Horowhenua Socio-Economic projections

Summary and methods

Projections report, 27 July 2017

SENSE PARTNERS
DATA LOGIC ACTION

Summary of projections

This report presents long term population and economic projections for Horowhenua District.

Population growth expected to continue

Recent increases in population growth in Horowhenua are expected to continue. Population growth is expected to average 0.8% over the next decade. This is much lower than the 1.6% growth experienced in 2016[1] but significantly higher than the 0.3% growth per year in the previous 10 years.

The uncertainty in this projection is captured in Table 1. The Table shows growth rates for the next 10 years ranging from 0.3% to 1.5% per annum.[2] These different growth rates have a significant impact on the size of the projected population, with the high end of the range resulting in a population in 10 ten years' time which is more than 15% larger.

The percentiles presented in Table 1, and elsewhere in the report, are calculated by simulating population change while varying the main drivers of population growth, such as immigration rates. These simulations are calibrated based on historical variations. This produces a range of results which is summarised by ranking the projections and presenting them according to their ranking or percentile.

TABLE 1: POPULATION PROJECTIONS

Population

	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
2016	31,895	31,895	31,895	31,895	31,895
2026	33,015	33,806	34,484	35,468	36,952
2036	33,403	35,610	37,659	40,519	45,037
2046	33,184	37,226	41,144	46,633	58,665
2056	33,014	39,473	46,980	55,027	78,406
2066	33,347	42,855	53,443	67,433	106,226

Population growth

	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
2016					
2026	0.3%	0.6%	0.8%	1.1%	1.5%
2036	0.1%	0.5%	0.9%	1.3%	2.0%
2046	-0.1%	0.4%	0.9%	1.4%	2.7%
2056	-0.1%	0.6%	1.3%	1.7%	2.9%
2066	0.1%	0.8%	1.3%	2.1%	3.1%

[1] Statistics New Zealand 'Usually Resident' population estimates, 2017.

[2] For the 5th to 95th percentiles of the range of projected outcomes.

Use of these projections needs to be tailored to the question at hand

In this summary report, there is a focus on the 50th percentile of projections. This is just to keep the explanations as straight forward as possible.

To use these projections, such as for planning purposes, it is best to consider ranges of values between percentiles. This is because no single value or percentile is more likely than another but some ranges of values are more likely than others. For example, there is a 1 in 2 chance (50% probability) the population will be between 35,610 and 40,519 in 2036.[3] While there is a 1 in 20 chance (5% probability) that the population will be smaller than 33,403 in 2036.

The 'best' range of values to use will depend on the decision-making context, such as whether a decision is irreversible or not and whether errors would have serious consequences.

Growth to continue long term but the magnitude is highly uncertain

The uncertainty in these projections is magnified over time. At the low end of the range, the population is projected to increase by 5% (1,450 people) over 50 years. At the high end, the population trebles, adding an additional 74,000 residents.

The full extent of this uncertainty is illustrated in Figure 1 which shows the range of simulated population outcomes for Horowhenua and for New Zealand overall.

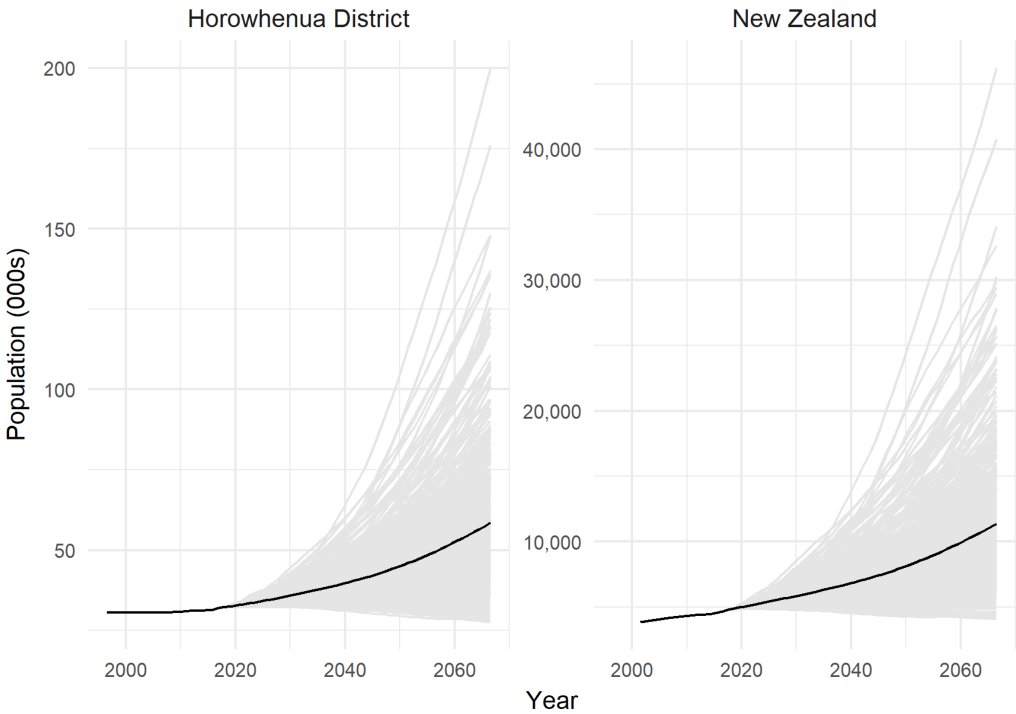
The very high population projections shown in Figure 1 are very unlikely. And they are probably unsustainable from a policy point of view. However, our projections are not based on expectations of policy change. Policy change is, therefore, an important factor that needs to be contemplated when using these projections.

Assumption: high immigration would be allowed to take place

International immigration, and therefore immigration policy, is the single most important factor in these projections. Increased immigration grows the population of Horowhenua directly and indirectly through increased domestic migration. When the national population is growing due to increased net migration this increases the flows of people to smaller areas, whether in retirement or for a change of lifestyle or for job opportunities.

[3] Based on this model. Technically speaking, this measure of uncertainty excludes 'model uncertainty'.

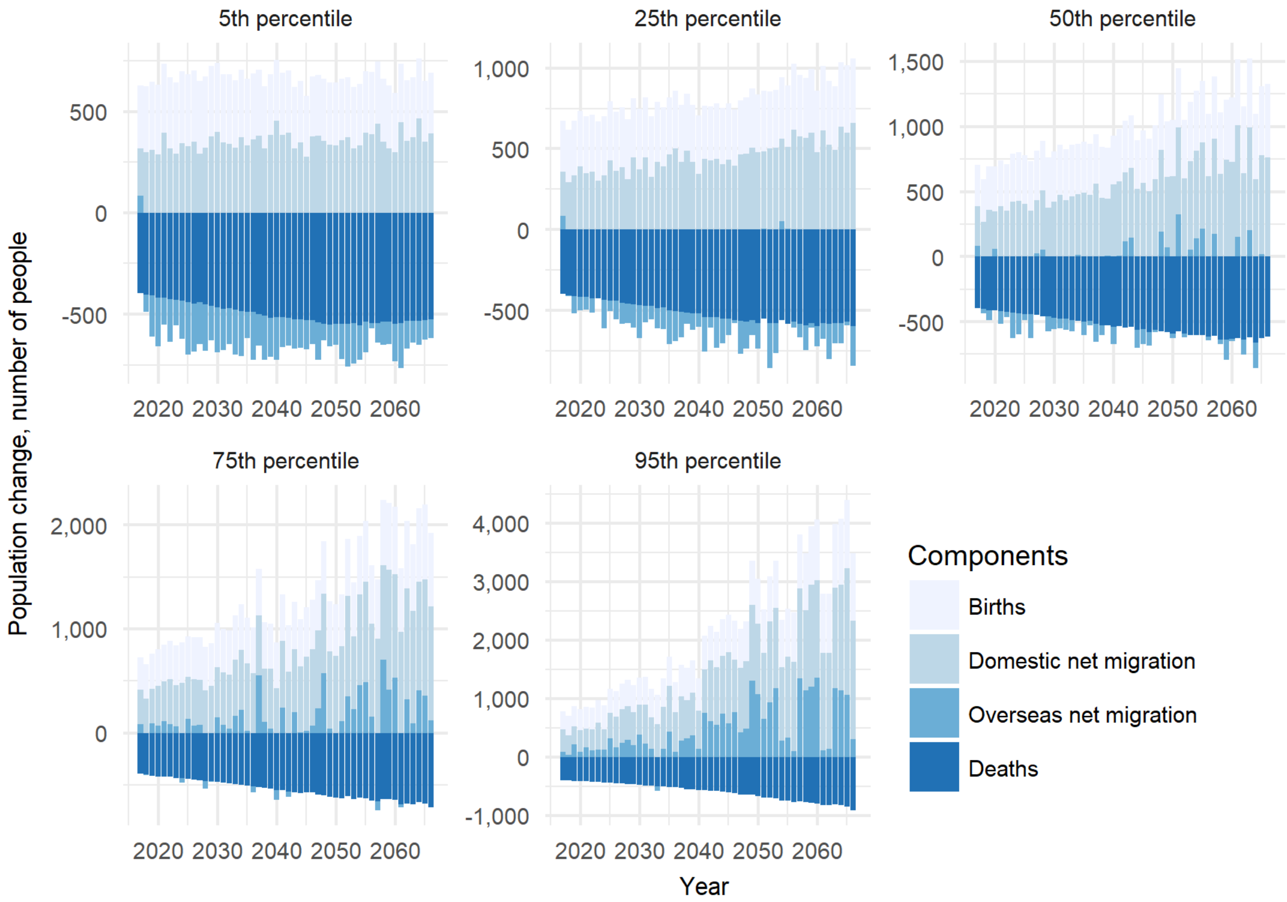
FIGURE 1: STRONG POPULATION GROWTH EXPECTED TO CONTINUE
500 simulated population projections. Black lines are means.



The importance of migration in driving population growth is illustrated in Figure 2 which shows components of projected population change. In the low growth case, the top left panel of Figure 2, annual changes in components of population change are small and overseas net migration is negative. In the higher growth cases, overseas migration becomes increasingly visible – a key driver of population growth and therefore in uncertainty around population growth. Also, as international migration grows – nationally – this helps to increase positive domestic net migration to the district.

We assume that if people want to migrate to New Zealand, they will be able to – that there will be no new steps taken to limit immigration.

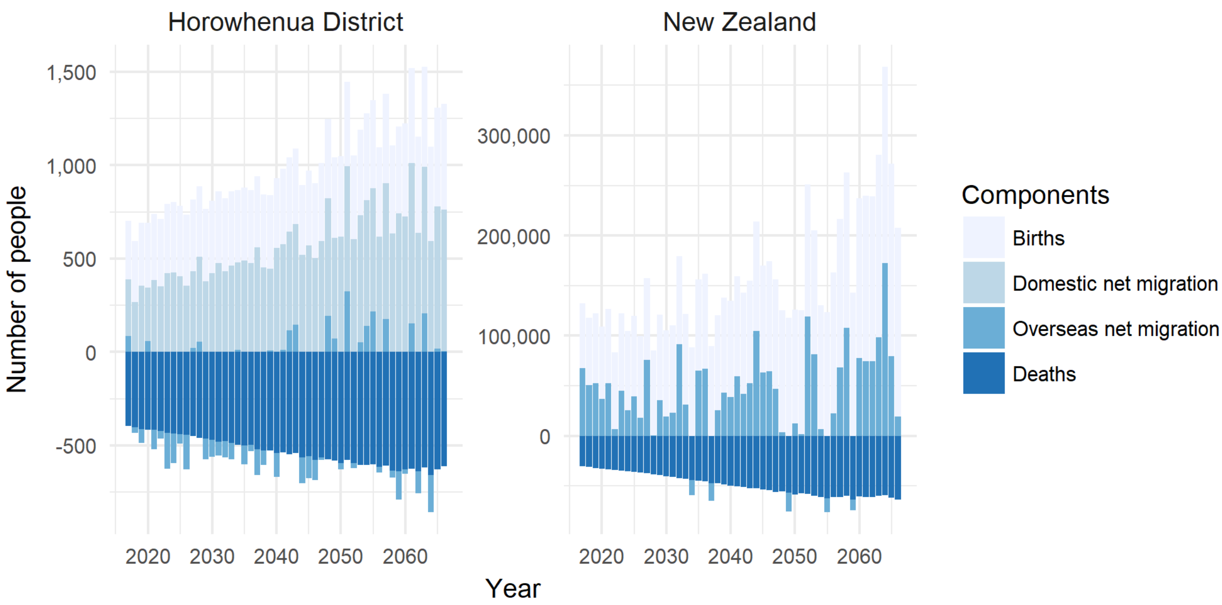
FIGURE 2: OVERSEAS NET MIGRATION IS THE MAIN SOURCE OF UNCERTAINTY
Annual population change, broken down by component of change and percentile of projection



The 50th percentile of these projections includes national net migration which is of similar magnitudes to those experienced in the past few years. As Figure 3 shows, net migration is projected to be lower between 2020 and 2030 than it has been in the past 2 years but to increase long term as inward migration trends upwards and outward migration remains stable as a proportion of the overall population.

The projections in the 75th and 95th percentiles are more extreme in terms of being outside the bounds of what has been experienced before.

FIGURE 3: MEDIAN PROJECTION ASSUMES MODERATE-TO-STRONG MIGRATION[4]
Annual population change, broken down by component of change and percentile of projection



Population growth and economic growth go hand-in-hand

Inflows of migrants and increasing labour force participation at older ages will help bolster labour force growth (see Table 2). This is the mainstay of economic growth with growth in the labour force strongly correlated with expanding economic activity.

Not all of these people will be employed or employed in Horowhenua District. Many of them will commute to work in nearby districts in the Wellington and Manawatu-Whanganui regions.

Nonetheless the economy is expected to grow by 2.1% per year[5], on average, over the next decade due to a growing labour force, increased employment and growth in productivity[6] averaging 0.8%.

Figure 4 shows the range of projected outcomes for growth in GDP or 'value-added' which sit behind the median economic growth projection figures. These show a wide range of potential outcomes over the long term, but a positive trend in all cases.[7]

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[4] The median projection is the 50th percentile.
[5] Excluding inflation.
[6] Measured here as GDP per working age person.
[7] Strictly speaking, percentiles below the 5th percentile do include declines. But the emphasis for these projections are the range of more likely outcomes between the 5th and 95th percentiles.

TABLE 2: LABOUR FORCE PROJECTIONS

Labour force (working age people participating in the labour force)

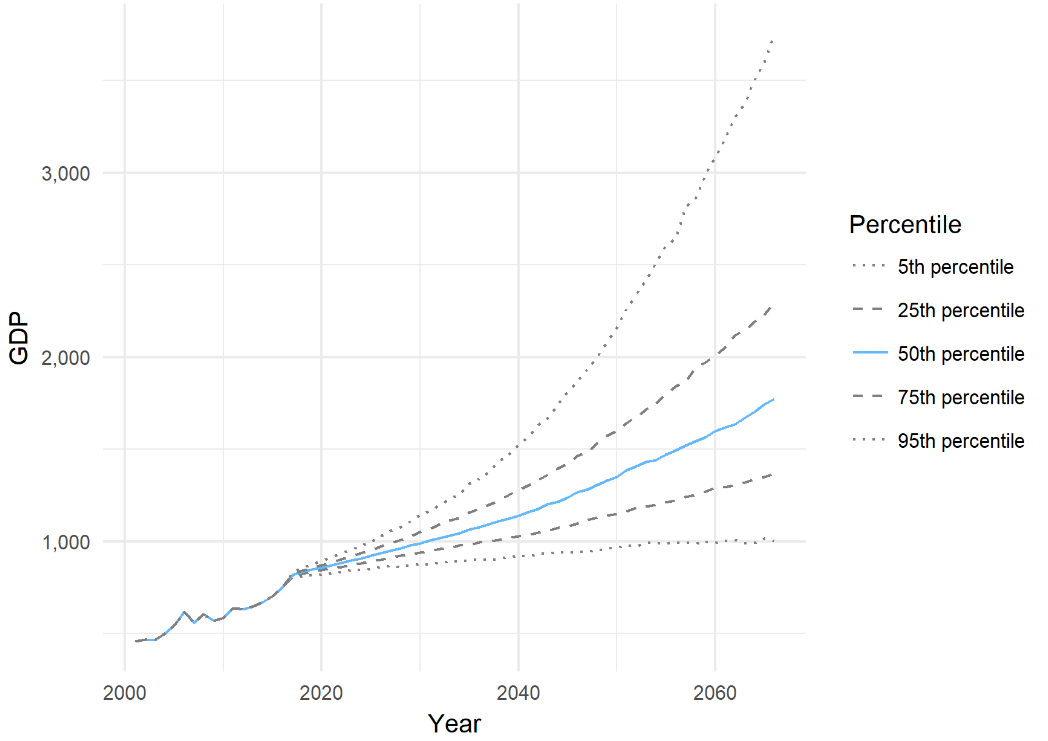
	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
2016	13,874	13,874	13,874	13,874	13,874
2026	14,583	15,024	15,423	15,953	16,803
2036	14,570	15,742	16,879	18,453	21,063
2046	14,451	16,679	18,833	21,864	28,475
2056	14,344	17,862	21,814	26,163	38,842
2066	14,161	18,852	24,311	31,576	51,722

Labour force growth (annual average between dates)

	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
2016					
2026	0.5%	0.8%	1.1%	1.4%	1.9%
2036	0.0%	0.5%	0.9%	1.5%	2.3%
2046	-0.1%	0.6%	1.1%	1.7%	3.1%
2056	-0.1%	0.7%	1.5%	1.8%	3.2%
2066	-0.1%	0.5%	1.1%	1.9%	2.9%

FIGURE 4: ECONOMY ON A POSITIVE GROWTH PATH

Estimated GDP, Horowhenua District, (2016 dollars, millions)



Service industries expected to lead growth

Projections of industry activity show service industries are expected to grow the most in coming years.

As shown in Table 3, Retail services (which, here, include accommodation services) and construction are amongst the fastest growing sectors over the next 50 years. This reflects the intimate connection between these sectors and population growth.

Other sectors, such as agriculture and manufacturing tend to ebb and flow and, overall, reduce as a share of overall GDP. These projected patterns reflect trends that have been occurring for many decades in New Zealand and in Horowhenua District.

Information, media and communications also grow rapidly, albeit from a small base.

Note that the projections shown here are trends and do not include volatility in industry output likely to be observed in any given year. Commodity sectors, such as agriculture, which face volatile international prices, can rise and fall significantly in any given year.[8]

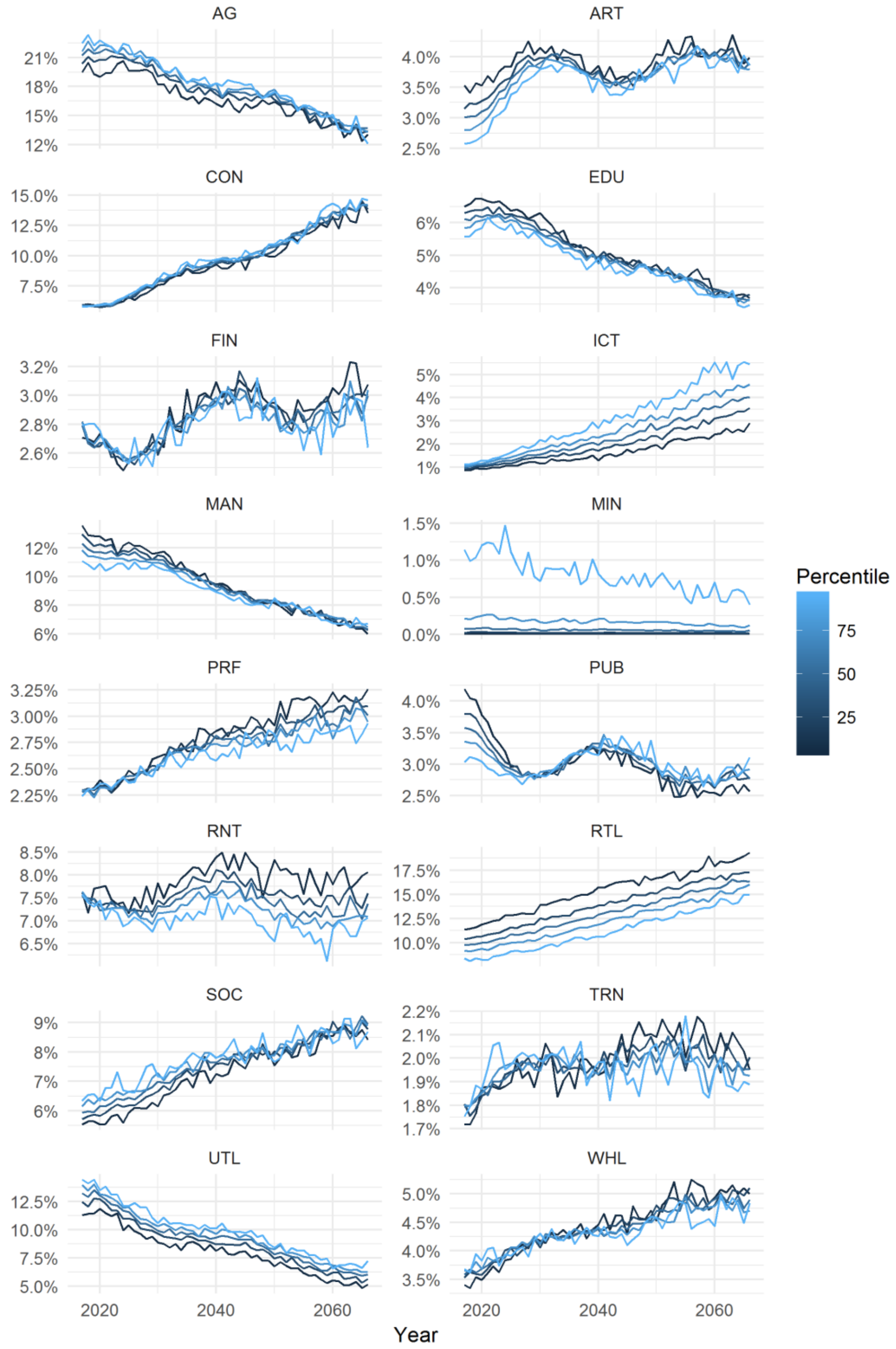
TABLE 3: LOCALLY TRADED SERVICE SECTORS LEAD IN ECONOMIC GROWTH

Value-added by industry (millions, 2016 dollars, 50th percentile for each industry)

Industry	2016	2026	2036	2046	2056	2066
Agriculture (AG)	139	163	159	179	185	188
Mines & Quarries (MIN)	0	0	0	1	1	1
Manufacturing (MAN)	80	86	85	82	85	89
Utilities (UTL)	101	77	75	82	79	76
Construction (CON)	37	51	76	97	145	189
Wholesale Trade (WHL)	20	32	40	48	61	71
Retail Trade (RTL)	50	82	106	136	186	231
Transport (TRN)	12	13	15	17	21	22
Information Media Communications (ICT)	6	12	18	27	43	61
Finance & Insurance (FIN)	14	21	26	31	36	42
Rental & Property (RNT)	49	103	125	146	161	193
Professional Services (PRF)	16	18	23	28	34	41
Public Administration (PUB)	26	22	27	32	32	40
Education (EDU)	38	43	41	43	47	47
Health & Social Services (SOC)	40	47	61	77	97	117
Arts & Recreation (ART)	20	27	32	34	47	51
Total	648	796	908	1,061	1,259	1,459

[8] The individual projections for each industry in Table 3 are projections associated with the 50th percentile for that industry. They are not the projections for the 50th percentile of GDP projections. Those projections would be significantly more volatile than the numbers shown here.

FIGURE 4: TRENDS IN INDUSTRY SHARES OF GDP
See Table 3 for industry acronym descriptions



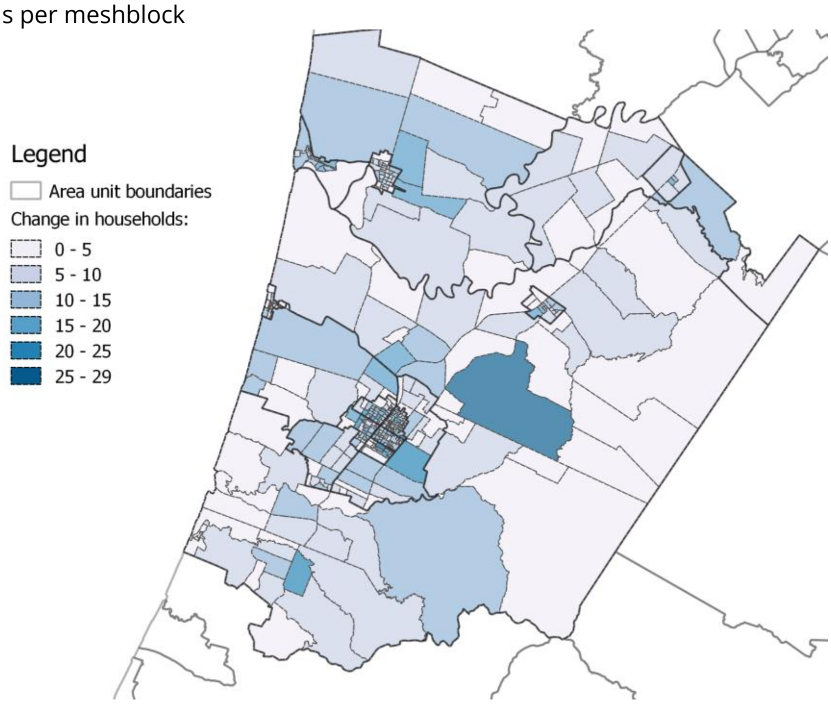
Population growth dispersed across the District

Our projections include allocations of household growth by area unit and by meshblock based on the propensity of different types of households to locate in different areas. Sole parent households, for example, are more likely to locate in more densely populated and well-established areas.

As Figure 5 shows, the projections suggest reasonably widely dispersed population growth. However, it is worth recalling that population location is as much a result of council and development decisions as it is about the decisions of households.

Also, a substantial share of growth is concentrated in developed areas (such as in and around Levin) but this growth is not easily seen in a map at the scale of Figure 5.

FIGURE 5: CHANGE IN NUMBER OF HOUSEHOLDS 2016-2036
Households per meshblock



Comparisons against other projections

The population projections presented in this report are higher than Statistics New Zealand projections for the Horowhenua District released in 2017 and similar to projections by NZIER produced in 2015. The differences are summarized in Table 4.

NZIER's projections included scenarios capturing impacts of the Wellington Northern Corridor (WNC) transport project. For comparability, Table 4 includes an implementation of the same scenario (the projection denoted '+ WNC').[9]

TABLE 4: COMPARISON WITH NZIER AND STATISTICS NEW ZEALAND PROJECTIONS

Population projections ('Medium' scenarios)

	2013	2018	2028	2038
StatsNZ (2017)	31,200	32,200	32,600	32,000
NZIER (2015)	31,200	32,390	34,600	36,840
NZIER (2015) + WNC	31,200	32,450	36,740	39,910
Sense (2017)	31,200	32,450	35,118	38,314
Sense (2017) + WNC	31,200	32,758	36,886	41,128

Annual average growth rates

	2013	2018	2028	2038
StatsNZ (2017)		0.6%	0.1%	-0.2%
NZIER (2015)		0.8%	0.7%	0.6%
NZIER (2015) + WNC		0.8%	1.2%	0.8%
Sense (2017)		0.8%	0.8%	0.9%
Sense (2017) + WNC		1.0%	1.2%	1.1%

The differences between NZIER's projections and Sense projections are reasonably minor and can be accounted for by small differences in methodologies.

Differences are due to views on international migration trends

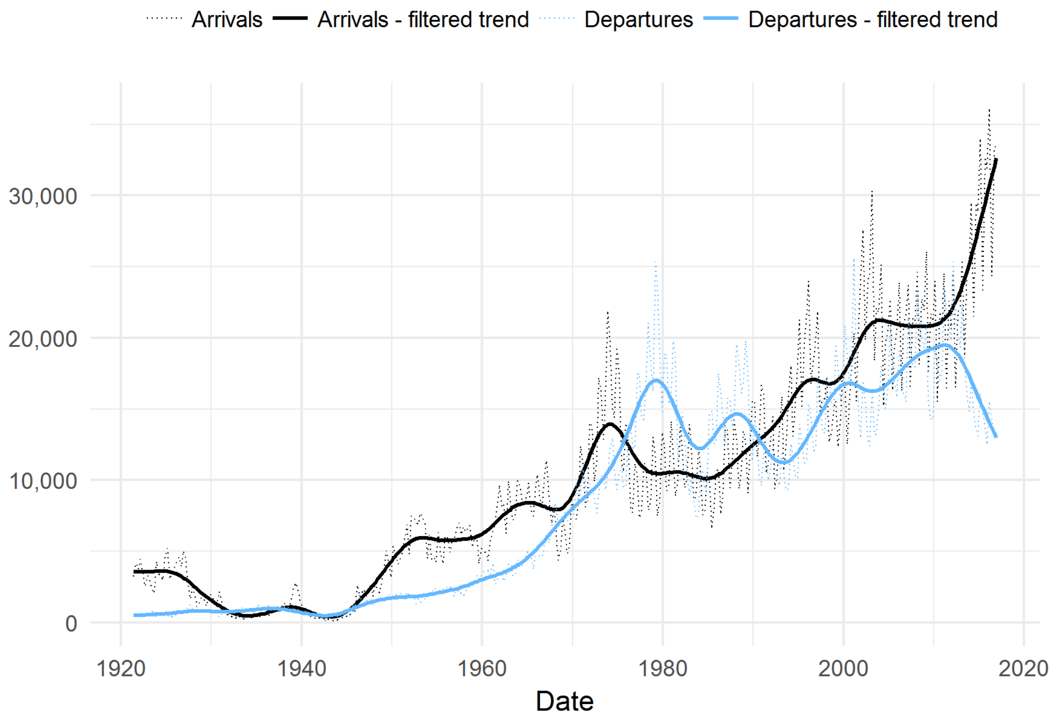
The difference between Sense projections and Statistics New Zealand's projections are differences in views about international migration.

[9] NZIER increase propensities to migrate to Horowhenua and the Wellington Region by 0.4%. The same shock has been implemented here. The effect of the shock is more pronounced in the short term in the Sense projections than in the NZIER projections. This is because immigration levels are much higher in 2017 and 2018 than was expected in the NZIER projections. As national migration growth eases, so too does the size of the shock relative to baseline population growth. Hence the percentage size of the shock (difference in population growth rates) is smaller in 2028 in the Sense scenario compared to the NZIER scenario.

The projections shown in this report are based on detailed modelling of long term trends in international inward and outward migration. As Figure 6 shows, there is a general long term upward trend in inward migration into New Zealand reflecting the attractiveness of New Zealand and increasing numbers of people internationally who are capable of migrating. This means inward migration is increasing relative to the size of the New Zealand population.

Trends in outward migration, on the other hand, have been comparatively subdued relative to the size of the population.[10] Consequently, net international migration is projected to grow.

FIGURE 6: ARRIVALS TRENDING UP FOR MORE THAN FIFTY YEARS
National quarterly permanent and long-term arrivals and departures



In contrast, Statistics New Zealand's projections appear to be based on assumptions about **net** migration and an assumption that net migration will return to historical averages of the past – averages in terms of absolute rather than proportional numbers. This means they don't not take account of long term trends of increasing net migration.

As discussed earlier this matters for growth in a District like Horowhenua because international migrants directly increase the District's population and increases domestic migration flows which also increase the District's population.

Sense and NZIER share similar views about potential for increased international migration, however NZIER assumed that growth could not continue long term.

[10] At least, this is the case since a rapid increase between 1960 and 1980, coinciding with rapid improvements in the availability and affordability of air transport.

Method

These projections should be interpreted as potentials. The projections do not, for example, take account of national or local policy changes which can affect actual population and economic growth.

Demographics

The method used to produce the population projections is a conventional population projection model, with a few relatively novel aspects.

The model simulates populations by age, by sex by District.

Fertility and mortality rates are projected using the same methods that Statistics New Zealand uses to project age- and sex-specific mortality rates.[11, 12]

International migration is predicted at the national level using a model of migration which accounts for trends and patterns in growth in arrivals from different types of countries in conjunction with changes in outward migration and economic conditions in New Zealand and Australia (unemployment rates and real exchange rates).[13]

Ages of migrants and domestic destinations of international migrants are determined based on observed historical probabilities that migrants are of a given age and the propensities these migrants have to move to particular parts of New Zealand (in this case Districts).

Internal domestic migration is based on age- and origin- and destination-specific probabilities of observed migration in each of the past three Censuses.[14] So, each District's inward domestic migration reflects the size and age distribution of other Districts from which it traditionally sources migrants.

At the household level, living arrangements are based on methods used by Statistics New Zealand. Each age and gender has an observed historical (Census-based) probability of residing in a different household type. The probabilities used here are national-level probabilities.[15]

[11] Demography package for R, by Rob J Hyndman with contributions from Heather Booth, Leonie Tickle and John Maindonald.

[12] Actual data on age-specific rates at the district level are limited and so these are inferred using splines to interpolate between ages where age-group data is available.

[13] To be precise, the model is a mean of forecasts from 3 different types of models: a set of univariate time series model, a vector-autoregression, and a vector-error correction model with economic components. The latter includes cluster analysis of arrivals from different countries which allows grouping of countries into 4 different groups which tend to move together.

[14] The number of observations here is limited but the probabilities have proved to remain remarkably stable over time.

[15] Except that, in the national context, projections for Auckland include adjustments to reflect the large numbers of multi-family households in Auckland This overall approach, using national 'living arrangement

Economic projections

The economic projections are based on a 'growth accounting' method, whereby growth is predicted based on growth in the working age population, labour force participation rates, unemployment rates, and productivity.

Here labour force participation rates are modelled at the national level and district rates are estimated based on typical age-specific deviations from national rates.[16]

Unemployment rates are also modelled at the national level and age-specific deviations from national rates are used to model persistent differences in unemployment rates at different ages in different districts.

The model used to predict unemployment rates at the national level takes account of changes in labour force growth and other economic factors on unemployment rates. It also includes a measure of labour productivity.[17] Predictions of productivity growth come from this model.

There is no attempt to model district-level productivity growth, rather districts are assumed to face random fluctuations in productivity which move around the national average.

Industry projections are based on a model of trends in industry shares of GDP. At the district level, industry output is then projected using historical correlations between movements in national output and district output. So, the district's fortunes are attached to national trends, but also reflect local cycles and comparative advantages.

Randomness

To run simulations and produce ranges for projections we use the observed errors in our models and underlying variation in the variables we are modelling to produce 'prediction intervals'. In each simulation, we draw randomly from these prediction intervals.

Not all variables are subject to this randomness directly[18] and some variables do not fluctuate a great deal. The most volatile components of the projections are: migration, productivity, and industry GDP growth shares.

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type rates' is a weakness in this modelling method but is accepted for the time being in the absence of better data to discriminate 'living arrangement type rates' by district.

[16] The national rates are modelled using logistic growth curves which help to capture the rising, but ultimately limited, rates of participation of older age groups.

[17] The national model of unemployment rates is a vector auto-regression of unemployment, CPI, labour force, interest rates, and earnings per hour ('labour productivity). The use of vector auto-regressions helps ensure that we extract underlying trends in variables and means that the model can capture the effects of economic cycles over a 1 to 2 year horizon. After that the model reverts to trends. Although randomness is added to reflect uncertainty, there are no economic cycles in the model beyond the first 1 to 2 years.

[18] All age-specific probabilities used in the model are fixed, for example.

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