Drivers of economic growth in the Northland regional economy

for
Northland Regional Council

Prepared by Infometrics Ltd

April 2009

Table of Contents

Executive summary

- This report presents analysis of the factors that have underpinned economic growth in the Northland region since 1997.
- Three approaches are used:
  - An investigation of industry multiplier effects
  - Analysis of leading indicators
  - Investigation of industry spillovers onto regional growth
- The report focuses on region-wide findings but the analysis is replicated for individual districts. Tables presenting results for individual districts are located in the appendices to this report.

Multiplier analysis

- The multipliers used in this report are sourced from Butcher Partners and measure the amount of added value generated for the Northland economy resulting from a $1 increase in added in a specific industry.
- The range of multipliers for Northland is from 3.37 for Meat and Dairy Manufacturing to 1.09 for imputed rent associated with owning one's own house. The high multiplier activities include the production, transportation, processing, and manufacture of locally produced commodities like food and wood. It also includes activities that are largely carried out entirely within the region like, for example, construction.
- Low multiplier activities have either low levels of purchasers from other firms (eg real estate), have high purchases from outside the region (eg petrol refining), are owned and operated from outside the region (eg communications), or some combination of the three.
- Weighting these multipliers with actual Northland activity levels indicates that opportunity is an important determinant of economic contribution. For example, the multiplier effect from petrol refining is low, but the sheer scale of the refinery ensures its importance to the Northland economy.
- Combining multipliers with trend growth rates indicates that forestry and wood processing, public spending, construction, real estate and retail trade activity have been important for economic growth in Northland over the last decade.
- On the other side of the ledger, the region's recent growth performance has been constrained by declines in farming output, fishing, farm product processing, mining, and refining activity.

Leading indicators

- Leading indicator analysis examines the extent that external events precede changes in economic activity in Northland.
- Increases in guest nights and non-residential construction activity in Northland are most strongly associated with future increases in economic activity in the region.

- There appears to be a spillover from Auckland, eg increases in guest nights, retail sales, external migration arrivals, house prices, and car registrations in Auckland are associated with future increases in economic activity in Northland.
- Wealth gains, as captured by house prices, seem to have a positive impact on economic activity in the region.
- Growth in commodity prices, employment, and wages (unadjusted LCI) are associated with positive economic outcomes.
- Increases in interest rates and dwelling construction activity in Auckland are associated with declines in economic activity in Northland. These may be both associated with tourism influences, higher world bond rates might be correlated with less international travel; likewise more spending on housing in Auckland might be at the expense of discretionary spending on travel.

Industry spillovers

- The spillover analysis examines the industries where changes in output are associated with a greater than proportional change in region-wide economic activity. An implication is that a movement of capital and labour into these industries would be expected to enhance Northland's growth potential.
- The industries identified to have a growth dividend for Northland were:
    - Agriculture
    - Wood and paper product manufacturing
    - Textile and apparel manufacturing
    - Machinery and equipment manufacturing
    - Non-metallic minerals manufacturing
    - Personal and other community services
    - Cultural and recreational services
    - Local government administration
    - Accommodation, restaurants and bars
    - Metal product manufacturing
    - Finance and insurance

Glossary

Gross Domestic Product

Gross domestic product (GDP) is a measure of economic output. It is equal to the sum of the value added (see below) at every stage of production (the intermediate stages) by all the industries within a region.

Multipliers

Multipliers estimate the induced impact of activity in one sector on economic activity in the whole of the study area. Multipliers are estimated from inter-industry studies and account for the flow of money between industries and between sectors (households, business, government) in the production process. Effectively these estimates are a shorthand way of accounting for the fact that the spending by one person is the revenue of another and that producers need to reimburse their workers and the providers of goods and services used in the production process.

The extent that an activity will stimulate further activity within the region will differ from activity to activity depending on the input structure of production processes and the spending patterns of people and institutions that receive income as a result of the transactions. Multipliers are therefore estimated for each source of activity. For example an activity that uses a higher proportion of labour will tend to induce a higher amount of subsequent spending as employees spend their wages. Alternatively an activity which uses a high proportion of imported inputs will have a lower flow-on impact onto local economic activity.

Nominal GDP

Nominal GDP is GDP expressed in the current prices of the period being measured.

Productivity

Productivity measures of output from production processes, per unit of input. Labour productivity, for example, is measured as a ratio of output per labour-hour, an input.

Real GDP

Real GDP is a measure of the size of the economy adjusted for price changes and inflation. It enables measures of GDP to be meaningfully compared over time. Real GDP for a given year is the given year's nominal GDP stated in the base-year price level. In this report all GDP measures are real and are expressed in 1995/1996 prices (the year to March 1996 is the base year).

Spillovers

Spillovers occur when the benefits accruing from an economic activity spill over to individuals or groups not directly involved in the initial activity. For example, a health service benefits not only the patient but also clients of the patient.

Value added

A term used to describe the contribution of an industry to gross domestic product. Value added measures the difference between total revenue of firms and the cost of raw materials, services and components.

Introduction

This report presents analysis of the factors that have underpinned economic growth in the Northland region since 1997. The myriad of interconnections in an economy means that there is always a speculative aspect to such analysis. We collect circumstantial evidence using a variety of analytical techniques, each of which provides insights which enhance our understanding of the factors that have been important for economic activity in the region. This approach aims at gaining an understanding of the relative importance of the multiple influences on activity.

Three approaches are used:

- Multipliers derived from the Northland inter-industry input-output tables compiled by Butcher Partners provide an assessment of how an expansion in one industry is likely to influence total economic activity in the area as a whole.
- Analysis of leading indicators of economic activity.
- An examination of industries that are associated with greater than proportional changes in region-wide economic activity.

The analysis is undertaken at the regional level and at the territorial authority level. In addition to total area GDP, the leading indicator analysis is also undertaken for the five interest areas identified by the Northland Growth Strategy Team:

- Aquaculture
- Forestry
- Information technology
- Marine industries
- Tourism

1. MULTIPLIER ANALYSIS

The multiplier analysis is based on regional inter-industry data provided by Butcher Partners. We begin with the raw multiplier data provided by Butcher Partners. Table 1 presents the type II value add multipliers as calculated by Butcher Partners for Northland for 2005/06.[1] The multipliers have been calculated for 53 industries and have been ordered from largest to smallest. The multipliers measure the amount of added value generated for the Northland economy resulting from a $1 increase in added in a specific industry. Thus an extra $1 of added value from Meat and Dairy Manufacturing ultimately implies an increase in added value throughout the Northland economy of $3.37. This extra $2.37 of added value results because the industry purchases its inputs from local farmers, it pays local companies to transport the inputs from the farms to the factories and also finished products to markets or ports. In addition to these ancillary upstream and downstream activities, the region economy will also be stimulated by the extra spending of employees and business owners. Industries will have higher multipliers if:

- their activity is associated with extensive activity in other industries in the region
- employment induces high levels of spending and on goods and services produced in the region

On the other hand multipliers will typically be lower if:

- inputs into the production process have to be brought in from outside the region
- earnings are spent outside the region.

The range of multipliers for Northland is from 3.37 for Meat and Dairy Manufacturing to 1.09 for imputed rent associated with owning one's own house. The high multiplier activities include the production, transportation, processing, and manufacture of locally produced commodities like food and wood. It also includes activities that are largely carried out entirely within the region like, for example, construction.

Low multiplier activities have either low levels of purchasers from other firms (eg real estate), have high purchases from outside the region (eg petrol refining), are owned and operated from outside the region (eg communications), or some combination of the three.

[1] The analysis focuses on value added rather than turnover or gross output. From a firm perspective, gross output is revenue adjusted for stock change (ie it is the sale value of production). Value added is gross output less intermediate consumption (ie less purchases of raw materials and inputs). In this way value added measures the value added to a commodity by the firm's activity. For example, if I purchase a sandwich, the value added by the sandwich maker is the sale price of the sandwich less the purchased ingredients (bread etc) and other overhead costs (power rent etc). Adding up the value added from all enterprises in the country sums to gross domestic product (GDP).

Table 1. Type II Value Add Multipliers for Northland

	No.	Industry	Type II multiplier
1	10	Meat and Dairy Manufacturing	3.37
2	28	Residential Construction	2.98
3	25	Electricity generation, transmission and distribution	2.42
4	14	Wood product manufacturing	2.37
5	6	Forestry and logging	2.28
6	4	Other farming	2.19
7	2	Livestock and cropping farming	2.08
8	7	Fishing	1.96
9	29	Other Construction	1.91
10	11	Other food manufacturing	1.87
11	27	Sewerage, drainage and waste disposal services	1.82
12	30	Wholesale trade to non trade sectors	1.82
13	31	Wholesale trade to trade sector	1.78
14	34	Road freight transport	1.78
15	39	Insurance	1.78
16	13	Textiles and apparel manufacturing	1.77
17	24	Furniture and other manufacturing	1.73
18	36	Rail, water & Air Transport and Transport services	1.73
19	15	Paper and paper product manufacturing	1.70
20	19	Non-metallic mineral product manufacturing	1.69
21	1	Horticulture and fruit growing	1.68
22	3	Dairy and cattle farming	1.68
23	5	Services to agriculture, hunting and trapping	1.68
24	47	Local government administration	1.68
25	35	Road passenger transport	1.67
26	46	Central government administration and defence	1.63
27	21	Structural, sheet & fabricated metal product man.	1.60
28	17	Chemicals incl fertiliser, ind chem and personal chem	1.59
29	18	Rubber, plastic and other chemical product man.	1.58
30	23	Machinery and other equipment manufacturing	1.58
31	22	Transport Equipment Manufacturing	1.56
32	52	Cultural and recreational services	1.56
33	53	Personal and other community services	1.56
34	8	All non-oil&gas mining, plus services to mining	1.54
35	40	Services to Finance & Insurance	1.54
36	51	Other health and community services	1.53
37	33	Accommodation, restaurants and bars	1.52
38	49	Other education	1.52
39	32	Retail Trade	1.51
40	45	Other business services	1.50
41	20	Basic metal manufacturing	1.48
42	44	Scientific research and computer services	1.48
43	16	Printing, publishing and recorded media	1.47
44	50	Hospitals and nursing homes	1.44
45	42	Equipment hire and investors in other property	1.43
46	48	Pre-school, primary and secondary education	1.39
47	26	Water supply	1.36
48	38	Finance and Banking	1.35
49	37	Communication services	1.32
50	12	Beverage, malt and tobacco manufacturing	1.28
51	41	Real estate	1.27
52	9	Oil and gas extraction & distribution plus petrol refining and prodı	1.14
53	43	Ownership of owner-occupied dwellings	1.09

Source: Butcher Partners

Weighted impact

Having a high multiplier indicates a propensity for generating a growth dividend for the region, but does the region have the opportunity to exploit this propensity? For example, although fishing has a reasonably high multiplier (1.96), the extent of the fishing resource and government quotas will limit the region's ability to generate a growth dividend from fishing. This is illustrated when we apply the multipliers from Table 1 to our estimates of industrial added value in Northland in 2005/06, see Table 2. Comparing Table 2 with Table 1 indicates that although fishing has a high propensity to generate regional economic activity (it has the eighth highest multiplier) the small scale of fishing in the region means that fishing has just the 34th highest weighted contribution.

The weighted impact numbers presented in Table 2 are in the form of $m, but in 1995/96 prices. There is also an element of double counting in these numbers, which means that adding the numbers across industries is meaningless. Instead it is the order and relative size of each industry's weighted impact that is of interest.

The table illustrates that opportunity is as important as propensity in determining the contribution to regional activity. For example, despite its low multiplier, the sheer scale of the petroleum refinery means that it still was the thirteenth most important industry for the region in 2005/06.

The general conclusion from Table 1**Error! Reference source not found.Error! Reference source not found.** that the production, transportation, processing, and manufacture of locally produced commodities like food and wood are important for the region's economy is also supported from the data in Table 2. Forestry and logging, meat and dairy manufacturing, wood product manufacturing, and dairy and cattle farming remain in the top ten industries in Table 2.

However, the table also demonstrates the importance of other relatively low multiplier industries such as retail trade (number 39 in Table 1 but number 2 in Table 2), other health and community services (up from 36 to 5), real estate (up from 51 to 8) and central government services (up from 26 to 10).

Table 2: Northland industrial value added in 2005/06 rated up by Type II Multipliers

	No.	Industry	Weighted impact
1	6	Forestry and logging	414
2	32	Retail Trade	330
3	10	Meat and Dairy Manufacturing	318
4	43	Ownership of owner-occupied dwellings	276
5	51	Other health and community services	266
6	29	Other Construction	233
7	14	Wood product manufacturing	229
8	41	Real estate	198
9	3	Dairy and cattle farming	184
10	46	Central government administration and defence	168
11	2	Livestock and cropping farming	159
12	45	Other business services	154
13	9	Oil and gas extraction & distribution plus petrol refining and prod	149
14	48	Pre-school, primary and secondary education	143
15	30	Wholesale trade to non trade sectors	141
16	1	Horticulture and fruit growing	138
17	25	Electricity generation, transmission and distribution	136
18	47	Local government administration	127
19	37	Communication services	110
20	33	Accommodation, restaurants and bars	101
21	34	Road freight transport	84
22	28	Residential Construction	82
23	38	Finance and Banking	80
24	5	Services to agriculture, hunting and trapping	80
25	50	Hospitals and nursing homes	79
26	40	Services to Finance & Insurance	56
27	11	Other food manufacturing	55
28	19	Non-metallic mineral product manufacturing	54
29	31	Wholesale trade to trade sector	48
30	36	Rail, water & Air Transport and Transport services	47
31	23	Machinery and other equipment manufacturing	45
32	53	Personal and other community services	45
33	42	Equipment hire and investors in other property	44
34	7	Fishing	42
35	21	Structural, sheet & fabricated metal product man.	42
36	44	Scientific research and computer services	40
37	35	Road passenger transport	39
38	52	Cultural and recreational services	38
39	22	Transport Equipment Manufacturing	35
40	49	Other education	30
41	8	All non-oil&gas mining, plus services to mining	27
42	18	Rubber, plastic and other chemical product man.	26
43	17	Chemicals incl fertiliser, ind chem and personal chem	26
44	16	Printing, publishing and recorded media	23
45	4	Other farming	22
46	27	Sewerage, drainage and waste disposal services	21
47	24	Furniture and other manufacturing	18
48	13	Textiles and apparel manufacturing	8
49	39	Insurance	8
50	26	Water supply	6
51	12	Beverage, malt and tobacco manufacturing	4
52	15	Paper and paper product manufacturing	1
53	20	Basic metal manufacturing	0

Source: Butcher Partners multipliers and Infometrics' value added estimates

Marginal impact

On a forward looking basis, the growth potential of an industry is less about how much activity takes place in an industry but by the extent it contributes to extra growth in the region. From this perspective, the marginal impact, as distinct from the average impact may be of more interest. The marginal impact is estimated here (Table 3) as the product of the multipliers from Table 1 and the trend rate of growth calculations presented in the Statistical Appendix in the associated report: *Historical performance of the Northland regional economy*. The format of the marginal impact data is average annual increase in regional output (in 1995/96 $m). Again it is the comparison of the relative size of the industry marginal impacts that is of interest.

The results in Table 3 support the earlier evidence of the importance of the forestry and wood processing for economic prospects for Northland, with wood product manufacturing and forestry and logging being number one and three respectively. Public spending has also been important for Northland's growth during the last decade, with other health and community services (2) central government (8) and local government (9) also making the top ten.

The marginal impact analysis indicates that other important sectors for growth in Northland over the last decade have been:

- construction (other construction generating the 4th largest contribution and residential construction the 13th of Northland industries)
- real estate (5th)
- retail trade (6th)
- business related services (other business services 7th, services to finance and insurance 10th, communication services 11th)
- road freight transport (12th)

At the other end of the spectrum declines in activity in a number of industries appear to have constrained economic development in the region. In particular:

- Farming activities (livestock and cropping farming, horticulture and fruit growing, other farming)
- Fishing
- Farm product processing (meat and dairy manufacturing, textiles and apparel manufacturing)
- Mining and petroleum refining activities

An important implication from this analysis is that although industries like farming, food processing, and petroleum refining are important components of the Northland economy, they have not been drivers of growth in recent years. Growth in "non-traditional" industries has occurred while activity in the traditional industries has contracted. An implication is that the Northland economy appears to have diversified its activities over the last decade.

Table 3: Trend annual growth in industry value added rated up by Type II multiplier

	No.	Industry	Marginal Impact
1	14	Wood product manufacturing	4.08
2	51	Other health and community services	3.54
3	6	Forestry and logging	3.34
4	29	Other Construction	2.88
5	41	Real estate	2.79
6	32	Retail Trade	2.60
7	45	Other business services	2.12
8	46	Central government administration and defence	1.76
9	47	Local government administration	1.62
10	40	Services to Finance & Insurance	1.06
11	37	Communication services	1.04
12	34	Road freight transport	1.03
13	28	Residential Construction	0.89
14	18	Rubber, plastic and other chemical product man.	0.89
15	25	Electricity generation, transmission and distribution	0.86
16	33	Accommodation, restaurants and bars	0.75
17	23	Machinery and other equipment manufacturing	0.67
18	44	Scientific research and computer services	0.61
19	19	Non-metallic mineral product manufacturing	0.60
20	38	Finance and Banking	0.54
21	21	Structural, sheet & fabricated metal product man.	0.46
22	3	Dairy and cattle farming	0.46
23	27	Sewerage, drainage and waste disposal services	0.45
24	43	Ownership of owner-occupied dwellings	0.44
25	52	Cultural and recreational services	0.43
26	50	Hospitals and nursing homes	0.39
27	53	Personal and other community services	0.37
28	5	Services to agriculture, hunting and trapping	0.35
29	30	Wholesale trade to non trade sectors	0.29
30	11	Other food manufacturing	0.21
31	17	Chemicals incl fertiliser, ind chem and personal chem	0.21
32	16	Printing, publishing and recorded media	0.19
33	24	Furniture and other manufacturing	0.17
34	22	Transport Equipment Manufacturing	0.15
35	48	Pre-school, primary and secondary education	0.14
36	12	Beverage, malt and tobacco manufacturing	0.10
37	49	Other education	0.10
38	36	Rail, water & Air Transport and Transport services	0.09
39	26	Water supply	0.08
40	39	Insurance	0.03
41	15	Paper and paper product manufacturing	0.02
42	20	Basic metal manufacturing	0.01
43	35	Road passenger transport	0.00
44	10	Meat and Dairy Manufacturing	-0.07
45	13	Textiles and apparel manufacturing	-0.10
46	42	Equipment hire and investors in other property	-0.11
47	4	Other farming	-0.12
48	1	Horticulture and fruit growing	-0.13
49	31	Wholesale trade to trade sector	-0.32
50	8	All non-oil&gas mining, plus services to mining	-0.50
51	7	Fishing	-0.64
52	9	Oil and gas extraction & distribution plus petrol refining and prod	-0.99
53	2	Livestock and cropping farming	-1.12

Source: Butcher Partners' multipliers and Infometrics' growth estimates

Differences between districts

Tables equivalent to Table 2 and Table 3 are presented for each of the three Northland districts (Far North, Kaipara and Whangarei) are presented in Appendix 1. The estimates presented in these tables are based on Northland-wide multipliers (ie those presented in Table 1) but weighted by activity measures within each district. An implication of using Northland wide multipliers is that the results presented in the tables represent the impact for the whole of Northland resulting from activity in the individual district. For example, the multiplier analysis will account for how dairy farming in Kaipara will influence the demand for Northland road freight services, even if the freight businesses used are based in Whangarei or the Far North.

Except for minor variations in the ordering of importance, the ten industries with the highest *weighted impacts* (as per Table 2) were very much the same in all three districts. Exceptions to the rule seemed to be:

- higher importance for livestock and cropping farming, and horticulture and fruit growing for both the Far North and Kaipara,
- higher importance for petroleum refining, wholesale trade, and other business services in Whangarei,
- lower importance for central government in the Far North and Kaipara,
- lower importance of dairy and cattle farming in the Far North and Whangarei, and
- lower importance of health services in Kaipara.

In terms of *marginal impact* (ie contributions to growth as per Table 3) there was again generally very little difference between the results for Northland as a whole, but there were a number of divergent experiences for a number of industries:

- Communication services expanded strongly in the Far North and Kaipara but contracted in Whangarei
- Meat and dairy manufacturing expanded strongly in Kaipara, was stable in the Far North, and contracted sharply in Whangarei
- Both education and hospital and nursing homes activity grew well in Whangarei but declined modestly in the Far North and Kaipara
- There seems to have been a strong contraction in chemical manufacturing and electricity generation activity in Kaipara

Focus industry multiplier analysis

The multiplier analysis has been repeated for the composite focus industries identified by the Northland Regional Strategy group:

- Aquaculture
- Forestry
- Information Technology
- Marine industries
- Tourism

Table 4 Type II value add multipliers for composite focus industries

Composite industries	Type II multiplier
Forestry	2.28
Aquaculture	1.96
Tourism	1.59
Marine industries	1.56
Information technology	1.48

The multipliers calculated for the composite industries (Table 4) indicate that forestry and aquaculture have a reasonably high potential to generate growth in the Northland region (relative to the region median of 1.60). The other three industries' multipliers are only marginally below the region median. Note, however, that the high multiplier for forestry will implicitly assume that the forestry activity is ultimately for wood or paper production purposes. The multiplier would be considerably lower if there is no intention to ultimately harvest the trees, say if the investment in forestry is purely to exploit carbon credit opportunities. Such opportunities would potentially generate income for investors, but would not stimulate the same level of ancillary economic activity in the region as is generated when trees are logged and processed.

Table 5 demonstrates that tourism is currently about ten times more important for the region economy than the other focus industries – and over seventy times more important than information technology.

Table 5: Focus industry value added in 2005/06 rated up by Type II multipliers

Composite industries	Weighted impact
Tourism	308.9
Marine industries	32.0
Forestry	30.5
Aquaculture	22.2
Information technology	4.2

The contribution to region growth by tourism over the last ten years has also been roughly ten to twenty times that of other industries (see Table 6). Of the five focus industries, information technology appears to have the strongest relative contribution to region growth over the last decade. Its marginal impact has been 2.4% of its weighted impact (0.1/4.2), compared with 0.6% for tourism and marine industries, 0.4% for forestry and negative contributions from aquaculture.

Table 6: Trend annual growth in focus industry value added rated up by Type II multiplier

Composite industries	Marginal Impact
Tourism	1.85
Marine industries	0.18
Forestry	0.11
Information technology	0.10
Aquaculture	-0.10

2. LEADING INDICATORS

The preceding multiplier analysis is useful for identifying which industries contribute most to the region's economic activity and to its growth in recent years. It is silent, however, on the factors that might be underpinning changes in economic activity. For example, the analysis above suggests that retail trade is both an important component of economic activity in Northland and an important source of economic growth. But is retail trade a driver of growth or is the industry responding to another source of growth? Does a change in retail activity reflect an increase in tourism, an increase in wealth, improved farm incomes, increase in industrial production, an increase in government income support, increases in the local population, or is it due to some combination of such factors?

We attempt to investigate such factors by undertaking analysis of the correlation between economic activity in Northland and a collection of potential leading indicators. The approach is reasonably atheoretical, and instead lets the data talk for itself. The approach cannot be used for identifying what *causes* economic growth in Northland. Instead we are trying to isolate the types of external events that typically precede a change in economic activity.

An issue with investigating the existence of leading indicators is to remove the interaction between indicators. An obvious way to remove this multicollinearity is to correlate economic activity with each indicator individually. The problem with this approach is that it potentially introduces omitted variable bias into the estimates. The approach that we adopt is to use principal component analysis to group co-movements in the pool of potential indicators and then regress lags of the principal components with the measure of economic activity:

$$Q_t = \beta_0 + \beta_1 PC^1_{-t} + \beta_2 PC^2_{-t} + \beta_3 PC^3_{-k} + \mu \quad (1)$$

Where PC^x_{-z} is the time-series of the x^{th} principal component of the pooled matrix of potential indicators lagged z quarters (ie leading economic activity by z quarters). The appropriate lag length used was discovered by experimentation using the following algorithm:

1. Initially Q_t is regressed against four lags of all first three principal components.
2. The least significant principal component in the regression is removed from the regression equation and regression is repeated.
3. Step 2 is repeated except if removing the least significant lagged principal component means that the equation is no longer represented by lags of that principal component, in which case the next least significant principal component is removed.
4. Step 3 is repeated until their remain just three principal component variables left in the equation, representing the three different principal components, but not necessarily of the same lag length. If all variables are significant the process finishes, but any remaining insignificant principal components are sequentially removed.

The purpose of this approach is to let the data determine the lag lengths. By construction principal components are orthonormal (ie independent

and uncorrelated) with each other. This will not necessarily be the case with other lags of the same principal component, so it is important to retain just one lag of each principal component in the final equation. Different principal components of different lag lengths could potentially be partially correlated with each other, but given the orthonormality of concurrent principal components, we consider the risk of remaining multicollinearity is quite low.

Estimations were carried out with the data in log levels. Estimation using log levels allows the parameters to be interpreted as elasticities, ie the percentage change in output associated with a change in the indicator. The potential leading indicators investigated were:

- House prices (Northland and Auckland)
- House sales (Northland and Auckland)
- External migration arrivals (Northland and Auckland)
- External migration departures (Northland and Auckland)
- Guest nights (Northland and Auckland)
- Consumer confidence (Northland and Auckland)
- Retail sales (Northland and Auckland)
- Car registrations (Northland and Auckland)
- Dwelling consents (Northland and Auckland)
- Non-residential construction consents (Northland and Auckland)
- Primary industry employment (Northland only)
- Manufacturing industry employment (Northland only)
- Construction industry employment (Northland only)
- Private service industry employment (Northland only)
- Public service industry employment (Northland only)
- Total employment (Northland only)
- Terms of trade (National)
- Exchange rate (National)
- 90 day bank bill rate (National)
- 10 year bond rate (National)
- World bond rate
- Employment rate (National)
- Balance of Payment (National)
- Unadjusted labour cost index (National)
- Core crown expenses (National)
- Core crown revenue (National)
- Crown operating balance before gains and losses (OBEGAL)
- Commodity prices (National)

The preferred equation for Northland was:

$$Q_t = \underset{(661.3)}{6.696} - \underset{(17.96)}{0.079} \cdot PC^1_{-2} + \underset{(9.21)}{0.109} \cdot PC^2_{-2} - \underset{(4.70)}{0.060} \cdot PC^3_{-1} + seasonals \quad (2)$$

$$\bar{R}^2 = 0.5101 \qquad \text{DW} = 1.814$$

This equation is of limited use by itself, but becomes more informative when the original coefficients are calculated back from the components. In Table 7 we present the long run results of equation 2 transformed back to show the implications for individual indicators. The structure of equation 2 implies that the indicators are correlated with changes in Northland economic activity after one or two quarters. The results in Table 7 present the net long term elasticity (ie the combined impact of all three principal components in equation 2). The results have been sorted from highest (most positive) long run elasticity to most negative.

The interpretation of the results presented is, for example, that a doubling (100% increase) in guest nights in Northland is typically associated with a 7.9% increase in economic activity in Northland. Larger absolute elasticity values indicates that changes in the indicators are associated with larger changes in economic activity (ie they are more economically important). A negative value indicates an inverse relationship. Higher absolute t-statistic values indicate that the statistical a narrower error margin around the estimated elasticity. For indicators with t-statistics between -2 and 2, there is insufficient statistical evidence to conclude that the true value (as distinct from the estimated value) of the coefficients are not actually zero, ie that there is no correlation between the indicator and economic activity in Northland.

Some of the implications of the results presented in Table 7 include:

- Increases in guest nights and non-residential construction activity in Northland are most strongly associated with future increases in economic activity in the region. This reflects the importance of tourism for the region.[2]
- There appears to be a spillover from Auckland, eg increases in guest nights, retail sales, external migration arrivals, house prices, and car registrations in Auckland are associated with future increases in economic activity in Northland.
- Wealth gains, as captured by house prices, seem to have a positive impact on economic activity in the region.
- Growth in commodity prices, employment, and wages (unadjusted LCI) are associated with positive economic outcomes.
- Increases in interest rates and dwelling construction activity in Auckland are associated with declines in economic activity in Northland. These may be both associated with tourism influences,

[2] Other analysis undertaken indicates a strong relationship between non-residential construction activity and tourism activity in the region.

higher world bond rates might be correlated with less international travel; likewise more spending on housing in Auckland might be at the expense of discretionary spending on travel.

Table 7: Leading indicators of economic activity in Northland (long run elasticities)

Area	Indicator	Elasticity	T-statistic
Northland Region	Guest nights	7.9%	7.55
Northland Region	Non-residential consents	7.0%	11.18
Auckland Region	Guest nights	4.4%	8.50
Northland Region	House prices	3.4%	7.18
Northland Region	Arrivals	3.2%	7.99
Auckland Region	Retail sales	2.8%	14.36
Auckland Region	Arrivals	2.8%	6.38
Northland Region	Retail sales	2.7%	10.78
Northland Region	Departures	2.7%	6.02
Auckland Region	House prices	2.4%	8.12
Northland Region	Construction industry employment	2.3%	9.85
Auckland Region	Departures	1.9%	6.86
National	Unadjusted LCI	1.7%	11.57
Auckland Region	Non-residential consents	1.6%	7.39
National	Commodity prices	1.5%	9.91
Northland Region	Private service industry employment	1.4%	13.33
National	Balance of Payment	1.3%	1.50
Northland Region	Total employment	1.3%	14.67
Auckland Region	Car registrations	1.3%	7.10
Northland Region	Manufacturing industry employment	1.2%	13.98
Northland Region	Public service industry employment	1.1%	11.52
Northland Region	Primary industry employment	0.9%	5.02
National	Terms of trade	0.8%	8.90
Northland Region	Car registrations	0.5%	4.39
Northland Region	Consumer confidence	0.4%	4.43
Auckland Region	Consumer confidence	0.4%	2.11
Auckland Region	House sales	0.3%	0.78
National	Employment rate	0.3%	13.20
National	Exchange rate	0.3%	2.35
Northland Region	House sales	0.2%	0.47
National	Core crown revenue	0.0%	0.35
Northland Region	Dwelling consents	0.0%	0.06
National	Core crown expenses	-0.1%	-1.25
National	90 day bank bill rate	-0.2%	-0.53
National	10 year bond rate	-0.2%	-6.61
National	OBEGAL	-0.4%	-0.51
National	World bond rate	-1.1%	-6.42
Auckland Region	Dwelling consents	-1.5%	-2.16

Results for individual districts are presented in Appendix 2, but there do not appear to be great differences in the results found for individual districts and for Northland as a whole.

3. INDUSTRY SPILLOVERS FOR REGIONAL ECONOMIC ACTIVITY

In this final section we examine the potential for industries of the Northland economy to generate overall economic growth for the region. The multiplier analysis presented in Chapter 1 is based on the detailed analysis of interactions between industries during one specific study period, in this case the year ending March 2006. The analysis presented in this chapter examines the correlation of growth in individual industries with overall economic growth in the region. The form of the investigation is:

$$Ln(Q_t) = \beta_0 + \sum_{i=1}^{n} \beta_i Ln(q_{i,t}) + \mu \quad (3)$$

That is total output, Q, is a function of all the n sub industries, q_i. The estimation is undertaken in log level format so that the estimated parameters β_i can be interpreted as elasticities. In essence if q_i were to double in size then we would expect regional output Q to increase by β_i %.

The problem with this equation structure is that we would rarely expect the individual industries to grow independently of each other. For example an increase in agricultural production is likely to coincide with an increase in food processing. This is a similar problem to that faced in Chapter 2 on *Leading indicators* and we similarly use a two stage process using principal component estimation to collect the principal co-movements in industrial production. A panel data set of output for n industries over t time periods can be presented as an nxt matrix, which can be decomposed into n orthonormal components (ie n tx1 vectors) with each component's associated nx1 eigenvector of correlations between the industries. The principal components and associated eigenvectors are typically ordered in descending order of their ability to explain the variation in the original panel data set. These principle components can then be regressed against an exogenous element of interest (in this case regional value added). Thus equation 3 is replaced by:

$$Ln(Q_t) = \gamma_0 + \sum_{i=1}^{k} \gamma_i PC_{jt} + \mu \quad (4)$$

There is no hard and fast way of selecting the number of principal components to be used in the regression analysis. The method we used here was to select principal components up to the point that an additional principal component improved the cumulative percentage of eigenvalues by less than 1%. We further restrict the number of principal components if the final principal component used is not statistically significant (at the 95% level of confidence). The analysis presented in this chapter is undertaken using national accounting definitions, which divides the economy into four primary production industries, nine manufacturing

industries, sixteen service industries, and two notional industries (imputed rent from owner-occupied dwellings and an unallocated activity industry, an accounting item to account for indirect taxes and bank service charges).

Table 8 presents the estimation results from estimating an equation of the form of equation 4 for Northland. The S1, S2, and S3 variables are seasonal dummies included to account for the quarterly frequency of the data analysed.

Table 8: Regression results

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO 32 DF
S1	-0.0049	0.0058	-0.851
S2	0.0077	0.0157	0.494
S3	-0.0018	0.0127	-0.144
PC1	-0.1132	0.0013	-89.410
PC2	0.0035	0.0027	1.276
PC3	-0.0756	0.0196	-3.865
PC4	-0.0451	0.0074	-6.107
PC5	-0.0711	0.0048	-14.810
PC6	-0.0505	0.0099	-5.116
PC7	-0.0720	0.0134	-5.358
PC8	0.0568	0.0102	5.575
PC9	0.0295	0.0081	3.619
CONSTANT	6.5810	0.0080	818.800

$\bar{R}^2 = 0.9968$ DW = 1.7281

Table 9 presents the implications of the regression analysis when the results from Table 8 are transformed back to show the implications for individual industries. As mentioned above, the elasticities represent an estimate of the percentage increase in regional output that would result from doubling the output produced in each industry. Obviously the economic significance of these results depends on the size of the industry in question. If an industry is "pulling its weight" its growth inducement elasticity should be comparable with its proportion of the Northland economy.

The sixth column of Table 9 presents the percentage of Northland real value added in the year ending March 2008 that is attributable to each industry. The seventh column presents an implicit growth dividend from each industry, which is calculated as the ratio of the elasticity presented in the third column to the percentage of region value added presented in column six. The rows marked with an asterisk on the far right denote industries whose implicit growth dividend is significantly greater than one. These are the industries where it would appear that an increase in output would be associated with a greater than proportional increase in regional value added.

Table 9: Estimation of implicit industry growth dividends for regional output

Growth Drivers: **Northland**

SNA industry groupings

Industry	Code	Elasticity	Standard Error	T-statistic	% of area VA	Implicit growth dividend	
Agriculture	NR1	13.75%	2.26%	6.09	9.34%	1.47	*
Fishing	NR2	-0.34%	0.61%	-0.56	0.42%	-0.80	
Forestry and logging	NR3	2.72%	0.83%	3.29	5.06%	0.54	
Mining	NR4	-1.46%	0.39%	-3.79	0.63%	-2.32	
Food, beverage and tobacco manufacturing	NR5	1.09%	0.80%	1.37	2.97%	0.37	
Textile and apparel manufacturing	NR6	2.16%	0.45%	4.81	0.16%	13.52	*
Wood and paper product manufacturing	NR7	5.31%	0.21%	25.40	3.23%	1.64	*
Printing, publishing and recorded media	NR8	-0.76%	0.41%	-1.85	0.48%	-1.56	
Petroleum, chemical, plastic and rubber product m	NR9	1.27%	0.28%	4.58	5.43%	0.23	
Non-metallic mineral products manufacturing	NR10	2.52%	0.24%	10.61	1.07%	2.35	*
Metal product manufacturing	NR11	1.54%	0.16%	9.46	0.89%	1.73	*
Machinery and equipment manufacturing	NR12	3.14%	0.25%	12.42	1.68%	1.87	*
Furniture and other manufacturing	NR13	0.02%	0.37%	0.63	0.30%	0.08	
Electricity, gas and water supply	NR14	1.64%	0.40%	4.10	2.19%	0.75	
Construction	NR15	3.52%	0.26%	13.67	4.60%	0.76	
Wholesale trade	NR16	2.11%	0.42%	4.99	3.09%	0.68	
Retail trade	NR17	2.85%	0.25%	11.57	6.54%	0.44	
Accommodation, restaurants and bars	NR18	2.60%	0.22%	11.66	1.74%	1.49	*
Transport and storage	NR19	1.00%	0.17%	5.95	2.80%	0.36	
Communication services	NR20	1.07%	0.36%	2.96	2.57%	0.42	
Finance and insurance	NR21	4.09%	0.28%	14.72	3.67%	1.11	*
Property services	NR22	3.00%	0.21%	14.51	6.50%	0.46	
Business services	NR23	4.10%	0.31%	13.04	5.23%	0.78	
Central government admin and defence	NR24	1.78%	0.30%	5.87	3.05%	0.58	
Local government administration	NR25	2.96%	0.42%	7.06	1.93%	1.53	*
Education	NR26	0.91%	0.08%	11.02	3.73%	0.24	
Health and community services	NR27	2.64%	0.17%	15.74	7.31%	0.36	
Cultural and recreational services	NR28	1.97%	0.17%	11.51	0.80%	2.46	*
Personal and other community services	NR29	2.97%	0.17%	17.65	1.65%	1.80	*
Ownership of owner-occupied dwellings	NRX	0.51%	0.04%	13.34	7.86%	0.06	
Unallocated	NRU	3.07%	0.46%	6.73	3.07%	1.00	*

No. of PCs used 9 Adj R^2 = 0.9968 DW = 1.7281

The Northland industries with a growth dividend greater than one include:

- Agriculture
- Wood and paper product manufacturing
- Textile and apparel manufacturing
- Machinery and equipment manufacturing
- Non-metallic minerals manufacturing
- Personal and other community services
- Cultural and recreational services
- Local government administration
- Accommodation, restaurants and bars
- Metal product manufacturing
- Finance and insurance

In addition to this list can perhaps be added furniture and other manufacturing, as although its implicit growth dividend is not significantly above one, our results cannot reject that it is significantly below one

either.[3] Paradoxically, mining is another industry that can potentially be added to the list. Exploration for minerals results in measured reductions in mining industry value added but the exploration activity can also stimulate activity in the rest of the economy, eg from extra people living and working in the region.

Table 10: Implicit growth potential estimates

Industry	Implicit growth potential
Agriculture	4.4%
Wood and paper product manufacturing	2.1%
Textile and apparel manufacturing	2.0%
Machinery and equipment manufacturing	1.5%
Non-metallic mineral products manufacturing	1.4%
Personal and other community services	1.3%
Cultural and recreational services	1.2%
Local government administration	1.0%
Accommodation, restaurants and bars	0.9%
Metal product manufacturing	0.7%
Finance and insurance	0.4%
Unallocated	0.0%
Furniture and other manufacturing	-0.3%
Electricity, gas and water supply	-0.5%
Fishing	-0.8%
Wholesale trade	-1.0%
Construction	-1.1%
Business services	-1.1%
Printing, publishing and recorded media	-1.2%
Central government admin and defence	-1.3%
Communication services	-1.5%
Transport and storage	-1.8%
Food, beverage and tobacco manufacturing	-1.9%
Mining	-2.1%
Forestry and logging	-2.3%
Education	-2.8%
Property services	-3.5%
Retail trade	-3.7%
Petroleum, chemical, plastic and rubber product manufacturing	-4.2%
Health and community services	-4.7%
Ownership of owner-occupied dwellings	-7.3%

[3] We ignore the unallocated industry as this is a notional industry that is required to ensure that industrial production reconciles with national measures of GDP.

These are the industries where an increase in output is likely to generate a greater than proportional increase in regional output. Increases in output here have spillover benefits for other parts of the Northland economy. The implication is that the region could have higher economic output simply through a change in emphasis of production activity.

Why is actual production in Northland out of line with this implicit optimal allocation of activity? First, there may be natural constraints to increased production. For example, the amount of land suitable for farm production will be limited. Second, there may be national or local regulations that inhibit or promote an alternative production mix. For example, national tax rules have been argued by many as promoting home ownership. If true, this will divert resources away from production or expenditure on other goods and expand the proportion of output classified as imputed rent from home ownership. Finally, if there are any true spillover effects, such spillovers are not captured by private investors and this will result in an under-investment in activities that might be optimal for the region.

There may or may not be a policy response available to local government agencies in Northland to foster an improved resource allocation in Northland, but the analysis presented in this section provides a useful starting point for identifying potential policy options. Table 10 orders from largest to smallest (most positive to most negative) the absolute difference between the estimated elasticity and the percentage of regional value added of each industry (ie the value in column 3 less the value in column 6 in Table 9). The implication is that, where possible, policies that encourage resources to shift from activities at the bottom of the list towards activities at the top of the list should be growth promoting for the region.

Special industries

What are the implications for the special industries identified by the growth strategy team? Table 11 presents the results form analysis similar to that presented in Table 9, but for the five special industries. The first point we would make is that there is evidence of serial correlation in the errors of the principal component regression (the Durbin-Watson Statistic for the regression equation is 0.7345). A plausible reason for this would be that the regression omits too many important variables. The regression is examining the relationship between just 7.4% of the economy with overall economic activity. We are wagging the dog by the tail. Potentially this means we should ignore all of the results presented in Table 11.

If we do take the results presented in Table 11 at face value they imply that of the five focus industries, forestry and information technology offer the largest growth potential for the industry. Aquaculture may offer some potential, but the statistical evidence is weak. Tourism and marine industries are currently operating at levels that appear to be at or above their optimum for the region.

However, the results presented in Table 9 are more positive for both tourism and marine industry. Two sub-industries of tourism, Accommodation, restaurants and bars and cultural and recreational services, are identified there as having growth potential for the region. Also machinery and equipment manufacturing, the parent industry of marine manufacturing, is also identified as having growth potential.

Likewise forestry and logging is painted in a more negative light in Table 9 compared with the positive implication for Forestry alone in Table 11.

Given the concerns we have with the equation underpinning the special industry analysis, plus some of the contradictory implications with the more robust region-wide analysis, we conclude that the results presented in Table 11 are not reliable and should not be used.

Table 11

Growth Drivers: **Northland**
Special Industries

Industry	Code	Elasticity	Standard Error	T-statistic	% of area VA	Implicit growth dividend	
Aquaculture	LAQUA	0.33%	2.32%	0.14	0.18%	1.85	
Forestry	LFORE	14.12%	2.26%	6.25	0.56%	25.23	*
Tourism	LTOUR	3.62%	0.29%	12.40	5.81%	0.62	
Marine Industries	LMARI	0.14%	0.51%	0.28	0.77%	0.18	
Information Technology	LINFO	15.20%	0.92%	16.52	0.10%	154.23	*

No. of PCs used 3 Adj R^2 = 0.9004 DW = 0.7345

District outcomes

Outcomes of spillover analysis for individual districts are presented in Appendix 3. Note that the dependent variable in this analysis is total output at the district level. As such, results from this analysis can differ from that found for the region as a whole for two reasons:

- Different industries can be more important for local economies.
- The spillover can be larger at the regional level due to influences that cross over district borders. For example, an expansion in dairy output will generate an increase in transport services and milk processing, but some of the operations providing these services might be based in neighbouring districts.

Observations from the analysis at the district level include:

- The growth potential from agriculture appears to be concentrated in Whangarei only.
- The potential from manufacturing appears quite widespread (textile and apparel, machinery and equipment, non-metallic mineral products, metal product, and furniture).
- Further expansion into housing, health, retail trade, property services, education, and forestry and logging consistently appears to inhibit the growth potential of Northland districts.

Appendix 1: Tables of Multiplier analysis for Northland districts

Weighted impact

Far North

	No.	Industry	Weighted impact
1	6	Forestry and logging	142.03
2	32	Retail Trade	117.29
3	51	Other health and community services	100.62
4	43	Ownership of owner-occupied dwellings	93.31
5	2	Livestock and cropping farming	90.86
6	10	Meat and Dairy Manufacturing	87.63
7	41	Real estate	85.60
8	14	Wood product manufacturing	82.53
9	1	Horticulture and fruit growing	75.28
10	29	Other Construction	69.66
11	48	Pre-school, primary and secondary education	65.57
12	47	Local government administration	53.73
13	33	Accommodation, restaurants and bars	51.62
14	45	Other business services	48.73
15	25	Electricity generation, transmission and distribution	48.42
16	37	Communication services	47.48
17	46	Central government administration and defence	46.56
18	3	Dairy and cattle farming	46.33
19	30	Wholesale trade to non trade sectors	33.03
20	7	Fishing	32.06
21	5	Services to agriculture, hunting and trapping	31.82
22	28	Residential Construction	30.17
23	11	Other food manufacturing	26.64
24	34	Road freight transport	22.96
25	38	Finance and Banking	22.95
26	42	Equipment hire and investors in other property	19.80
27	17	Chemicals incl fertiliser, ind chem and personal chem	19.63
28	35	Road passenger transport	18.01
29	36	Rail, water & Air Transport and Transport services	15.19
30	52	Cultural and recreational services	15.06
31	53	Personal and other community services	13.71
32	18	Rubber, plastic and other chemical product man.	11.98
33	8	All non-oil&gas mining, plus services to mining	11.90
34	50	Hospitals and nursing homes	11.81
35	23	Machinery and other equipment manufacturing	10.98
36	40	Services to Finance & Insurance	10.43
37	44	Scientific research and computer services	9.90
38	19	Non-metallic mineral product manufacturing	8.16
39	49	Other education	7.84
40	21	Structural, sheet & fabricated metal product man.	7.16
41	16	Printing, publishing and recorded media	6.61
42	22	Transport Equipment Manufacturing	5.93
43	4	Other farming	5.59
44	31	Wholesale trade to trade sector	5.52
45	27	Sewerage, drainage and waste disposal services	5.22
46	24	Furniture and other manufacturing	4.32
47	12	Beverage, malt and tobacco manufacturing	2.31
48	13	Textiles and apparel manufacturing	1.09
49	26	Water supply	0.78
50	20	Basic metal manufacturing	0.14
51	9	Oil and gas extraction & distribution plus petrol refining ar	0.00
52	15	Paper and paper product manufacturing	0.00
53	39	Insurance	0.00

Kaipara

	No.	Industry	Weighted impact
1	10	Meat and Dairy Manufacturing	131.08
2	6	Forestry and logging	73.41
3	3	Dairy and cattle farming	70.86
4	2	Livestock and cropping farming	37.70
5	1	Horticulture and fruit growing	35.80
6	32	Retail Trade	33.83
7	43	Ownership of owner-occupied dwellings	31.58
8	14	Wood product manufacturing	21.24
9	41	Real estate	16.35
10	29	Other Construction	15.99
11	5	Services to agriculture, hunting and trapping	15.34
12	51	Other health and community services	14.95
13	48	Pre-school, primary and secondary education	14.49
14	31	Wholesale trade to trade sector	14.38
15	37	Communication services	11.68
16	47	Local government administration	11.37
17	46	Central government administration and defence	9.15
18	30	Wholesale trade to non trade sectors	8.67
19	33	Accommodation, restaurants and bars	7.90
20	8	All non-oil&gas mining, plus services to mining	7.81
21	24	Furniture and other manufacturing	7.68
22	19	Non-metallic mineral product manufacturing	7.30
23	28	Residential Construction	6.14
24	17	Chemicals incl fertiliser, ind chem and personal chem	6.09
25	45	Other business services	5.23
26	38	Finance and Banking	4.83
27	34	Road freight transport	4.30
28	50	Hospitals and nursing homes	3.93
29	40	Services to Finance & Insurance	3.65
30	35	Road passenger transport	3.27
31	52	Cultural and recreational services	3.11
32	4	Other farming	3.03
33	7	Fishing	2.97
34	23	Machinery and other equipment manufacturing	2.67
35	11	Other food manufacturing	2.65
36	53	Personal and other community services	2.21
37	42	Equipment hire and investors in other property	2.04
38	21	Structural, sheet & fabricated metal product man.	1.76
39	16	Printing, publishing and recorded media	1.51
40	13	Textiles and apparel manufacturing	1.48
41	49	Other education	1.35
42	44	Scientific research and computer services	1.31
43	36	Rail, water & Air Transport and Transport services	1.11
44	25	Electricity generation, transmission and distribution	1.04
45	18	Rubber, plastic and other chemical product man.	0.76
46	12	Beverage, malt and tobacco manufacturing	0.59
47	22	Transport Equipment Manufacturing	0.51
48	26	Water supply	0.26
49	27	Sewerage, drainage and waste disposal services	0.11
50	9	Oil and gas extraction & distribution plus petrol refining ar	0.00
51	15	Paper and paper product manufacturing	0.00
52	20	Basic metal manufacturing	0.00
53	39	Insurance	0.00

Whangarei

	No.	Industry	Weighted impact
1	6	Forestry and logging	198.46
2	32	Retail Trade	178.51
3	43	Ownership of owner-occupied dwellings	151.08
4	51	Other health and community services	149.99
5	9	Oil and gas extraction & distribution plus petrol refining an	149.22
6	29	Other Construction	147.66
7	14	Wood product manufacturing	125.19
8	46	Central government administration and defence	112.06
9	30	Wholesale trade to non trade sectors	99.64
10	45	Other business services	99.57
11	10	Meat and Dairy Manufacturing	99.11
12	41	Real estate	95.91
13	25	Electricity generation, transmission and distribution	86.47
14	3	Dairy and cattle farming	66.77
15	50	Hospitals and nursing homes	63.58
16	48	Pre-school, primary and secondary education	62.54
17	47	Local government administration	61.99
18	34	Road freight transport	56.44
19	38	Finance and Banking	52.60
20	37	Communication services	51.24
21	28	Residential Construction	45.80
22	40	Services to Finance & Insurance	42.40
23	33	Accommodation, restaurants and bars	41.68
24	19	Non-metallic mineral product manufacturing	38.38
25	21	Structural, sheet & fabricated metal product man.	32.88
26	5	Services to agriculture, hunting and trapping	32.41
27	23	Machinery and other equipment manufacturing	31.78
28	36	Rail, water & Air Transport and Transport services	30.74
29	2	Livestock and cropping farming	30.67
30	53	Personal and other community services	29.35
31	44	Scientific research and computer services	29.28
32	22	Transport Equipment Manufacturing	28.80
33	31	Wholesale trade to trade sector	28.26
34	1	Horticulture and fruit growing	27.29
35	11	Other food manufacturing	25.98
36	42	Equipment hire and investors in other property	22.04
37	49	Other education	20.87
38	52	Cultural and recreational services	20.31
39	35	Road passenger transport	17.51
40	27	Sewerage, drainage and waste disposal services	15.37
41	16	Printing, publishing and recorded media	14.88
42	18	Rubber, plastic and other chemical product man.	13.44
43	4	Other farming	13.23
44	39	Insurance	8.02
45	7	Fishing	7.39
46	8	All non-oil&gas mining, plus services to mining	7.36
47	24	Furniture and other manufacturing	5.98
48	13	Textiles and apparel manufacturing	5.59
49	26	Water supply	4.69
50	12	Beverage, malt and tobacco manufacturing	1.02
51	15	Paper and paper product manufacturing	0.64
52	20	Basic metal manufacturing	0.35
53	17	Chemicals incl fertiliser, ind chem and personal chem	0.00

Marginal impact

Far North

	No.	Industry	Marginal Impact
1	51	Other health and community services	1.34
2	6	Forestry and logging	1.31
3	37	Communication services	1.21
4	14	Wood product manufacturing	1.11
5	32	Retail Trade	1.11
6	41	Real estate	1.10
7	29	Other Construction	0.81
8	47	Local government administration	0.75
9	46	Central government administration and defence	0.67
10	45	Other business services	0.65
11	25	Electricity generation, transmission and distribution	0.61
12	34	Road freight transport	0.44
13	18	Rubber, plastic and other chemical product man.	0.44
14	17	Chemicals incl fertiliser, ind chem and personal chem	0.43
15	28	Residential Construction	0.37
16	33	Accommodation, restaurants and bars	0.35
17	43	Ownership of owner-occupied dwellings	0.31
18	40	Services to Finance & Insurance	0.28
19	11	Other food manufacturing	0.26
20	3	Dairy and cattle farming	0.19
21	44	Scientific research and computer services	0.18
22	23	Machinery and other equipment manufacturing	0.16
23	36	Rail, water & Air Transport and Transport services	0.16
24	5	Services to agriculture, hunting and trapping	0.15
25	52	Cultural and recreational services	0.12
26	27	Sewerage, drainage and waste disposal services	0.11
27	21	Structural, sheet & fabricated metal product man.	0.10
28	53	Personal and other community services	0.10
29	30	Wholesale trade to non trade sectors	0.09
30	19	Non-metallic mineral product manufacturing	0.09
31	38	Finance and Banking	0.08
32	1	Horticulture and fruit growing	0.08
33	12	Beverage, malt and tobacco manufacturing	0.08
34	24	Furniture and other manufacturing	0.07
35	10	Meat and Dairy Manufacturing	0.04
36	35	Road passenger transport	0.03
37	26	Water supply	0.03
38	16	Printing, publishing and recorded media	0.02
39	31	Wholesale trade to trade sector	0.02
40	9	Oil and gas extraction & distribution plus petrol refining ai	NA
41	15	Paper and paper product manufacturing	NA
42	20	Basic metal manufacturing	NA
43	39	Insurance	NA
44	13	Textiles and apparel manufacturing	0.00
45	22	Transport Equipment Manufacturing	-0.02
46	49	Other education	-0.03
47	48	Pre-school, primary and secondary education	-0.05
48	7	Fishing	-0.07
49	50	Hospitals and nursing homes	-0.07
50	4	Other farming	-0.14
51	42	Equipment hire and investors in other property	-0.16
52	8	All non-oil&gas mining, plus services to mining	-0.33
53	2	Livestock and cropping farming	-0.46

Kaipara

	No.	Industry	Marginal Impact
1	10	Meat and Dairy Manufacturing	0.53
2	41	Real estate	0.41
3	14	Wood product manufacturing	0.40
4	37	Communication services	0.30
5	29	Other Construction	0.26
6	6	Forestry and logging	0.23
7	32	Retail Trade	0.22
8	5	Services to agriculture, hunting and trapping	0.19
9	47	Local government administration	0.17
10	51	Other health and community services	0.13
11	24	Furniture and other manufacturing	0.13
12	19	Non-metallic mineral product manufacturing	0.10
13	45	Other business services	0.08
14	46	Central government administration and defence	0.07
15	33	Accommodation, restaurants and bars	0.07
16	40	Services to Finance & Insurance	0.07
17	52	Cultural and recreational services	0.06
18	11	Other food manufacturing	0.05
19	28	Residential Construction	0.05
20	3	Dairy and cattle farming	0.05
21	31	Wholesale trade to trade sector	0.05
22	42	Equipment hire and investors in other property	0.05
23	38	Finance and Banking	0.04
24	23	Machinery and other equipment manufacturing	0.04
25	16	Printing, publishing and recorded media	0.04
26	8	All non-oil&gas mining, plus services to mining	0.03
27	30	Wholesale trade to non trade sectors	0.02
28	49	Other education	0.02
29	27	Sewerage, drainage and waste disposal services	0.02
30	12	Beverage, malt and tobacco manufacturing	0.01
31	53	Personal and other community services	0.01
32	21	Structural, sheet & fabricated metal product man.	0.00
33	9	Oil and gas extraction & distribution plus petrol refining an	NA
34	15	Paper and paper product manufacturing	NA
35	20	Basic metal manufacturing	NA
36	39	Insurance	NA
37	22	Transport Equipment Manufacturing	0.00
38	13	Textiles and apparel manufacturing	-0.01
39	44	Scientific research and computer services	-0.01
40	18	Rubber, plastic and other chemical product man.	-0.01
41	34	Road freight transport	-0.02
42	36	Rail, water & Air Transport and Transport services	-0.02
43	26	Water supply	-0.02
44	43	Ownership of owner-occupied dwellings	-0.03
45	48	Pre-school, primary and secondary education	-0.03
46	35	Road passenger transport	-0.03
47	50	Hospitals and nursing homes	-0.04
48	1	Horticulture and fruit growing	-0.06
49	4	Other farming	-0.07
50	7	Fishing	-0.09
51	2	Livestock and cropping farming	-0.12
52	17	Chemicals incl fertiliser, ind chem and personal chem	-0.22
53	25	Electricity generation, transmission and distribution	-0.34

Whangarei

	No.	Industry	Marginal Impact
1	14	Wood product manufacturing	2.57
2	51	Other health and community services	2.07
3	29	Other Construction	1.81
4	6	Forestry and logging	1.81
5	45	Other business services	1.39
6	41	Real estate	1.29
7	32	Retail Trade	1.27
8	46	Central government administration and defence	1.01
9	40	Services to Finance & Insurance	0.71
10	47	Local government administration	0.70
11	34	Road freight transport	0.61
12	25	Electricity generation, transmission and distribution	0.59
13	50	Hospitals and nursing homes	0.50
14	23	Machinery and other equipment manufacturing	0.47
15	28	Residential Construction	0.47
16	18	Rubber, plastic and other chemical product man.	0.46
17	44	Scientific research and computer services	0.44
18	19	Non-metallic mineral product manufacturing	0.42
19	38	Finance and Banking	0.41
20	21	Structural, sheet & fabricated metal product man.	0.36
21	33	Accommodation, restaurants and bars	0.34
22	27	Sewerage, drainage and waste disposal services	0.33
23	53	Personal and other community services	0.27
24	52	Cultural and recreational services	0.26
25	48	Pre-school, primary and secondary education	0.22
26	3	Dairy and cattle farming	0.22
27	30	Wholesale trade to non trade sectors	0.18
28	22	Transport Equipment Manufacturing	0.17
29	43	Ownership of owner-occupied dwellings	0.15
30	16	Printing, publishing and recorded media	0.14
31	49	Other education	0.11
32	4	Other farming	0.09
33	26	Water supply	0.06
34	39	Insurance	0.04
35	15	Paper and paper product manufacturing	0.02
36	5	Services to agriculture, hunting and trapping	0.01
37	42	Equipment hire and investors in other property	0.01
38	20	Basic metal manufacturing	0.01
39	12	Beverage, malt and tobacco manufacturing	0.00
40	35	Road passenger transport	0.00
41	17	Chemicals incl fertiliser, ind chem and personal chem	0.00
42	24	Furniture and other manufacturing	-0.03
43	36	Rail, water & Air Transport and Transport services	-0.05
44	13	Textiles and apparel manufacturing	-0.09
45	11	Other food manufacturing	-0.10
46	1	Horticulture and fruit growing	-0.15
47	8	All non-oil&gas mining, plus services to mining	-0.20
48	31	Wholesale trade to trade sector	-0.39
49	37	Communication services	-0.47
50	7	Fishing	-0.47
51	2	Livestock and cropping farming	-0.54
52	10	Meat and Dairy Manufacturing	-0.64
53	9	Oil and gas extraction & distribution plus petrol refining ar	-0.99

Appendix 2: Tables of leading indicators for Northland districts (long run elasticities)

Far North

Area	Indicator	Elasticity	T-statistic
Northland Region	Non-residential consents	8.5%	12.12
Northland Region	Guest nights	8.3%	8.69
Auckland Region	Guest nights	5.1%	9.73
Far North	House prices	4.6%	12.14
Auckland Region	Retail sales	3.4%	15.34
Auckland Region	Arrivals	3.3%	7.70
Far North	Departures	3.2%	7.43
Northland Region	Retail sales	3.0%	12.26
Auckland Region	House prices	2.8%	9.26
Far North	Construction industry employment	2.3%	10.49
Far North	Manufacturing industry employment	2.2%	10.78
Far North	Arrivals	2.0%	11.74
Auckland Region	Departures	2.0%	7.02
Far North	Private service industry employment	2.0%	15.21
National	Unadjusted LCI	2.0%	13.68
Auckland Region	Car registrations	1.9%	8.77
Far North	Total employment	1.9%	13.57
Auckland Region	Non-residential consents	1.8%	8.34
National	Commodity prices	1.8%	10.56
Far North	Primary industry employment	1.7%	6.60
Far North	Public service industry employment	1.2%	9.62
Auckland Region	House sales	0.9%	1.88
National	Terms of trade	0.9%	9.80
Northland Region	Car registrations	0.9%	6.69
National	Balance of Payment	0.8%	0.85
Northland Region	Consumer confidence	0.7%	6.40
Auckland Region	Consumer confidence	0.5%	2.95
Far North	House sales	0.5%	0.84
National	Employment rate	0.4%	15.38
National	Exchange rate	0.2%	1.50
Northland Region	Dwelling consents	0.0%	-0.37
National	Core crown revenue	0.0%	-0.83
National	Core crown expenses	-0.2%	-2.69
National	10 year bond rate	-0.3%	-7.30
National	OBEGAL	-0.6%	-0.70
National	90 day bank bill rate	-0.8%	-1.74
Auckland Region	Dwelling consents	-1.2%	-1.64
National	World bond rate	-1.5%	-7.90

Kaipara

Area	Indicator	Elasticity	T-statistic
Northland Region	Non-residential consents	4.1%	6.67
Northland Region	Guest nights	3.8%	5.92
Kaipara	House prices	2.5%	6.97
Auckland Region	Guest nights	2.3%	6.33
Kaipara	Construction industry employment	1.9%	7.29
Kaipara	Arrivals	1.9%	6.85
Auckland Region	Retail sales	1.7%	7.16
Auckland Region	House prices	1.6%	7.63
Kaipara	Departures	1.6%	5.19
Northland Region	Retail sales	1.5%	6.65
National	Balance of Payment	1.4%	7.38
Auckland Region	Arrivals	1.3%	6.68
Auckland Region	Departures	1.2%	5.60
Auckland Region	Non-residential consents	1.1%	9.16
National	Unadjusted LCI	1.1%	7.18
Kaipara	House sales	1.0%	9.87
National	Commodity prices	0.9%	6.00
Kaipara	Private service industry employment	0.8%	6.84
Kaipara	Manufacturing industry employment	0.8%	7.40
Auckland Region	Car registrations	0.7%	7.60
Kaipara	Total employment	0.6%	6.91
National	Terms of trade	0.5%	7.03
Kaipara	Primary industry employment	0.4%	6.21
Northland Region	Car registrations	0.3%	5.50
National	Exchange rate	0.3%	4.45
National	Employment rate	0.2%	7.73
Northland Region	Consumer confidence	0.2%	6.30
National	90 day bank bill rate	0.1%	1.77
Northland Region	Dwelling consents	0.1%	1.52
Kaipara	Public service industry employment	0.1%	9.62
Auckland Region	Consumer confidence	0.1%	6.69
Auckland Region	House sales	0.1%	0.56
National	Core crown revenue	0.1%	2.34
National	Core crown expenses	0.0%	-1.13
National	10 year bond rate	-0.1%	-5.63
National	OBEGAL	-0.2%	-0.20
National	World bond rate	-0.6%	-8.75
Auckland Region	Dwelling consents	-1.1%	-6.15

Whangarei

Area	Indicator	Elasticity	T-statistic
Northland Region	Guest nights	7.5%	6.83
Northland Region	Non-residential consents	6.0%	9.31
Whangarei	Departures	4.2%	8.44
Auckland Region	Guest nights	3.9%	7.59
Whangarei	House prices	3.3%	8.53
Whangarei	Arrivals	3.0%	3.79
Auckland Region	Retail sales	2.5%	11.20
Northland Region	Retail sales	2.4%	8.97
Auckland Region	House prices	2.3%	10.53
Auckland Region	Arrivals	2.2%	4.64
Whangarei	Construction industry employment	2.1%	14.08
Auckland Region	Departures	2.0%	7.55
National	Balance of Payment	1.6%	2.00
National	Unadjusted LCI	1.5%	13.38
Auckland Region	Non-residential consents	1.4%	8.21
National	Commodity prices	1.1%	8.73
Whangarei	Total employment	1.1%	12.81
Whangarei	Private service industry employment	1.1%	11.93
Whangarei	Public service industry employment	1.1%	15.11
Auckland Region	Car registrations	1.0%	4.48
Whangarei	Manufacturing industry employment	0.9%	13.16
National	Terms of trade	0.7%	13.08
National	Exchange rate	0.5%	3.85
Northland Region	Car registrations	0.4%	3.55
Auckland Region	Consumer confidence	0.3%	1.60
National	Employment rate	0.3%	15.42
Northland Region	Consumer confidence	0.3%	2.48
Whangarei	Primary industry employment	0.2%	1.57
Auckland Region	House sales	0.1%	0.39
National	90 day bank bill rate	0.1%	0.28
National	OBEGAL	0.1%	0.09
Northland Region	Dwelling consents	0.1%	0.64
National	Core crown revenue	0.1%	1.20
Whangarei	House sales	0.0%	0.13
National	Core crown expenses	0.0%	-0.54
National	10 year bond rate	-0.3%	-6.41
National	World bond rate	-1.0%	-4.69
Auckland Region	Dwelling consents	-1.7%	-2.66

Appendix 3: Spillover analysis for Northland districts

SNA industries

Far North

Growth Drivers: **Far North**

SNA industry groupings

Industry	Code	Elasticity	Standard Error	T-statistic	% of area VA	Implicit growth dividend	
Agriculture	FN1	2.76%	1.07%	2.58	11.38%	0.24	
Fishing	FN2	0.53%	1.21%	0.43	0.84%	0.63	
Forestry and logging	FN3	5.87%	0.88%	6.70	7.79%	0.75	
Mining	FN4	-3.85%	0.50%	-7.68	0.89%	-4.31	
Food, beverage and tobacco manufacturing	FN5	2.91%	1.22%	2.39	2.85%	1.02	*
Textile and apparel manufacturing	FN6	1.93%	0.43%	4.51	0.07%	29.43	*
Wood and paper product manufacturing	FN7	0.64%	0.18%	3.59	3.39%	0.19	
Printing, publishing and recorded media	FN8	-0.54%	0.64%	-0.83	0.40%	-1.35	
Petroleum, chemical, plastic and rubber product ma	FN9	2.54%	0.40%	6.36	2.52%	1.01	*
Non-metallic mineral products manufacturing	FN10	0.89%	0.37%	2.40	0.38%	2.37	*
Metal product manufacturing	FN11	2.97%	0.26%	11.47	0.47%	6.27	*
Machinery and equipment manufacturing	FN12	0.64%	0.37%	1.73	0.86%	0.74	
Furniture and other manufacturing	FN13	-0.24%	0.46%	-0.52	0.16%	-1.44	
Electricity, gas and water supply	FN14	4.79%	0.45%	10.60	2.38%	2.01	*
Construction	FN15	1.36%	0.24%	5.74	4.14%	0.33	
Wholesale trade	FN16	0.55%	0.48%	1.15	1.96%	0.28	
Retail trade	FN17	2.09%	0.22%	9.52	6.96%	0.30	
Accommodation, restaurants and bars	FN18	1.78%	0.33%	5.38	2.67%	0.67	
Transport and storage	FN19	2.85%	0.28%	10.05	3.17%	0.90	
Communication services	FN20	5.51%	0.22%	25.30	3.43%	1.61	*
Finance and insurance	FN21	1.79%	0.23%	7.88	2.58%	0.69	
Property services	FN22	2.38%	0.21%	11.15	8.05%	0.29	
Business services	FN23	2.39%	0.18%	13.07	3.87%	0.62	
Central government admin and defence	FN24	-1.29%	0.39%	-3.29	1.73%	-0.75	
Local government administration	FN25	-0.83%	0.35%	-2.37	2.73%	-0.31	
Education	FN26	0.06%	0.09%	0.67	4.47%	0.01	
Health and community services	FN27	2.89%	0.17%	17.26	6.14%	0.47	
Cultural and recreational services	FN28	1.88%	0.20%	9.41	0.88%	2.13	*
Personal and other community services	FN29	2.67%	0.22%	12.32	1.90%	1.41	*
Ownership of owner-occupied dwellings	FNX	1.10%	0.08%	14.45	7.86%	0.14	
Unallocated	FNU	0.89%	0.32%	2.76	3.07%	0.29	

No. of PCs used 7 Adj R^2 = 0.9929 DW = 1.8006

Kaipara

Growth Drivers: **Kaipara**

SNA industry groupings

Industry	Code	Elasticity	Standard Error	T-statistic	% of area VA	Implicit growth dividend	
Agriculture	KP1	13.00%	3.25%	4.00	24.72%	0.53	
Fishing	KP2	-2.98%	1.67%	-1.79	0.26%	-11.27	
Forestry and logging	KP3	0.33%	0.75%	0.44	7.98%	0.04	
Mining	KP4	-2.75%	0.84%	-3.28	1.75%	-1.57	
Food, beverage and tobacco manufacturing	KP5	6.98%	1.85%	3.78	7.96%	0.88	
Textile and apparel manufacturing	KP6	0.29%	0.55%	0.53	0.39%	0.74	
Wood and paper product manufacturing	KP7	1.83%	0.35%	5.22	2.75%	0.67	
Printing, publishing and recorded media	KP8	1.58%	0.67%	2.34	0.27%	5.83	*
Petroleum, chemical, plastic and rubber product ma	KP9	-0.34%	0.36%	-0.94	1.85%	-0.18	
Non-metallic mineral products manufacturing	KP10	2.74%	0.44%	6.16	0.56%	4.88	*
Metal product manufacturing	KP11	3.39%	0.80%	4.26	0.31%	11.01	*
Machinery and equipment manufacturing	KP12	2.26%	0.80%	2.81	0.48%	4.68	*
Furniture and other manufacturing	KP13	1.40%	0.33%	4.22	1.22%	1.14	*
Electricity, gas and water supply	KP14	-1.39%	0.47%	-2.98	0.05%	-26.02	
Construction	KP15	0.75%	0.52%	1.45	3.12%	0.24	
Wholesale trade	KP16	0.06%	0.69%	0.08	2.85%	0.02	
Retail trade	KP17	2.15%	0.54%	4.00	5.42%	0.40	
Accommodation, restaurants and bars	KP18	1.84%	0.38%	4.86	1.30%	1.42	*
Transport and storage	KP19	1.16%	0.68%	1.70	1.39%	0.83	
Communication services	KP20	-2.67%	1.01%	-2.66	2.50%	-1.07	
Finance and insurance	KP21	-0.23%	0.28%	-0.84	2.08%	-0.11	
Property services	KP22	1.00%	0.37%	2.74	6.84%	0.15	
Business services	KP23	2.60%	0.71%	3.65	2.03%	1.28	*
Central government admin and defence	KP24	0.30%	0.93%	0.33	0.97%	0.31	
Local government administration	KP25	0.13%	0.17%	0.76	2.21%	0.06	
Education	KP26	0.06%	0.06%	0.92	3.25%	0.02	
Health and community services	KP27	0.63%	0.15%	4.15	3.08%	0.20	
Cultural and recreational services	KP28	-1.01%	0.36%	-2.77	0.62%	-1.61	
Personal and other community services	KP29	0.63%	0.35%	1.80	0.88%	0.72	
Ownership of owner-occupied dwellings	KPX	2.69%	0.71%	3.78	7.85%	0.34	
Unallocated	KPU	6.25%	1.56%	4.02	3.07%	2.04	*

No. of PCs used 8 Adj R^2 = 0.9671 DW = 1.9997

Whangarei

Growth Drivers: **Whangarei**

SNA industry groupings

Industry	Code	Elasticity	Standard Error	T-statistic	% of area VA	Implicit growth dividend	
Agriculture	WH1	9.76%	2.16%	4.52	5.01%	1.95	*
Fishing	WH2	-0.43%	0.44%	-0.98	0.20%	-2.17	
Forestry and logging	WH3	0.88%	0.56%	1.56	2.78%	0.32	
Mining	WH4	-0.30%	0.21%	-1.43	0.24%	-1.22	
Food, beverage and tobacco manufacturing	WH5	2.45%	0.78%	3.13	2.06%	1.19	*
Textile and apparel manufacturing	WH6	3.28%	0.44%	7.43	0.17%	19.02	*
Wood and paper product manufacturing	WH7	5.81%	0.31%	18.85	3.22%	1.80	*
Printing, publishing and recorded media	WH8	-1.36%	0.58%	-2.35	0.58%	-2.35	
Petroleum, chemical, plastic and rubber product ma	WH9	2.36%	0.32%	7.27	7.95%	0.30	
Non-metallic mineral products manufacturing	WH10	4.41%	0.22%	20.21	1.61%	2.74	*
Metal product manufacturing	WH11	1.99%	0.16%	12.64	1.26%	1.58	*
Machinery and equipment manufacturing	WH12	3.22%	0.26%	12.42	2.43%	1.32	*
Furniture and other manufacturing	WH13	0.54%	0.50%	1.10	0.20%	2.79	
Electricity, gas and water supply	WH14	1.25%	0.39%	3.19	2.50%	0.50	
Construction	WH15	4.24%	0.45%	9.34	5.17%	0.82	
Wholesale trade	WH16	2.24%	0.35%	6.33	3.84%	0.58	
Retail trade	WH17	3.24%	0.43%	7.53	6.50%	0.50	
Accommodation, restaurants and bars	WH18	1.64%	0.25%	6.61	1.26%	1.30	*
Transport and storage	WH19	-0.61%	0.16%	-3.69	2.84%	-0.21	
Communication services	WH20	-0.53%	0.45%	-1.19	2.06%	-0.26	
Finance and insurance	WH21	3.77%	0.23%	16.63	4.66%	0.81	
Property services	WH22	3.01%	0.18%	16.49	5.46%	0.55	
Business services	WH23	3.26%	0.27%	12.29	6.72%	0.49	
Central government admin and defence	WH24	3.32%	0.35%	9.49	4.29%	0.78	
Local government administration	WH25	2.17%	0.30%	7.16	1.38%	1.57	*
Education	WH26	0.60%	0.04%	13.46	3.37%	0.18	
Health and community services	WH27	1.31%	0.18%	7.29	8.88%	0.15	
Cultural and recreational services	WH28	2.57%	0.15%	16.75	0.78%	3.30	*
Personal and other community services	WH29	1.53%	0.16%	9.78	1.65%	0.93	
Ownership of owner-occupied dwellings	WHX	0.46%	0.08%	5.54	7.85%	0.06	
Unallocated	WHU	3.92%	0.53%	7.42	3.07%	1.28	*

No. of PCs used 9 Adj R^2 = 0.9939 DW = 1.2429

Implicit growth potential estimates

Far North

Industry	Implicit growth potential
Metal product manufacturing	2.5%
Electricity, gas and water supply	2.4%
Communication services	2.1%
Textile and apparel manufacturing	1.9%
Cultural and recreational services	1.0%
Personal and other community services	0.8%
Non-metallic mineral products manufacturing	0.5%
Food, beverage and tobacco manufacturing	0.1%
Petroleum, chemical, plastic and rubber product manufacturing	0.0%
Machinery and equipment manufacturing	-0.2%
Fishing	-0.3%
Transport and storage	-0.3%
Furniture and other manufacturing	-0.4%
Finance and insurance	-0.8%
Accommodation, restaurants and bars	-0.9%
Printing, publishing and recorded media	-0.9%
Wholesale trade	-1.4%
Business services	-1.5%
Forestry and logging	-1.9%
Unallocated	-2.2%
Wood and paper product manufacturing	-2.8%
Construction	-2.8%
Central government admin and defence	-3.0%
Health and community services	-3.3%
Local government administration	-3.6%
Education	-4.4%
Mining	-4.7%
Retail trade	-4.9%
Property services	-5.7%
Ownership of owner-occupied dwellings	-6.8%
Agriculture	-8.6%

Kaipara

Industry	Implicit growth potential
Unallocated	3.18%
Metal product manufacturing	3.09%
Non-metallic mineral products manufacturing	2.18%
Machinery and equipment manufacturing	1.78%
Printing, publishing and recorded media	1.31%
Business services	0.57%
Accommodation, restaurants and bars	0.55%
Furniture and other manufacturing	0.17%
Textile and apparel manufacturing	-0.10%
Transport and storage	-0.24%
Personal and other community services	-0.24%
Central government admin and defence	-0.67%
Wood and paper product manufacturing	-0.91%
Food, beverage and tobacco manufacturing	-0.98%
Electricity, gas and water supply	-1.44%
Cultural and recreational services	-1.63%
Local government administration	-2.09%
Petroleum, chemical, plastic and rubber product manufacturing	-2.19%
Finance and insurance	-2.31%
Construction	-2.37%
Health and community services	-2.45%
Wholesale trade	-2.79%
Education	-3.19%
Fishing	-3.24%
Retail trade	-3.26%
Mining	-4.50%
Ownership of owner-occupied dwellings	-5.17%
Communication services	-5.17%
Property services	-5.84%
Forestry and logging	-7.65%
Agriculture	-11.72%

Whangarei

Industry	Implicit growth potential
Agriculture	4.75%
Textile and apparel manufacturing	3.11%
Non-metallic mineral products manufacturing	2.80%
Wood and paper product manufacturing	2.58%
Cultural and recreational services	1.79%
Unallocated	0.85%
Local government administration	0.79%
Machinery and equipment manufacturing	0.78%
Metal product manufacturing	0.73%
Food, beverage and tobacco manufacturing	0.40%
Accommodation, restaurants and bars	0.38%
Furniture and other manufacturing	0.35%
Personal and other community services	-0.12%
Mining	-0.54%
Fishing	-0.63%
Finance and insurance	-0.89%
Construction	-0.93%
Central government admin and defence	-0.96%
Electricity, gas and water supply	-1.25%
Wholesale trade	-1.60%
Forestry and logging	-1.90%
Printing, publishing and recorded media	-1.95%
Property services	-2.45%
Communication services	-2.59%
Education	-2.77%
Retail trade	-3.26%
Transport and storage	-3.45%
Business services	-3.46%
Petroleum, chemical, plastic and rubber product manufacturing	-5.60%
Ownership of owner-occupied dwellings	-7.40%
Health and community services	-7.58%