, commuting, and the diffusion of innovation) whereby the level of development of a peripheral area is changed due to spatial relationships with a core area.* (1997: 273)

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The overall impact is the net of spread and backwash effects (Partridge et al 2007); however, the net effect may well be hard to determine as the effect size and direction can vary with the object of interest. For instance, the impacts of proximity to a growth centre could differ between employment, income and population.

This conceptual framework is directly translatable to the study of sub-national spaces, with the role served by a central nation or trading block being taken by the dominant urban area and that of the periphery by the smaller towns and rural areas surrounding the primary urban area (Gaile 1980; Henry et al 1997).

Using a descriptive approach and Statistics New Zealand's (2004) urban-rural classification, we explore a range of impacts of urban-rural interaction and examine whether the spread or backwash effects dominate in the New Zealand context.

The article is structured as follows. In the first section we outline the classification system that we use to distinguish urban areas and the various levels of rurality. This provides us with a firm framework within which to discuss the relationship between the level of urban/rural interaction and a variety of demographic and labour market outcomes. The second section considers population change in the 2001-2013 period, disaggregated to the urban-rural classification, both for the population as a whole and by ethnic group. Our aim here is to describe any systematic variation in the age structure or pattern of population growth with the degree of urban influence. In the third section we reprise the approach taken in the second, but with the focus now on the labour market, particularly the employment rate and occupation structure. The penultimate section briefly explores the patterns of migration for the 2001-2013 period, again by urban/rural classification, while the final section discusses the results of the previous sections and makes some comments on the policy implications of the descriptive findings.

Table 1: Urban Rural Classification 2001

Area	Description
Main urban area	The main urban areas including: Whangarei, Auckland, Hamilton, Tauranga, Rotorua, Gisborne, Napier-Hastings, New Plymouth, Wanganui, Palmerston North, Kapiti, Wellington, Nelson, Christchurch, Dunedin and Invercargill.
Satellite urban community	Towns and settlements with strong links to main urban centres through commuting. Satellite urban communities are defined as urban areas (other than main urban areas) where 20% or more of the usually resident employed population's workplace address is in a main urban area.
Independent urban community	Towns and settlements without significant dependence on main urban centres. Independent urban communities are urban areas (other than main urban areas) where less than 20% of the usually resident employed population's workplace address is in a main urban area.
Rural area with high urban influence	These rural areas can be thought of as being intermediate between urban and rural areas. They lie outside urban areas but a significant proportion of the resident employed population work in a main urban area.
Rural area with moderate urban influence	To be classified in this category an area must either have a large percentage of the resident employed population working in a satellite or independent urban area, or a significant percentage, though less than areas with high urban influence, working in a main urban area.
Rural area with low urban influence	Most of the population in these areas works in a rural area although a number may work in an independent urban area.
Highly rural/remote area	These are rural areas where there is minimal dependence on urban areas in terms of employment, or where there is a very small employed population.

Source: Based on Statistics New Zealand (2004).

Urban/Rural Classification

Defining what delineates urban from rural, and how to conceptualise the relationship between the two is no straightforward matter, with there being no standardised all-purpose definition. This is in no small part the result of the elusive nature of the rural, with the word rural invoking a variety of descriptions based in land use (predominantly agricultural), population density, isolation, small communities and so on (Hart, Larson & Lishner 2005; Maré & Poland 2005).

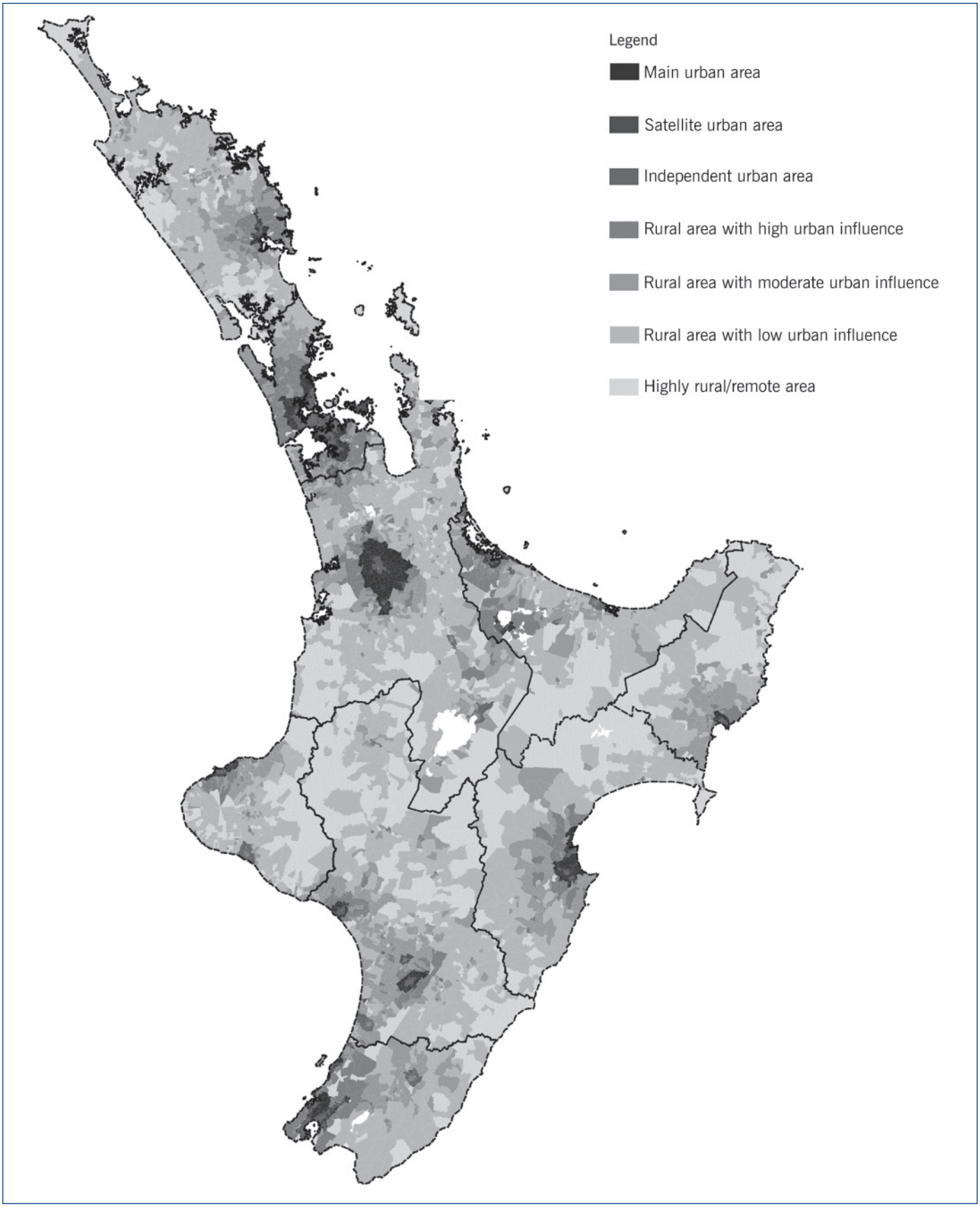
As our focus is on urban/rural interaction in the New Zealand context we adopt the experimental classification schema which was developed by Statistics New Zealand in 2004. This classification emphasised the use of commute to work data as a basis for classification rather than population size, as with the standard Statistics New Zealand urban-rural classification. Details of this schema are provided in Table 1 while Figures 1 and 2 show the spatial distribution of these areas.

The data used in this analysis is drawn from the New Zealand Census of Population and Dwellings for the period 2001-2013 and aggregated to Statistics New Zealand's urban-rural profile classification.

Population Change in Rural and Urban Areas

Table 2 shows the distribution of the usually resident population in 2001.

Figure 1: Urban Rural Classification (North Island)

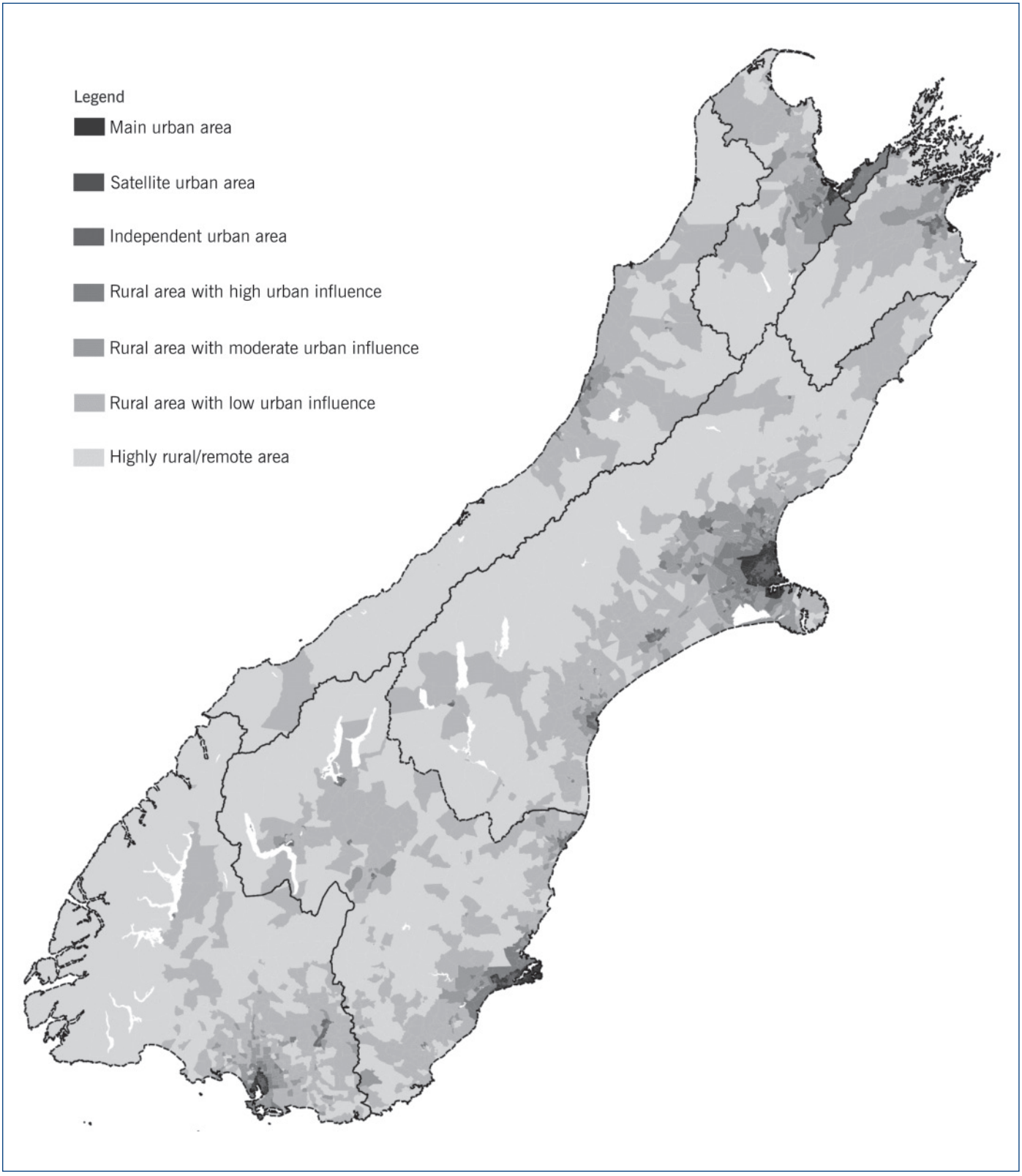


Source: Statistics New Zealand 2004

Overwhelmingly the usually resident population resides in the main urban areas, 72 percent, with a further 14.6 percent residing in some other urban category. This should be borne in mind when comparing rates of change over time for the various areas in the urban-rural classification discussed here.

Figure 3 shows strong evidence of spread, with non-urban areas having a clear gradient in growth for the 2001-13 period, from a high of around 32 percent

Figure 2: Urban Rural Classification (South Island)



Source: Statistics New Zealand 2004

in areas of high urban influence to a low of 8 percent in areas with a low urban influence. This is in contrast to the most remote category, highly rural/remote, which contracted by about -0.5 percent in the same period.

When considering the urban areas, satellite urban communities grow by an amount intermediate between that of the high and moderate influenced rural areas, again indicative of a hierarchy of growth in the peripheral areas that runs from high growth, high urban influence, to low growth, low urban influence, that is, high levels of commuting to low levels commuting.

Figure 4 disaggregates the population growth 2001-13 by broad age group. The first feature to stand out is that, with the exception of major urban areas, the age group that experiences the highest growth is that aged 65 and over. This is to be expected given the ageing of the 'Baby Boomer' cohort discussed throughout

Table 2: 2001 Usually Resident Population by Urban-Rural Classification

	Urban Influence				Urban			
	Rural/ remote	Low	Moderate	High	Independent	Satellite	Main	Total
Usually Resident Population	51195	196614	134988	105156	417552	114468	2617812	3637785
%	1.4	5.4	3.7	2.9	11.5	3.1	72.0	100.0

Source: Statistics New Zealand 2001-2013 Census of Population and Dwellings

this issue. For the rural population, those in rural/remote and low-high urban influence categories, higher levels of urban influence are associated with higher levels of growth in the 65 years and over population. Turning to the urban areas, the growth in the 65 years and over category is again the growing age group for satellite and independent urban areas; however for the major urban areas, growth in the older working age population, those aged 45-64 years, is slightly higher (by around 3 percentage points). This latter group of older working age people is, with the exception noted above, the second fastest growing group, with growth 2001-13 varying between 67 percent in areas with high urban influence to 12.5 percent in rural/ remote areas. Again there is a clear gradient among the non-urban areas, with high levels of urban influence being associated with high levels of population growth while lower levels of urban influence are associated with lower levels of population growth.

The younger working age population, 25-44 years, declines in all areas except satellite urban and major urban areas. This decline is particularly pronounced in the rural/ remote, low urban influence areas and, to a lesser extent, independent rural areas, creating a dichotomy between areas with significant decline in this age group (in the range of 10-17 percent) and those with low levels of decline or growth (-3.5 to 2 percent).

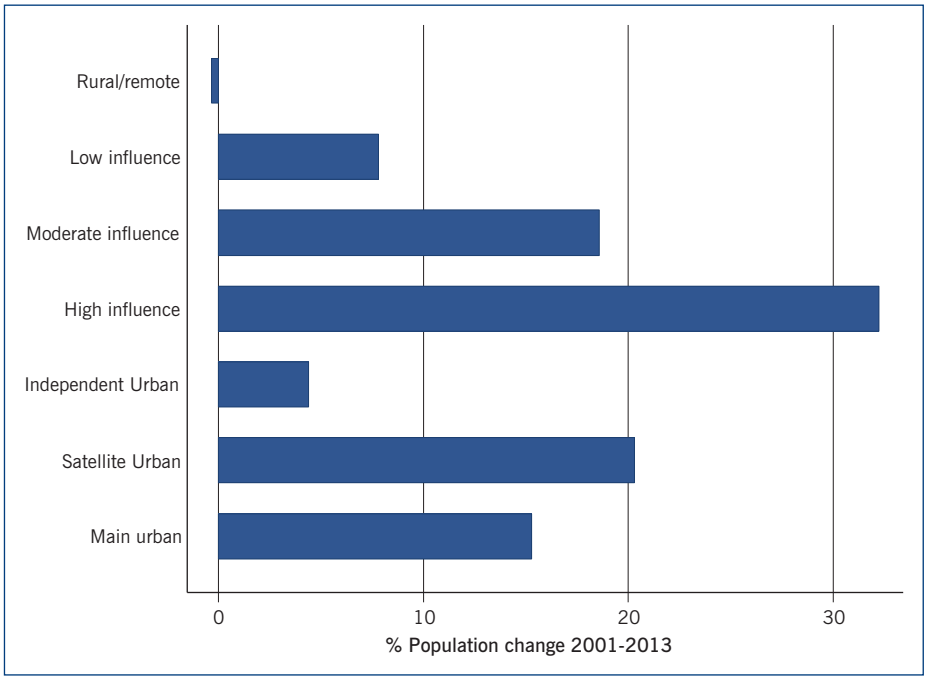
People in the 15-24 year age group are either in education or training, or attaching to the labour market, making them particularly important to an area's economic vitality. Of the various areas considered here, areas with high levels of urban influence have enjoyed the largest increases in this age group 2001-13 (37 percent), while independent urban areas experienced the lowest growth in this age group (4 percent). Restricting ourselves to the non-urban areas we again see a continuum of high urban influence/high grow to low urban influence/low growth with satellite urban areas seeing growth in the 15-24 age group intermediate between that of the high and moderate urban influence areas.

Lastly, we look at the youngest of the age groups, those aged 0-14 years, which are strongly related to the vitality of an area's population. The areas considered here split into two clear groups in terms of the growth of the 0-14 age group. One group, made up of independent urban, low urban influence and remote/rural areas, experiences declines of between -9 percent and -12 percent while the main, satellite and high influence urban areas grow by between 5 percent and 14 percent. The moderate urban influence is intermediate between these two groups with growth in the 0-14 age group being close to zero (-0.6 percent).

Considering Figure 5[1] and taking 2001 as a base year it is apparent that the majority of the population in the areas considered at least partially identify as European New Zealanders. There is, however, some variation in the proportion European, with over 90 percent of the population of areas with high urban influence so identifying, compared with around 77 percent in the major urban areas. For the non-urban areas, the gradient observed in Figures 3 and 4 is less pronounced here, with European affiliation declining from the 90 percent in high urban influence areas to a low of 86 percent in remote/ rural areas. Urban areas have notably lower levels of European affiliation than non-urban.

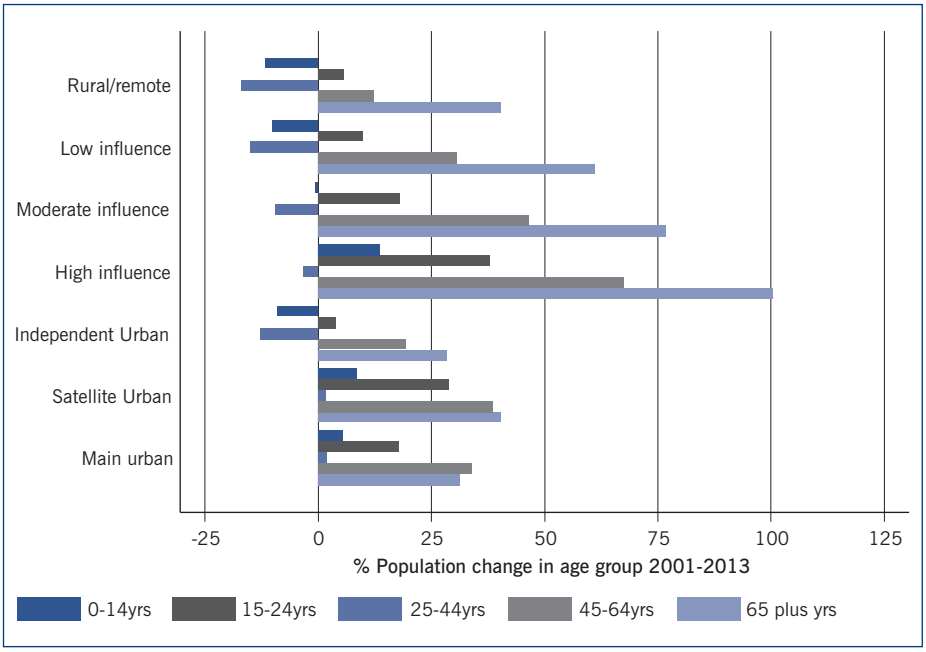
Turning to those who identify as Māori, the 2001 proportions vary markedly between area types, with Māori being around 18-20 percent of the population in independent, satellite urban, low urban influence and remote/

Figure 3: Percentage Change in Usually Resident Population 2001-13 by Urban-Rural Classification



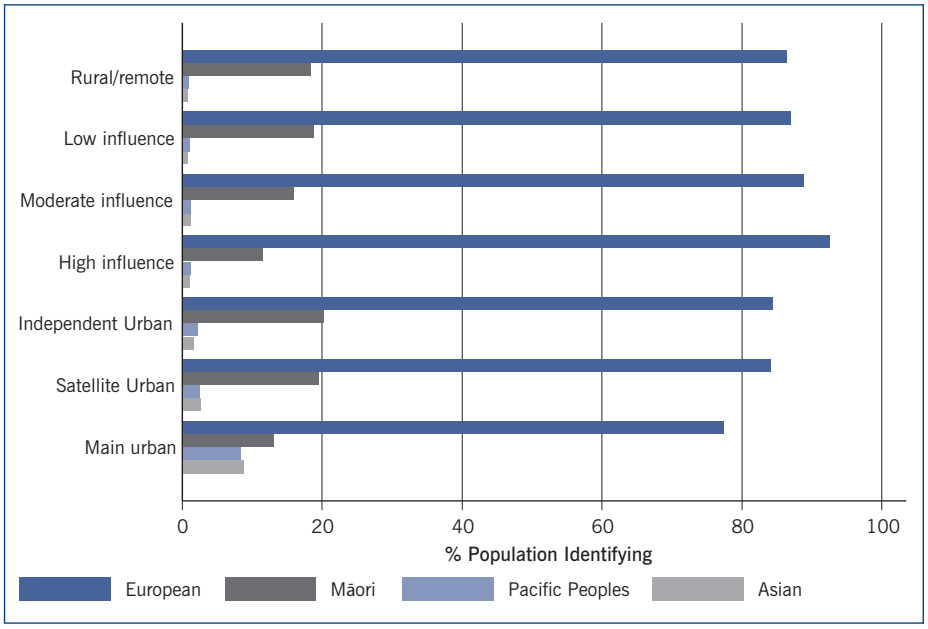
Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

Figure 4: Percentage Change in Usually Resident Population 2001-13 by Age & Urban-Rural Classification



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

Figure 5: Percentage Usually Resident Population (2001) Identifying with Ethnicity by Urban-Rural Classification



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

rural areas while in the main urban and high urban influence areas the proportion is between 11 percent and 13 percent.

Pacific peoples are primarily concentrated in the main urban areas, accounting for 8.5 percent of those populations, with the proportion of independent and satellite urban communities being between 2 percent and 3 percent, and the remaining areas close to 1 percent. Those identifying as Asian are distributed in a manner similar to Pacific peoples, primarily concentrated in the major urban areas (8.8 percent), with lesser concentrations in satellite urban areas (2.7 percent) and the remaining areas being in the 1 percent to 2 percent range.

Figure 6 shows the percentage change in persons identifying with each ethnicity. The most striking feature of this is the rapid increase in the number of people identifying as Asian across all areas. Part of this may be a low baseline (see Figure 5 and Table 2) in the case of non-urban areas, however areas with substantial pre-existing populations still approximately double the number of those identifying as Asian in the 2001-2013 period. Another factor in the rapid growth in the proportions of Asians in rural/remote or low urban influence regions may be the recent trend to employ foreign workers, particularly from the Philippines, in various agricultural or horticultural roles in peripheral areas (Trafford and Tipples 2012).

In terms of the other ethnicities the growth in those identifying as European is greatest in areas of high urban influence, being almost twice as high (28 percent) as the next highest growth rate (satellite urban areas, 15.6 percent). European population shares declined somewhat in remote/rural (-5.1 percent) and independent urban (-1.8 percent) areas, but were positive in the remaining areas.

Employment in Rural and Urban Areas

The employment rate, that is, the ratio of the total number of people employed to the working age[2] population, shown in Figure 7 is a good measure of the utilisation of labour in an area. It serves as an alternative to the conventional unemployment rate and is in some ways preferable as it is more robust to definitional issues arising from the distinction between 'not in the labour force' and 'unemployed' (Murphy & Topel 1997).

In general the non-urban areas have employment rates higher than the urban, the gap typically being 6 to 10 percentage points. Areas of high urban influence have the highest employment rates in both 2001 (70.9 percent) and 2013 (70.7 percent), while independent urban areas have the lowest in both 2001 (56.6 percent) and 2013 (57.7 percent). Considering change over time, most of the employment rates are stable with the 2001-2013 difference in rates in most areas being under one percentage point.

The exceptions to this are independent urban areas (1.1 percentage point) and satellite urban areas (2.6 percentage points).

Having discussed the level of engagement with the labour market of the population in the areas under consideration we turn now to what the population actually does; that is, what

occupations the usually resident populations are engaged in. Occupational category captures not only the job an individual does, but also serves as an indicator of how much human capital the individual possesses, their likely income and their social status (Milne et al 2013). The distribution of the population of an area between occupations, then, is a good guide to the socio-economic context of that area.

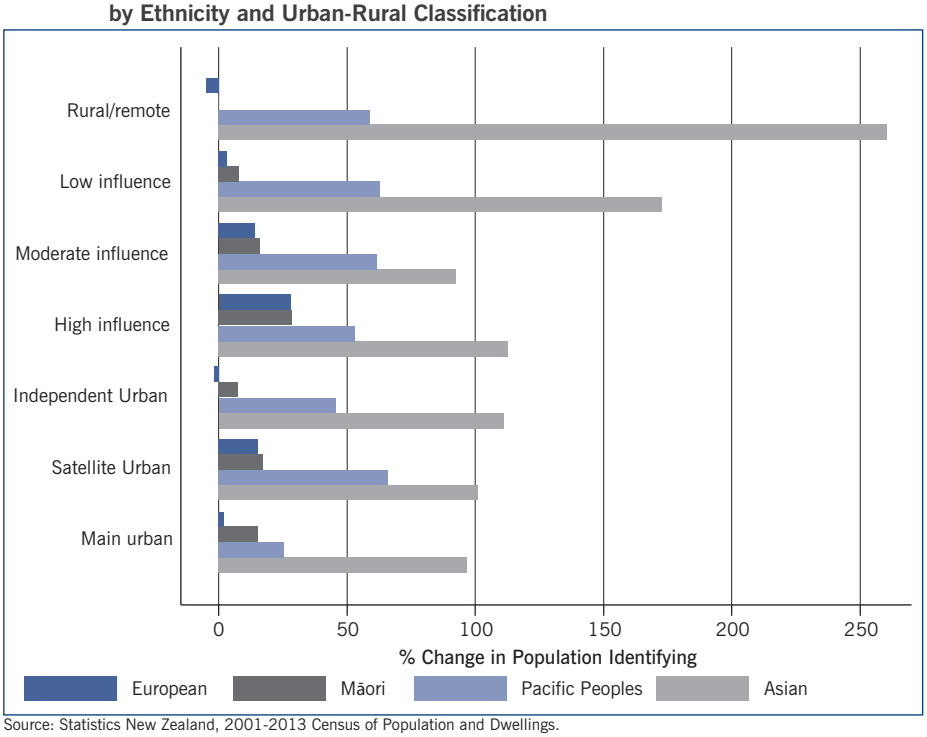
Figure 8 shows the occupational distribution for each of the areas in 2001. The occupational classification used is NZSCO99[3] rather than ANZSCO[4] as we wished to look at change over the 2001-13 (see Figure 7) period[5].

As a baseline we start by looking at the 2001 occupational structure. The most striking feature is the clear relationship between the degree of urban influence and the proportion of the population involved in manual occupations. The rural/remote areas have nearly 70 percent of their work force involved in manual labour while the areas with high urban influence have less than half this (33 percent). Major urban areas have the least participation in manual occupations (21 percent) while independent and satellite urban areas are very similar to areas with high urban influence, with participation in manual occupations 32 percent and 34 percent.

At the other end of the skills spectrum, employment in management/professional occupations in non-urban areas also gradate, albeit in the opposite direction to manual occupations, with higher degrees of urban influence being associated with higher levels of participation in management/professional occupations. When comparing areas of high urban influence with the urban areas it can be seen that the level of participation in management/professional occupations is higher in the high urban influence areas (26.5 percent) than either satellite or independent areas (by around 6 percentage points), but lags the main urban areas by approximately 3 percentage points.

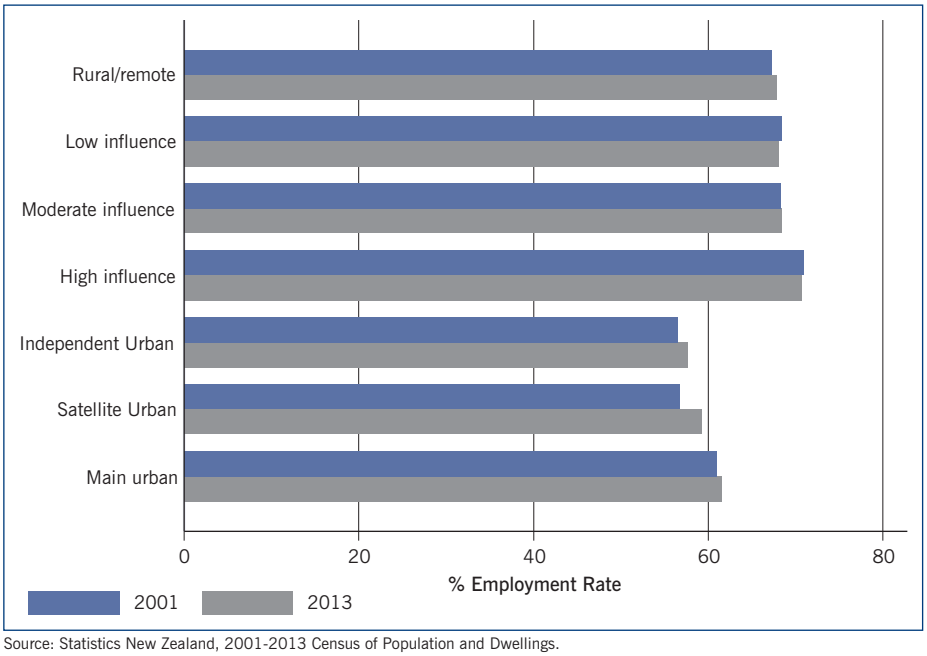
The technical and trades occupational group is around 20-23 percent of the employed in the main urban, satellite urban and high urban influence areas,

Figure 6: Percentage Change in Usually Resident Population 2001-13 by Ethnicity and Urban-Rural Classification



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

Figure 7: Employment Rate (%) by Urban-Rural Classification



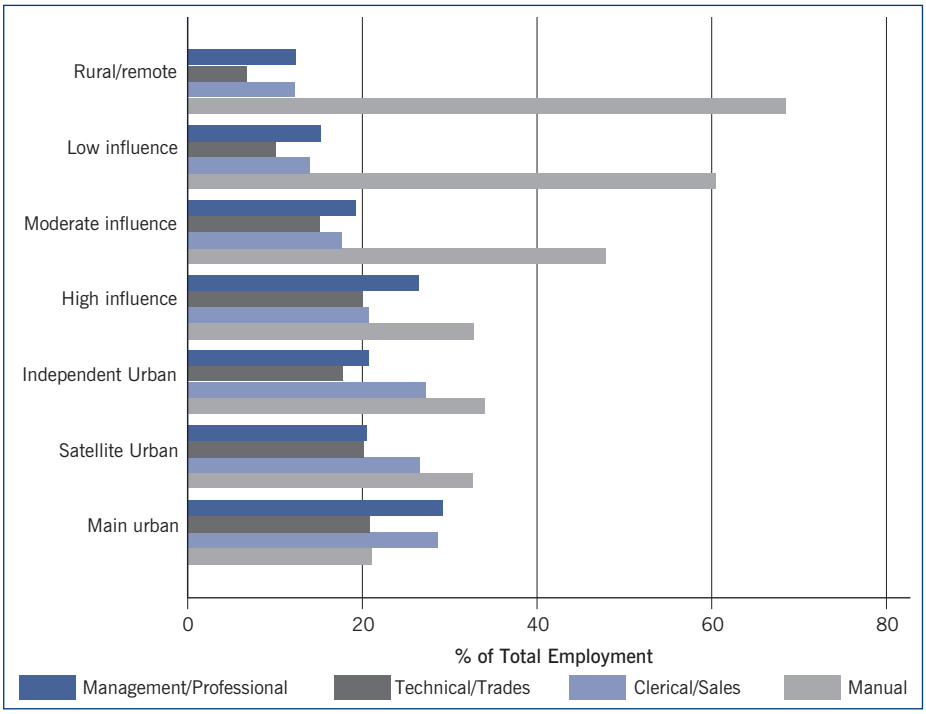
Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

while in the independent urban and moderate influence areas this proportion is 5 or 6 percentage points lower, with the remaining two groups, low urban influence and rural/remote areas, being around 6%-10%.

Lastly, the proportion in the clerical/ sales group is roughly equal in the main, satellite and independent urban areas (26%-29%), while the remaining areas range between 12 percent (rural/remote) and 20 percent (high urban influence).

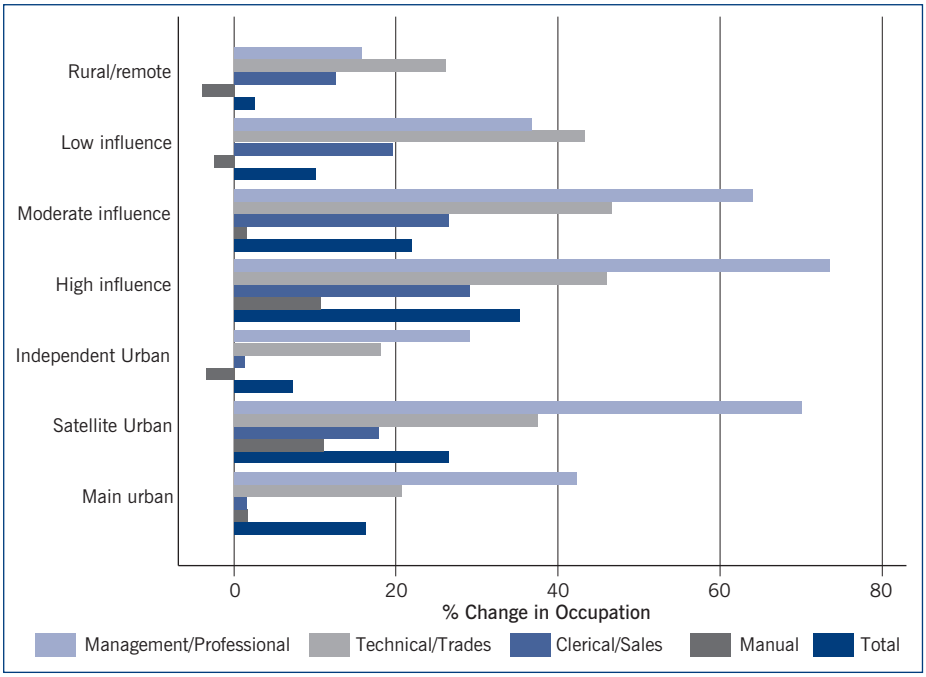
Having considered the baseline 2001 occupational distribution we turn now to look at the changes in this distribution for the 2001-13 period (Figure 9). Growth in the management/ professional group has been rapid, with this group being the fast growing occupation in all but the rural/ remote and low urban influence areas. In particular growth in the management/ professional category in satellite urban and high urban influence and medium urban influence areas is very high, with

Figure 8: Percentage Employed (2001) by Occupation & Urban-Rural Classification



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

Figure 9: Percentage Change in the Usually Resident Employed Population 2001-13 by Occupation & Urban-Rural Classification



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

growth rates of 70 percent, 74 percent and 64 percent respectively.

The next fast-growing group is the technical/trades group in, again, all but the rural/remote and low urban influence areas, where this category is the fastest growing. For clerical/sales in the non-urban areas, growth increases with urban influence from 13 percent in rural and remote areas to 29 percent in areas of high urban influence. For the urban areas growth in the main and independent areas is low, under 2 percent in both cases, but is notably higher, 18 percent, in satellite urban areas.

Growth in the manual occupational category is modest to negative across all areas. The highest growth in this category is 11 percent in satellite urban areas, similar to the high urban influence areas (10.8 percent), while declines of 2 percent to 4 percent are reported in rural/remote, low urban influence and independent urban areas.

Place of Residence 5 years ago

One of the few sources of information on sub-national migration comes from the census question on where a person usually lived five years ago[6]. This question gives us some insight into the recent mobility of the usual residents of an area. The discussion here will mainly focus on people who were at their current residence 5 years ago, people who were elsewhere in New Zealand 5 years ago, and those who were overseas.

The largest single category in Figure 10 across all areas is those whose place of usual residence is the same as their usual address 5 years ago, that is, they have not moved or they moved away and then returned to their initial area of usual residence. For the areas of low, medium and high urban influence, those who have not moved narrowly constitute an absolute majority (51 percent - 53 percent), however for the main urban and satellite urban areas the proportion of people in this category is some 5-6 percentage points lower.

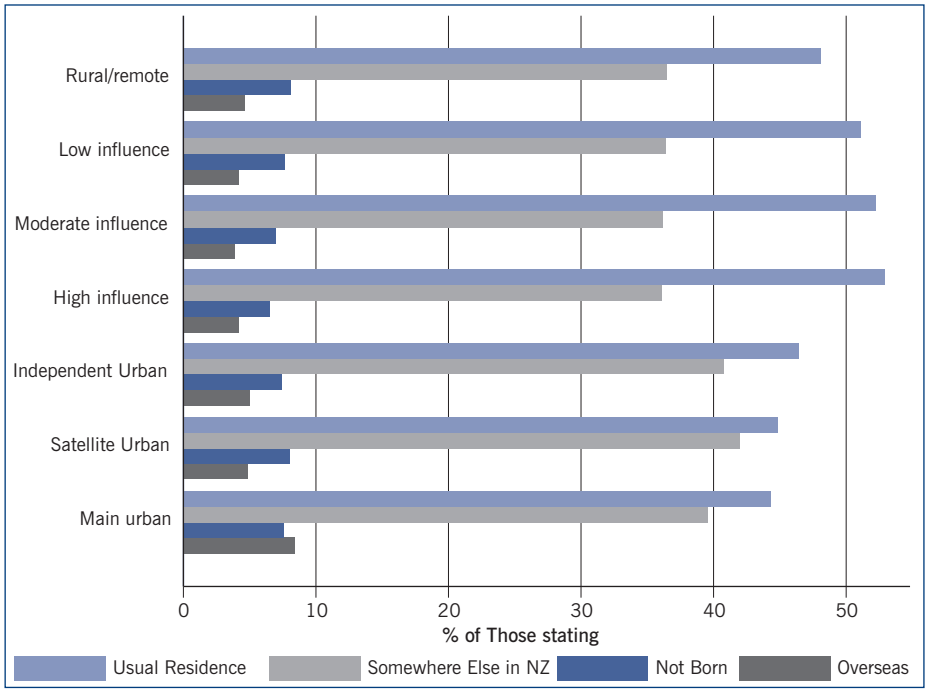
Around 36 percent of the population of rural/remote and low-high urban influence areas were elsewhere in New Zealand 5 years prior to the 2013 census. In the urban areas those who are in the 'elsewhere in NZ' category constitute between 40 percent (main urban areas) and 42 percent (satellite urban areas) of the population, with the rural/remote category, at 48 percent, being intermediate between the areas under urban influence and the urban areas themselves.

The 'not born 5 years ago' category varies by under 2 percentage points, from a low of 6.5 percent in areas of high urban influence to a high of 8.1 percent in rural or remote areas.

'Overseas 5 years ago' is the category that potentially excites the most interest given its relationship to the controversial topic of migration. While the proportion of the population overseas 5 years ago is relatively small, less than 10 percent in all cases, the areas under consideration fall into 3 distinct groups; the main urban

areas where the proportion of people overseas 5 years ago is considerably larger, by 3.5 percentage points or more, than the other areas; satellite urban, independent urban and rural/remote, where the proportion is 4.5% - 5%, and the remainder with the proportion overseas 5 years ago being close to 4 percent.

Figure 10: Where were you 5 years ago? (2013)



Source: Statistics New Zealand, 2001-2013 Census of Population and Dwellings.

Discussion and Policy Implications

In this section we reflect on the empirical patterns described and consider a few of their policy implications.

The first point to note is that the description of the various areas in the urban-rural profile offered here is at a very high level of aggregation, hence much of the spatial heterogeneity[7] that no doubt exists in relations between urban core and rural periphery (and the gradations between the two) will have been suppressed. Essentially we have an averaging effect that extinguishes the variability within the categories considered, hence actual conditions in a specific location might differ markedly from the average values presented here.

Table 3 summarises some of the key outcomes discussed above by rank order with 1 indicating that that area has the highest value, and 7 the lowest, on the variable under consideration. As noted earlier (see Table 1) the high urban influence areas have the highest interaction, through travel to work commuting, with urban areas of all the non-urban categories. The performance[9] of the high urban influence area on the four outcome variables considered is very good, with this category being the best performing of the areas on three of the outcome variables (population growth, employment rate and growth in high skilled jobs), and second best on the remaining variable (employment in high skill jobs). This would seem to be more consistent, at least at this highly aggregated level, with the spread interpretation of urban-rural interaction, than with backwash. If backwash effects dominated we would expect to see a more muted performance on the variables in Table 2.

For the other non-urban areas, performance declines with the degree of urban influence, that is, high > moderate > low > rural/remote corresponding to a clear pattern of level of urban influence equating to the performance of the area. Again this is what one would expect to see if a spread interpretation of urban-rural interaction held.

Looking at the urban categories, independent urban areas do not fare well with their performance on population growth, employment rate, and growth in high skilled employment, being either the worst or the second to worst of the categories. On the other hand the performance of the independent urban areas on the dimension of the level of employment is in the top half of the rankings. This, combined with the low rate of growth in high skilled jobs, is indicative of a relatively stable occupational share of skilled workers in the population. Satellite urban areas resemble high urban influence areas on several dimensions, being second to them in the population growth and growth in high skilled jobs ranking, but having somewhat worse, though still middling,

Table 3: Rank of Area by Outcome Variable

	Urban Influence				Urban		
	Rural/Remote	Low	Moderate	High	Independent	Satellite	Main
Population Growth (2001-2013)	7	5	3	1	6	2	4
Employment Rate (2001)	4	3	2	1	7	6	5
% Employed in High Skill Jobs[1] (2001)	7	6	5	2	3	4	1
% Growth in High Skilled Jobs (2001-13)	7	5	3	1	6	2	4

Rank 1 (Highest) to 7 (Lowest)

performance on the other dimensions considered. The main urban areas, while having the highest level of high-skilled labour at the beginning of the period (2001), are ranked fourth out of the seven urban-rural categories for both population growth and the growth in high-skilled labour, while they are fifth on the employment rate (2001). This would indicate that on many dimensions the main urban areas perform considerably worse than the high urban influence areas that tend to surround them.

Given that on this reading the high urban influence areas are the best performing, it is interesting to return to our discussion of the age and ethnic characteristics of these areas. From Figure 5 it is clear the high urban influence areas have the highest level of people identifying as European in 2001 (in keeping with the other non-urban areas) and the highest growth in people identifying as European 2001-2013. In terms of ageing the high urban influence area has the highest growth of all the areas in the 65 years plus group, the 45-65 year age group, and the 15-24 year age group. Hence, considering also our previous discussion, it would appear that these areas are largely European, with high occupational (in terms of skill) attainment and rapidly growing older populations.

Bringing this all together then, the area of main interest here, areas of high urban interest, have managed to maintain or grow their populations (Figure 3), employment rates (Figure 7) and skills levels despite having: high growth in the older population (Figure 4), the lowest proportion of people not born 5 years ago (Figure 10), low gross international migration (Figure 10), and a pattern of internal migration similar to other non-urban areas (Figure 10).

Briefly, let us consider what this might mean from a policy perspective. It would seem that on the basis of the descriptive evidence presented here, the success of an area outside of the urban areas is in part associated with the level of interaction that area has with urban areas. As the areas used here are predominantly defined with respect to the travel to work behaviour of the usually resident population this is largely a story based on locational choice, that is, the decision on where a household will locate. Locational choice in turn arises from a complex interaction of the value a household places upon a locations amenities, the cost of commuting and the budget constraint faced by the household (Partridge et al 2010).

If a rural area wishes to increase the level of interaction with urban areas with the aim of improving its population growth and economic success it has two main avenues open to it: decrease the cost of commuting and/or increase the amenity value of the area. This assumes of course that there is little local government can do short run about local income levels.

Decreasing the cost of commuting could be achieved by a number of means, engineering enhancements to motor vehicles or lowering the cost of fuel for example, but many of these factors lie well beyond the control of local governance. What is open to control, albeit within often tight bounds, is investment in infrastructure; upgrading the road network or improving the provision of public transport both might facilitate growth (economic and/or population)[10] by reducing the amount of travel time and cost of travel.

Improving the amenity value of an area might be somewhat harder, as it is difficult to conjure forth a scenic lake or mountain; however, it is possible to make somewhere a nicer place to live by building social capital in the area, fostering the development of pony clubs or sporting teams for instance, or providing convenient schooling or childcare for commuters.

The take away message here is that for those in the vicinity of urban areas the use of infrastructural investment and/or the improvement of local amenities maybe a viable approach to development. However, if it is not possible to commute to a main urban area or the location lacks amenities, it may prove difficult to foster growth in a locale absent some innovative strategy.

1 Note that the official measure of ethnicity used in New Zealand allows individuals to identify with more than one ethnic group, hence the ethnicities used here are not mutually exclusive – see Callister et al (2007: 301-310) for a discussion of the measurement of ethnicity in New Zealand.
2 Where the Working Age Population is the usually resident population aged 15 years and over. It should be noted that the New Zealand practice of defining the working age population in these terms differs from many countries, where the working age population is defined as those aged 15 to 64 years (Statistics New Zealand 2017).
3 For ease of exposition we have aggregated the NZSCO major groups as follows; Management/Professional consists of the NZSCO categories of Legislators, Administrators and Managers and Professionals; Technical/Trades of Technicians and Associate Professionals and Trades Workers; Clerical/Sales of Clerks and Service and Sales Workers; and, Manual which is comprised of Agriculture and Fishery Workers, Plant and Machine Operators, and Assemblers and Elementary Occupations.
4 Details of these classification schema are to be found here: http://www.statistics.maori.nz/~/media/Statistics/surveys-and-methods/methods/class-stnd/occupation/NZSCO-99-manual.pdf and http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/occupation.aspx.
5 Classification of occupation by ANZSCO is not readily available for the 2001 census year.
6 The actual question (question 7) in the 2013 Census of Population and Dwellings read: 'Where did you usually live 5 years ago, on 5 March 2008?'
7 Essentially spatial heterogeneity refers to the variation of a phenomenon across space (Anselin 2010).
8 High skill job refers to employment in the managerial/professional category.
9 Here performance is equated with high values on the measure being considered.
10 See Cochrane et al (2016) for a discussion of the impacts of local infrastructural investment in a New Zealand context.

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