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Abstract

The vitality of a region is frequently assessed by looking at its population growth pattern. This is seen as being linked to its economic and social vibrancy. To better understand the dynamics of this growth pattern it is necessary to decompose population growth into the contributions of natural increase (births less deaths) and migration (both domestic and international). This provides a demographic accounting of the factors of population change which we use to analyse the degree to which the levels and impacts of these factors differ between the Regional Council Areas of New Zealand.

We find large variations between Regional Council Areas in overall population growth for the three quinquennia between 1986 and 2001. The Auckland region experienced the largest growth, coming both from high natural increase and international migration, while the "sun-belt" regions of Bay of Plenty, Nelson-Tasman and Marlborough had high growth, but driven by internal migration. In other regions, such as Gisborne, West Coast and Southland population growth declined.

Key Words: population growth, region, New Zealand

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INTRODUCTION

The vitality of a region is frequently assessed by looking at its population growth pattern. This is seen as being linked to its economic and social vibrancy. New Zealand, in common with other Western Developed Counties (WDCs) has entered what some European demographers call the "Second Demographic Transition" (Lesthaeghe 1991; van de Kaa 1987); that is a population with sub-replacement fertility and low mortality. But as is also true for some other WDCs, migration flows also affect growth patterns.

Higher fertility and net in-migration produce younger or middle aged population structures; lower fertility and net out-migration the inverse. Long term declines in mortality at first occur at younger ages and thus produce younger age-structures, but at the last phases of a mortality transition improvements in survivorship occur at older ages thus increasing the proportions at the older ages (Pool 1994; Pool and Cheung 2002; Pool and Cheung 2003) . In addition, the population structure has an effect on the dynamics of natural increase. All other things being equal, a region with concentrations of people at young adult ages will have a higher rate of natural increase than those with lower proportions.

Cutting across this are ethnic differences in the population. Regions with larger numbers of Maori will to some degree reflect Maori patterns of natural increase than will be true elsewhere. Other ethnic minority migrant groups also have an impact on trends, particularly in Auckland and to a lesser degree Wellington. Migration trends themselves, however, are more likely to be determined by other structural factors relating to the society and economy.

In this paper we analyse the degree to which the levels and impacts of these factors differ between the regions of New Zealand. Thus this paper looks at regional dynamics by analysing population growth and its components, natural increase (its births and deaths) and migration, both domestic and international. It thus presents a review of the different population flows, and then disaggregates these into their components -- natural increase, net migration -- so as to provide a demographic accounting of the factors of change.

METHOD

The regions considered in this paper are in essence the same as those covered by New Zealand's 16 regional councils, with the exception that the Nelson and Tasman regional councils are combined to make one region in our analysis, as they are small contiguous councils that effectively function as one region. Additionally as we do not have information on internal migration between 1986 and 1991 for Nelson-Tasman separate from the Marlborough region in this period this area is treated as one, Nelson-Tasman and Marlborough.

Population Growth is calculated from the difference between the regional total census population information from the 1986 to 2001. The source of this information is from Statistics New Zealand, 1986-2001 Censuses of Population and Dwellings. This is the raw growth which is made up of the following components.

Birth data came from Statistics New Zealand vital statistics. Before 1990 the data were not available in the regional council areas which we use now, so for 1986-91 births have been estimated. These numbers are estimated for 1986-88 using the age distribution of mothers

using the local government region data included in the original table published in *Demographic Trends 1989* (Department of Statistics 1989) and realigned to Regional Councils. The data used are for the March year data compared to the December year for the other years. This work was done by William Boddington of Statistics New Zealand. Using the estimated total birth for 1986-88 and 1990-92 and multiplying by 5/6 to estimate births between 1986 and 1991. The births for the other two periods 1991-1996 and 1996-2001 used the December years births for 1991-1995 and 1996-2000 respectively.

Deaths come from the unit record data that was from the New Zealand Health Information Service. The number of December year death is counted for each region and year. Then a five year total is calculated.

The net migration estimates used in this measure include both domestic and international inflows and outflows, while census data on residence five-years ago to be used in chapter 3 in the monograph (Pool et al. forthcoming) can be analysed only for inflows, domestic and international, and outflows within New Zealand. The method used in this paper was as follows:

1. We subtracted from the net migration computed by the census survival method[1] (Shryock et al. 1976), the inflows and outflows to a given region to and from all New Zealand regions of origin and destination (data source: residence five years ago). The residual was seen as the net international migration.
2. From this figure for net international migration we subtracted the international inflows (residence overseas five years ago) to estimate the outflows to overseas destinations.

Annual population growth rates are calculated using the geometric growth method (Shryock et al. 1976). The annual average rates per 100,000 are calculated using the average population of the period based on the populations at the beginning and the end divided by two.

RESULTS

The different components of growth are the factors of natural increase, and international and internal migration which contribute to changing overall population sizes and distributions. This paper comprises an accounting exercise in which the relative contributions of these different components are assessed producing the annual rates reported in Table 1 (for numbers see Appendix Table 1). It is based on detailed analyses of each of the explored in a forthcoming monograph (Pool et al. forthcoming).

Auckland is the region with the largest population, so not unexpectedly it has experienced the greatest numerical changes (see Appendix Table 1). Indeed, in the most recent quinquennium much of New Zealand's population vitality was being driven, disproportionately, by this region. In 1996-2001 period it had just over 30 per cent of the tota1 population, but produced

[1] The census survivorship method was chosen over the alternative, the life-table survivorship method, as it is robust. It takes into account as inherent property imperfections in the base data from which survivorship ratios are being computed. This property was spelt out in detail in the classical study (Lee et al. 1957), who even employed it for African-American migration 1870-1950, covering an era in which reporting errors were significant. Pool chose this method for his study on Maori rural-urban migration (1966). The life-table method is biased by data adjustments and graduation made when tables are being constructed.

34 per cent of the births, as against only 26 per cent of the deaths, a function in part of its younger age structure (Pool et al. forthcoming). It is also the only region with significant net international migration, in 1996-2001, with 54 per cent of the inflows but only 34 per cent of the outflows, and only one of two regions (the other was Nelson-Tasman) that had positive net international migration. Thus it the gateway to the country and is the only truly large city in New Zealand. Against this, the rates of net internal migration level are low, and in the case of 1996-2001, actually resulted in a loss. Moreover, the net internal migration streams in and out of this region were a disproportionately small fraction (19 per cent) of the national movement. Thus Auckland in a sense has a system of population dynamics that is relatively independent of the rest of New Zealand.

Moreover, Auckland is the only region which had an annual rate of natural increase that has not declined, over the period 1986-2001, and in fact it went up slightly (see Table 1). With decreases in both the crude death and birth rates its rate of natural increase had remained relatively stable. In 1996-2001, the Auckland region had one of the highest crude birth rates even though, its total fertility rate was only around the national level (Pool et al. forthcoming). This is because there is a concentration in the metropolis of people of reproductive ages, a result of the in-migration of young workers (Pool et al. forthcoming).

The data in Table 1 on patterns of natural increase and its components births and deaths, show some other definite patterns. There are clear difference between the rates of natural increase as well as crude birth rates between the North and South Islands. The rates in the North Island all are higher than in the South. There is also a tendency for rates to be even higher in the northern half of the North Island. Not only did rates of natural increase decline in all regions other than Auckland in the time period, but all regions had reductions in their crude birth rate. In contrast, crude death rates showed a different pattern with Auckland, Waikato and Wellington having low rates, mainly as a function of the age-composition, while other regions had higher rates sometimes because of age-compositional factors, sometimes because of their ethnic composition.

Other than Auckland, the regions which gained from international migration were few. Wellington saw in-flows in the period 1986-91, Canterbury 1991-96 and Nelson Tasman for both 1991-96 and 1996-2001. But these gains were small in size and the rates were low compared to those of Auckland. In contrast, over the period many regions saw increases in internal migration with Northland, Auckland, Waikato, Bay of Plenty, Canterbury, Nelson-Tasman and Marlborough experiencing an increase for 1986-91. But in 1996-2001 Northland and Auckland moved to a decrease. In contrast, the Bay of Plenty saw high rates of inflow in every quinquenium, Canterbury, Nelson-Tasman and Marlborough had modest increases, and Otago and Wellington changed their movements from outflows to inflows. Waikato also had an increase in 1996-2001 after a decline in 1991-96. In the period 1996-2001, internal migration to the Bay of Plenty, Canterbury, Nelson-Tasman and Marlborough were strong enough to offset international outflows, and thus gave them net migration gains from all sources. For Auckland international migration counteracted its losses to other New Zealand regions.

Table 1 Average Annual Rates of Regional Growth (%) and their component (per 1,000), 1986-91, 1991-96 and 1996-2001

Region	Population Growth (%)	Natural Increase (per 1,000)			Migration (per 1,000)		
		CBR	CDR	RNI	International	Internal	Total
	1986-1991						
Northland	0.6	18.9	8.0	10.9	-4.2	0.6	-3.6
Auckland	1.6	18.2	7.6	10.5	7.6	1.1	8.7
Waikato	0.7	18.2	7.3	10.9	-3.5	1.0	-2.5
Bay of Plenty	1.4	18.1	8.1	10.0	-3.1	8.6	5.4
Gisborne	-0.7	19.8	8.3	11.6	-2.5	-14.7	-17.2
Hawke's Bay	-0.2	17.7	8.7	9.0	-4.5	-4.5	-9.1
Taranaki	-0.2	17.4	8.1	9.3	-4.5	-5.7	-10.1
Manawatu-Wanganui	0.2	17.2	8.9	8.4	-3.8	-0.8	-4.6
Wellington	0.4	17.1	7.8	9.3	0.8	-3.2	-2.4
West Coast	-0.9	16.8	10.1	6.6	-4.1	-11.7	-15.8
Canterbury	0.4	14.4	9.0	5.5	-1.8	2.5	0.7
Otago	-0.1	14.1	9.0	5.0	-3.2	-0.3	-3.4
Southland	-0.8	16.5	8.5	8.0	-5.9	-9.8	-15.7
Nelson-Tasman Marlborough	0.9	14.8	8.4	6.4	-0.7	5.6	4.9
	1991-1996						
Northland	1.6	18.3	8.1	10.2	-0.4	-0.2	-0.5
Auckland	2.5	18.2	6.9	11.2	9.3	1.0	10.2
Waikato	1.1	17.5	6.9	10.6	-4.5	-0.2	-4.7
Bay of Plenty	1.9	17.5	8.1	9.5	-4.0	8.0	4.0
Gisborne	0.7	20.9	8.9	11.9	-4.3	-6.7	-11.0
Hawke's Bay	0.6	17.4	8.8	8.7	-3.9	-3.8	-7.7
Taranaki	-0.1	16.2	8.6	7.7	-7.4	-7.3	-14.7
Manawatu-Wanganui	0.4	16.7	8.6	8.1	-7.1	-3.1	-10.2
Wellington	0.7	16.7	7.2	9.6	-4.0	-3.2	-7.2
West Coast	0.6	16.2	9.3	6.9	-4.4	-3.8	-8.2
Canterbury	1.3	13.9	8.6	5.3	0.5	2.6	3.0
Otago	0.8	13.6	8.6	5.0	-2.5	1.5	-1.0
Southland	-0.6	15.5	8.5	7.0	-8.9	-10.9	-19.7
Nelson-Tasman	2.1	14.3	8.2	6.1	3.2	6.8	10.0
Marlborough	1.8	14.0	8.1	5.9	-0.1	6.6	6.5

(continued on next page)

Table 1 continued

Region	Population Growth (%)	Natural Increase (per 1,000)			Migration (per 1,000)		
		CBR	CDR	RNI	International	Internal	Total
	1996-2001						
Northland	0.4	15.7	8.2	7.6	-2.0	-0.9	-2.8
Auckland	1.6	17.1	6.4	10.8	9.2	-0.4	8.8
Waikato	0.4	15.9	7.1	8.8	-4.2	0.8	-3.4
Bay of Plenty	1.3	16.4	8.1	8.3	-1.4	7.4	6.0
Gisborne	-0.8	17.8	8.9	8.9	-6.0	-11.8	-17.8
Hawke's Bay	[0.02]	15.7	8.6	7.0	-3.1	-3.0	-6.1
Taranaki	-0.7	14.3	8.0	6.3	-5.2	-7.0	-12.2
Manawatu-Wanganui	-0.8	15.0	8.5	6.6	-7.5	-5.5	-13.1
Wellington	0.5	15.4	6.9	8.5	-2.7	1.0	-1.7
West Coast	-1.4	13.3	9.2	4.1	-4.7	-13.8	-18.4
Canterbury	0.6	13.0	8.0	5.0	-1.0	3.7	2.6
Otago	-0.4	12.0	8.4	3.5	-6.4	1.2	-5.1
Southland	-1.3	13.8	8.3	5.5	-6.7	-11.5	-18.2
Nelson-Tasman	1.2	12.7	7.8	4.9	1.1	6.6	7.7
Marlborough	0.6	12.2	8.4	3.8	-0.2	2.9	2.8

CBR – Crude Birth Rate = Births/Population*1000
CDR – Crude Death Rate = Deaths/Population*1000
RNI – Rate of Natural Increase = Natural increase/Population*1000
Source: Appendix Table 1.

Finally in Table 1 above it will be seen that every region experienced positive rates of natural increase, outrunning in some regions the total migration effect. But it is the migration trends that produce the inter-quinquennial fluctuations in growth seen in column one of Table 1 – generally lower growth or decline 1986-91, an upsurge driven by migration 1991-96 and then a deceleration in 1996-2001.

CONCLUSION

New Zealand's regions differ greatly with respect to patterns of population growth and the dynamics of its components, natural increase and migration. A small number of regions are growing relatively quickly, but for differing reasons. This growth occurs either because of economic changes resulting from the concentration of industries and population in fewer and fewer metropolitan areas, particularly Auckland; or because of retirement migrations to sun-belt destinations. Most regions, however, are stagnating and some are in decline. The causes of increase for metropolitan areas used to relate to net in-migration both from elsewhere in New Zealand and from overseas, but today for Auckland overseas flows are the critical factor. As the rates of natural increase decelerate (but, as yet, are not negative for any region) migration, mostly internal outside Auckland, assumes a much more significant role. The younger age structure of Auckland also ensures higher birth rates, even though fertility is low in some sub-regions of that metropolis.

The "sun-belt" regions have not only been subject to in-flows of retirees, but also of younger working age adults coming into service occupations, and bringing along with them passive

migrant children. In the North Island these same regions are also affected by the dynamics of the significant Maori minorities found there. The better survivorship relative to their ages enjoyed by well-off retirees is mediated by the less favourable patterns experienced by Maori.

Appendix Table 1 Estimates of Levels and Components of Regional Growth (quinquennial numbers): A Balancing Equation, 1986-91, 1991-96 and 1996-2001

a) 1986-1991

Region	Population change			Natural Increase Component			Migration Component						
							International Migration			Internal Migration			Net
	1986	1991	Growth	Births[1]	Deaths	Natural Increase	Inflows	Outflows[2]	Net[3]	Inflows	Outflows	Net	Migration
Northland	122,832	126,786	3,954	11,790	4,974	6,816	3,561	6,186	-2,625	17,829	17,469	360	-2,355
Auckland	873,906	943,776	69,870	82,511	34,696	47,815	74,055	39,480	34,575	66,408	61,249	5,159	38,863
Waikato	320,466	331,026	10,560	29,662	11,828	17,834	10,515	16,264	-5,749	42,174	40,542	1,632	-4,419
Bay of Plenty	189,990	203,985	13,995	17,843	7,982	9,861	6,114	9,213	-3,099	31,980	23,517	8,463	5,136
Gisborne	45,759	44,265	-1,494	4,463	1,861	2,602	861	1,421	-560	4,482	7,797	-3,315	-3,921
Hawke's Bay	139,455	138,336	-1,119	12,300	6,058	6,242	3,531	6,690	-3,159	13,831	16,980	-3,149	-6,473
Taranaki	108,462	107,127	-1,335	9,379	4,353	5,026	2,751	5,162	-2,411	9,498	12,548	-3,050	-5,605
Manawatu-Wanganui	222,252	224,763	2,511	19,256	9,915	9,341	6,732	10,988	-4,256	29,991	30,900	-909	-5,426
Wellington	392,358	400,284	7,926	33,950	15,427	18,523	24,081	22,562	1,519	36,325	42,689	-6,364	-5,234
West Coast	33,021	31,563	-1,458	2,707	1,638	1,069	579	1,245	-666	4,313	6,203	-1,890	-2,600
Canterbury	430,113	438,171	8,058	31,340	19,474	11,866	14,796	18,657	-3,861	36,357	30,949	5,408	955
Otago	178,530	177,525	-1,005	12,512	8,032	4,480	5,547	8,362	-2,815	19,421	19,662	-241	-3,314
Southland	104,280	99,954	-4,326	8,411	4,322	4,089	1,515	4,529	-3,014	7,229	12,234	-5,005	-8,143
Nelson-Tasman Marlborough[4]	100,977	105,630	4,653	7,665	4,344	3,321	3,201	3,588	-387	15,177	12,276	2,901	2,394

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Appendix Table 1 (continued)

b) 1991-1996

Region	Population change			Natural Increase Component			Migration Component						
							International Migration			Internal Migration			Net
	1991	1996	Growth	Births[1]	Deaths	Natural Increase	Inflows	Outflows[2]	Net[3]	Inflows	Outflows	Net	Migration
Northland	126,786	137,052	10,266	12,063	5,354	6,709	4,992	5,234	-242	17,934	18,048	-114	-356
Auckland	943,776	1,068,645	124,869	91,379	34,953	56,426	107,577	61,039	46,538	64,971	59,958	5,013	51,551
Waikato	331,026	350,124	19,098	29,880	11,812	18,068	14,151	21,827	-7,676	42,633	42,912	-279	-7,955
Bay of Plenty	203,985	224,367	20,382	18,764	8,625	10,139	9,051	13,367	-4,316	33,213	24,666	8,547	4,231
Gisborne	44,265	45,786	1,521	4,695	2,007	2,688	1,140	2,105	-965	5,169	6,684	-1,515	-2,480
Hawke's Bay	138,336	142,788	4,452	12,252	6,171	6,081	4,512	7,249	-2,737	13,944	16,614	-2,670	-5,407
Taranaki	107,127	106,587	-540	8,666	4,575	4,091	3,411	7,361	-3,950	8,706	12,594	-3,888	-7,838
Manawatu-Wanganui	224,763	228,771	4,008	18,964	9,746	9,218	8,001	16,060	-8,059	27,969	31,428	-3,459	-11,518
Wellington	400,284	414,048	13,764	34,093	14,579	19,514	23,637	31,843	-8,206	34,530	41,070	-6,540	-14,746
West Coast	31,563	32,511	948	2,599	1,495	1,104	831	1,533	-702	4,809	5,421	-612	-1,314
Canterbury	438,171	468,042	29,871	31,545	19,547	11,998	25,275	24,194	1,081	37,188	31,386	5,802	6,883
Otago	177,525	185,082	7,557	12,330	7,759	4,571	8,811	11,076	-2,265	22,005	20,682	1,323	-942
Southland	99,954	97,101	-2,853	7,634	4,169	3,465	2,247	6,608	-4,361	7,506	12,852	-5,346	-9,707
Nelson-Tasman	70,485	78,249	7,764	5,317	3,044	2,273	3,747	2,555	1,192	10,947	8,424	2,523	3,715
Marlborough	35,145	38,397	3,252	2,575	1,483	1,092	1,116	1,137	-21	6,672	5,457	1,215	1,194

(continue on next page)

Appendix Table 1 (continued)

c) 1996-2001

Region	Population change			Natural Increase Component			Migration Component						
							International Migration			Internal Migration			Net
	1996	2001	Growth	Births[1]	Deaths	Natural Increase	Inflows	Outflows[2]	Net[3]	Inflows	Outflows	Net	Migration
Northland	137,052	140,130	3,078	10,910	5,669	5,241	4,668	6,021	-1,353	17,481	18,102	-621	-1,974
Auckland	1,068,645	1,158,891	90,246	95,399	35,448	59,951	131,220	79,857	51,363	65,604	67,968	-2,364	48,999
Waikato	350,124	357,726	7,602	28,223	12,621	15,602	15,453	22,943	-7,490	44,043	42,576	1,467	-6,023
Bay of Plenty	224,367	239,415	15,048	18,981	9,384	9,597	9,600	11,176	-1,576	34,827	26,253	8,574	6,998
Gisborne	45,786	43,974	-1,812	4,004	2,003	2,001	1,032	2,371	-1,339	4,842	7,500	-2,658	-3,997
Hawke's Bay	142,788	142,947	159	11,195	6,171	5,024	5,094	7,297	-2,203	14,580	16,701	-2,121	-4,324
Taranaki	106,587	102,858	-3,729	7,497	4,207	3,290	2,823	5,571	-2,748	8,634	12,288	-3,654	-6,402
Manawatu-Wanganui	228,771	220,089	-8,682	16,871	9,506	7,365	7,263	15,707	-8,444	25,809	32,034	-6,225	-14,669
Wellington	414,048	423,768	9,720	32,246	14,506	17,740	26,244	31,931	-5,687	39,231	37,071	2,160	-3,527
West Coast	32,511	30,300	-2,211	2,086	1,445	641	690	1,422	-732	3,753	5,913	-2,160	-2,892
Canterbury	468,042	481,431	13,389	30,847	18,973	11,874	25,104	27,593	-2,489	38,907	30,219	8,688	6,199
Otago	185,082	181,542	-3,540	10,966	7,734	3,232	8,298	14,121	-5,823	21,747	20,637	1,110	-4,713
Southland	97,101	91,002	-6,099	6,493	3,917	2,576	1,818	4,968	-3,150	6,705	12,129	-5,424	-8,574
Nelson-Tasman	78,249	82,917	4,668	5,123	3,132	1,991	3,552	3,091	461	11,571	8,916	2,655	3,116
Marlborough	38,397	39,558	1,161	2,378	1,645	733	1,221	1,256	-35	6,735	6,162	573	538

Totals do not add up exactly as different sources of data were employed. It must be stressed that the data in this table are merely indicative estimates and not exact figures.

(1) For 1986-91 births have been estimated explained in the methods section.

(2) Net overseas migration – Inflow from overseas; note the order for the arithmetic manipulation given in the method section is different from the order here where results are presented.

(3) Net migration – Net internal migration.

(4) Did not have internal migration for Nelson-Tasman and Marlborough separately in 1986-1991.

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