Regional Economic Performance in New Zealand: How Does Auckland Compare?

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Abstract

In this study we investigate Auckland's economic performance relative to other large cities in New Zealand, to medium-sized urban centres and to small towns and rural areas. Measures of regional economic performance are not well developed in New Zealand and there is a relative lack of official data at the regional level. Previous measures developed by two non-governmental organisations have suggested that Auckland is "underperforming" relative to other regions in New Zealand. However, neither of these measures satisfactorily capture productivity performance by areas that are classified according to the density of economic activity that takes place within them.

We use data from the annual New Zealand Income Survey to examine hourly earnings and other measures of labour productivity and utilisation for a number of regional areas. Our results tell a fairly consistent story. Auckland and Wellington have the highest levels of productivity performance based on almost all measures of earnings. In particular, both have significantly higher average levels of labour income, and wage rates than the three other comparison areas. Auckland has also experienced stronger growth in wages, in particular for wage/salary workers, than other regions.

Our findings cast doubt on the hypothesis that Auckland has been a productivity underperformer within New Zealand. In fact, Auckland appears to be a relatively good performer and this is consistent with agglomeration economies being at work in New Zealand's largest urban concentration. However, because we limited our investigations to within New Zealand we are not able to say how Auckland's productivity performance compares to innovative, high-skill cities in other countries. Given New Zealand's overall poorer performance in labour productivity and the rather modest wage rate growth that we find even for Auckland, it is unlikely to have been as good.

JEL CLASSIFICATION R12, R20, J24

KEYWORDS Regional Economic Performance, Auckland, Productivity, New Zealand

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Regional Economic Performance in New Zealand: How Does Auckland Compare?

1. Introduction

Auckland is New Zealand's largest urban centre of population and economic activity – comprising around one third of the total on each measure. It is almost axiomatic therefore that for the New Zealand economy to perform well, Auckland needs to perform well. Over and above the fact that Auckland is a large fraction of New Zealand, there is also a substantial body of economic theory and evidence that finds that large cities can be dynamic sources of innovation and productivity growth.[1] To what extent is this true of Auckland? This paper reports new evidence on how well the Auckland economy has been performing relative to other cities and regions of New Zealand.

Any investigation of regional economic performance in New Zealand is hampered by the relative paucity of official statistics at the regional level. For example, there are no data on the levels and growth rates of regional gross domestic product, or regional labour productivity. However some non-governmental organisations have developed proxies for regional economic performance in New Zealand and report them quarterly or less frequently.

The National Bank of New Zealand produces quarterly estimates of the growth of regional economic activity. It uses a variety of official and unofficial sources to construct an index of overall economic activity for each of 14 local government regions of New Zealand, but does not attempt to estimate labour productivity growth rates or levels at the regional level. The general picture that emerges from its quarterly reports on changes in the index and its components is that Auckland's growth performance, at least over the last business cycle, has been no better than average.

The New Zealand Institute of Economic Research (NZIER) has produced estimates of regional labour productivity. Their method assumes that average labour productivity for each industry at the national level applies in each region and therefore that differences in productivity performance across regions and over time simply reflect differences and changes in industry structure across regions. This is a restrictive assumption because it rules out, for example, that productivity in the business services sector could be growing faster (or slower) in Auckland than in Christchurch. While acknowledging the limitations of their approach, the NZIER (NZIER, 2004) find Auckland's economic performance over the

[1] Some examples of this literature are Jacobs (1969), Glaeser (1998) and Ciccone (2002)

early 2000s is a mixed bag with most measures very much sitting in the middle part of their regional distributions.

The research reported in this paper attempts to overcome some of the limitations of these existing estimates of regional economic performance. We do so by examining wage and income data from the annual New Zealand Income Survey (IS). According to human capital theory, hourly earnings of workers are indicative of their labour productivity, while real earnings growth reflects labour productivity growth. We divide the country into five areas that are broadly homogenous in terms of where they sit on an urban-rural spectrum. These areas are the cities of Auckland, Wellington, and Christchurch, a composite of medium-sized cities and a composite of rural areas and small centres. Then, we examine wage and income levels and trends from 1997 to 2004 across these areas. In contrast to the National Bank and NZIER findings over a comparable period, our results suggest that productivity levels are generally higher in Auckland than elsewhere and have been growing faster than other regions.

In section 2, we explain the motivation for the research and give a brief background on New Zealand's recent economic performance and on theory and evidence of the role of cities in economic growth. Section 3 describes our data and methodology, while section 4 lays out both raw results and results that take into account a range of influencing variables that may vary across regions such as age, ethnicity, occupation and educational qualifications. We also present results comparing four sub-regions of Auckland – Northern, Southern, Central and Western – against each other. Section 5 compares our results with the other studies of regional economic performance mentioned above and tries to understand and explain the differences. Section 6 summarises and concludes.

2. Background and motivation

2.1 Background

2.1.1 New Zealand's economic performance

New Zealand's overall economic performance picked up in the early 1990s compared with previous decades. From 1994 to 2004 GDP grew at an annual average rate of 3.4 per cent. GDP per capita over a recent 6-year period (1997-2003) grew at an annual average rate of 2.56 per cent compared with an OECD average of 2.10 per cent (MED and Treasury, 2005). Nevertheless the level of New Zealand's GDP per capita remains low in the OECD rankings in twentieth place. Moreover, the relatively high GDP per capita growth has been driven more by fast growth in labour utilisation than by good labour productivity growth. New Zealand's level of labour productivity is low by OECD standards and its growth rate is also below average (MED and Treasury, 2005).

The scope for further per capita growth through achieving a higher fraction of the population in paid work is limited – New Zealand has the second highest level of labour utilisation in the OECD. This has been achieved through one of the lowest unemployment rates in the OECD and above average levels of labour force participation. Therefore the main challenge for New Zealand in order to maintain and enhance its per capita growth rate and achieve higher relative levels of GDP per capita must lie largely in achieving higher labour productivity growth (MED and Treasury, 2005).

It is difficult to find clear answers to explain New Zealand's relatively slow labour productivity growth. On most policy settings and in its institutional architecture, New Zealand measures up well compared to other OECD economies. It may be that slow labour productivity growth is a by-product of fast employment growth – both because most growth in employment has been at the lower end of the skill distribution and because firms have expanded output more through hiring labour than by investing in plant and equipment and the modern technology embodied in it (McLellan, 2004; Hyslop and Yahanpath, 2005).

Another hypothesis is that New Zealand struggles to achieve higher productivity because of the small size of its domestic market and its distance from markets in other countries. These factors limit competition, create higher transport costs and other barriers for exporters, and slow down technology adoption. The economic geography literature that highlights size and distance as influencing factors in economic performance focuses mainly on so-called agglomeration economies[2]. These arise either from clusters of firms within an industry (the Silicon Valley syndrome) or the dense co-location of a variety of industries and skilled people in cities.

Some commentators point to cities that stand out as centres of creative innovation and high value-added industries, places such as Boston, San Francisco, London, Helsinki, Dublin, Amsterdam, Singapore, Sydney and Melbourne. In terms of size, Auckland is on the cusp of having the population that is typical of some of these successful smart cities. A question for policy analysts interested in New Zealand's economic performance is whether Auckland is playing the energising role of one of these dynamic cities within the national economy? The key motivation for the research reported in this paper is to throw a little more light on this question by examining how well Auckland has performed relative to other regions in New Zealand.

2.1.2 Agglomeration economies and cities

This section describes some of the reasons that at least some cities achieve the status of drivers of innovation and productivity growth within national economies. It also refers briefly to evidence on these factors. Conceptually cities are simply dense agglomerations of people and firms. Through history cities have been a feature of the economic landscape, but the reason for their economic importance has changed over time (Glaeser, 1998). In Glaeser's framework "all of the benefits of cities come ultimately from reduced transport costs for goods, people and ideas".

Transport and manufacturing are both sectors in which high fixed set-up costs and other forms of increasing returns have meant high returns from large-scale production and from locating production close to consumers. In the past, location in cities provided both these advantages. But reductions in transport costs of goods and in the importance of manufacturing in developed economies over the last 50 years have greatly diminished the role of cities in providing these advantages.[3] On the other hand, the ability of cities to lower the transport costs of people and ideas appears to be increasingly important.

The ability of dense cities to transport people at low cost (principally because it eliminates distance between them) benefits firms and residents of the city for several reasons. First

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2 For example Krugman (1991) and Rosenthal and Strange (2003)

3 See Dumais, Ellison and Glaeser (1997) for evidence on how new manufacturing technologies (less subject to scale economies), the shrinking importance of manufactures in total GDP, and reductions in the real costs of transporting goods have diminished the geographical concentration of manufacturing industries over the past 15 years

it enables the occupational specialisations required to support **a fine division of labour**. In accordance with one of the enduring insights of Adam Smith such division leads to higher productivity. In a small town, an actor or lawyer has to be a generalist. In New York or London, these professions are highly specialised and this provides benefits to the firms and individuals who consume their services.

A second benefit of cities is their ability to provide **thick labour markets for workers and firms**. As Alfred Marshall pointed out (Marshall, 1920), the thickness of these markets provides an effective insurance for workers against firm- or industry- specific shocks. It also gives workers more bargaining power because they have many prospective employers, and this security encourages workers to invest more in their human capital (Rotemberg and Saloner, 1991). Firms also benefit because the thick market raises their chances of finding in a short time good matches to meet their skill needs.

Thirdly urban agglomerations can play a key role in economic growth by **lowering the cost of transporting ideas**. There are two aspects – one is the much noted tendency of knowledge and information to spill over between firms and people. The other is the role of cities as centres of learning and skill acquisition. As Marshall (1920) wrote on the first of these, in dense areas "the mysteries of trade become no mystery but are, as it were, in the air ….". Other writers who focus on the role of cities in the production and diffusion of ideas which lie behind economic growth include Jacobs (1969) and Lucas (1988). The agglomerations can be either industrial clusters such as Silicon Valley, or diversified cities. The question of whether it is concentration or diversity that is more powerful as a catalyst for new ideas remains unsettled. Both appear to work.

Cities host a key process that consists of young workers learning and acquiring skills that raise their productivity. These skills and knowledge then spread when the young workers move to new jobs or start up their own firms. The density of the city speeds up the rate at which people interact and these interactions lead to faster human capital accumulation. In addition, "cities are even more effective in training workers when they are particularly full of knowledgeable or successful people and if cities offer a particularly wide range of 'educational' experiences" (Glaeser, 1998). There is a plausible story of young workers coming to cities where they learn faster, experience higher wage growth as a result, and take their knowledge, higher productivity and higher wages with them when they leave (Glaeser and Mare, 2001).

There is clear evidence that higher productivity comes about when people cluster densely in cities but much less on the relative importance and precise nature of the different possible mechanisms.[4] Three papers illustrate the former proposition. First, there is direct evidence that the fineness of the division of labour increases with the level of urbanisation (Ades and Glaeser, 1995). Secondly, for workers with the same qualifications, wages are higher in cities, reflecting higher productivity (Rauch, 1993). Thirdly, based on evidence from U.S. counties, Ciccone and Hall (1996) find that doubling employment density in a location results in a 6 per cent increase in average labour productivity.[5] While real wages are not connected with city size (the higher wages in cities being completely offset from the workers point of view by the higher cost of living in cities), from a firm's viewpoint, it is prepared to pay higher wages to get the higher productivity of workers in cities. In some cities at least, there have been periods in which prices have

[4] For a comprehensive recent review of the literature on agglomeration mechanisms, see Crawford (2005)

[5] See also Ciccone (2002)

risen faster than wages suggesting that the cities were providing increasing and substantial non-pecuniary (amenity) benefits to their residents[6].

Dumais, Ellison and Glaeser (2002) find evidence for the thick-labour-market benefits of cities – over a recent 20-year period they found that sharing a common labour market pool was the most important determinant of which industries located together. There is less available evidence for the benefits of cities in facilitating informational spillovers. Much of it tends to be more based on case studies and anecdotes (Saxenian, 1996; Scott, 1988) rather than rigorous statistical analysis. An exception is Audretsch and Feldman (forthcoming).

For the US, Berry and Glaeser (2005) highlight that cities with high levels of college graduates in 1990, became increasingly skilled over the 1990s (at a faster rate than cities with lower qualification levels in 1990). This tendency of initially skilled places to become more skilled over time suggests a form of increasing returns at work. One possibility is that the higher productivity of the initially skilled stimulates employment growth of other skilled and high-productivity workers. An alternative explanation is that the presence of existing skilled workers raises the amenity value of the location (e.g. through better restaurants and recreational facilities) that in turn attracts the more skilled. A study by Shapiro (2005) estimates 60% of the skilled growth coming from the productivity effect with the rest caused by growing quality of life.

Overall, there is now a strong body of ideas and supporting evidence that cities play an important role in economic growth. Many of the mechanisms appear to depend on forms of increasing returns and spillovers and therefore their strength may be subject to initial conditions and cumulative causation. In New Zealand, there is a natural focus on Auckland as the largest city and the question of the extent to which it is following the paradigm of an innovative, high-skill, high-productivity-growth large urban centre.

2.2 Motivation for this study

This study aims to take a further step towards understanding how well Auckland's economy is in fact performing. Specifically we examine whether Auckland is performing above or below average in labour productivity levels and growth rates compared to smaller cities in New Zealand, and to small centres and rural areas. In asking this question, we need to bear in mind that New Zealand's economic structure is different from most other developed OECD economies - it has a relatively large, export-based primary sector. This characteristic could mean that it is New Zealand's rural areas rather than its cities that are the driver of overall economic performance.

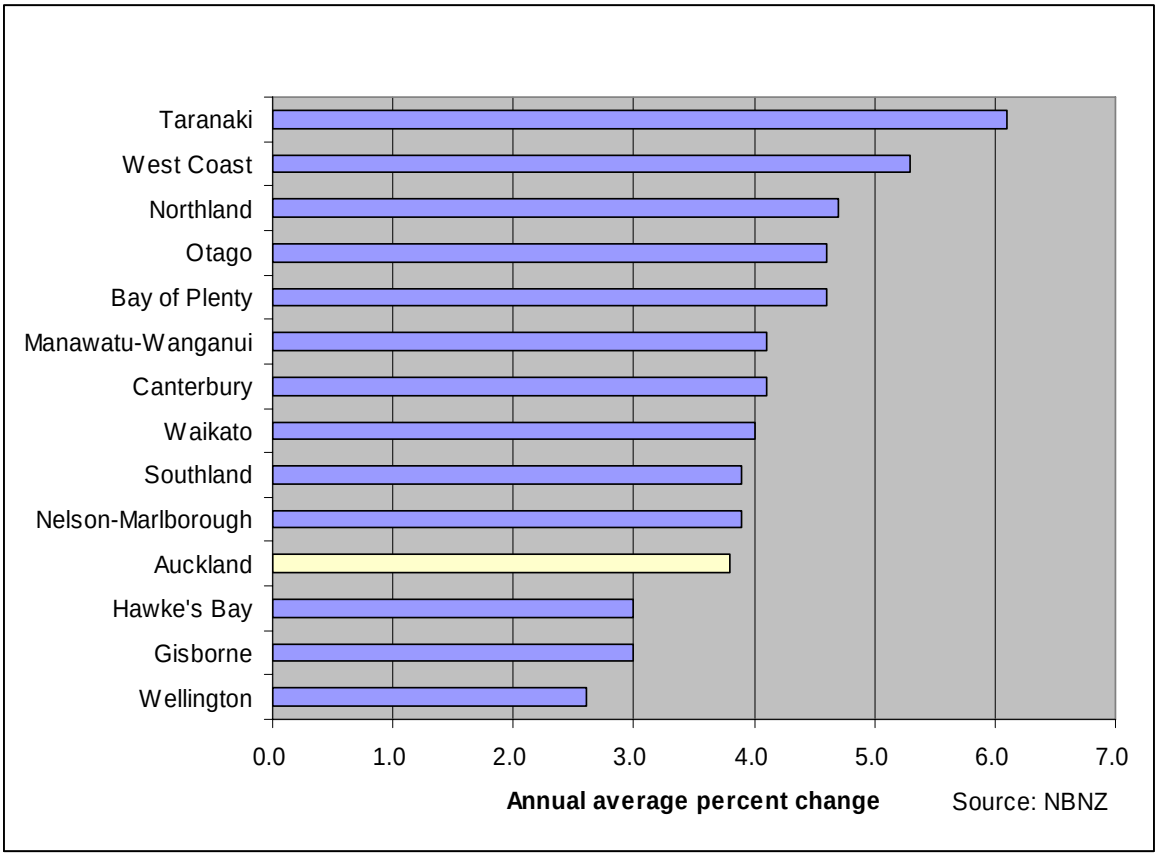
This study takes a previously unexplored route to measuring Auckland's relative economic performance. It focuses on productivity performance by analysing the wage rates for wage/salary and self-employed workers, and their growth across regions in New Zealand. We make the standard economic assumption that pay rates reflect marginal labour productivities of the relevant workers. We also look at employment rates, rates of benefit receipt and hours worked as indicators of relative labour utilisation performance in Auckland compared to other cities and regions.

There are perceptions that Auckland's economy is underperforming, and thus is not fulfilling the role of a dynamo for the rest of the New Zealand economy (LEK, 2001). It is possible that the National Bank's proxies for regional economic activity growth have

[6] See for example Glaeser, Kolko and Saiz (2001)

contributed to these perceptions. For example, a recent leaflet put out by the Auckland Regional Council (ARC, 2005) used the National Bank's data to illustrate that Auckland's growth in 2004 was the 4th lowest among fourteen New Zealand regions (see figure 1). However, one needs to keep in mind that overall growth in average income in a region reflects both labour productivity and labour utilisation. The National Bank measures do not contain enough information to uncover Auckland's relative performance in either measure on its own.

Figure 1 – Regional Growth Rates, 2004



While New Zealand's regions vary according to how urban or rural they are, most are a mixture. Even the Auckland region includes a significant hinterland of smaller centres and rural land beyond the city boundary. In order to capture whatever differences in labour productivity exist between densely populated urban areas and other parts of New Zealand, we divided households in the Income Survey into five areas: the Auckland urban area; the Wellington and Kapiti urban area, the Christchurch urban area; a composite of all other main urban areas and a composite of minor urban centres and rural areas. This is a significantly different geographical division compared to the local government regions of New Zealand, which are the focus of both the National Bank and NZIER measures.

As already mentioned, the NZIER study estimates regional labour productivity statistics by assuming that average labour productivity for each industry at the national level is constant across regions and that differences in productivity performance across regions and over time simply reflect differences in industry structure across regions and over time[7]. If Auckland and other New Zealand cities generate the sort of productivity effects that evidence indicates occur in cities in other countries, then the NZIER approach will at

[7] We note that the NZIER methodology made it necessary to assume that labour productivity by industry is constant across regions.

best capture them only partially. For the first time, our study provides an insight into labour productivity levels and growth rates across New Zealand, where allowance is made that these may differ within an industry across the country.

It is possible that Auckland could be underperforming compared to other regions in GDP per head, but performing above average in terms of labour productivity. This could occur, for example, if Auckland has experienced a low level and low growth rate of labour utilisation compared to other regions. Thus, it is important to examine indicators of labour utilisation as well as proxies for labour productivity in order to understand the underlying differences across regions and over time[8].

3. Data and methodology

3.1 New Zealand Income Survey

3.1.1 Background

Since 1997, the Income Survey (IS) has been carried out by Statistics New Zealand (SNZ) each June quarter as a supplement to the Household Labour Force Survey (HLFS). Taken together, the two surveys collect data on household structure, the socio-demographic characteristics of household members, and labour force activity in the reference week and recent incomes for individuals at least 15 years-old. The IS collects information on sample members' actual pre-tax weekly income in the reference week for the survey, and uses a series of detailed questions on each component of income in an effort to ensure that the final estimate of total income (from all sources) is as accurate as possible.[9] The HLFS has a sample size of approximately 15,000 households and 28,000 adults. About 85% of these respondents also complete the IS.[10] Sampling weights are calculated by SNZ to increase the representativeness of the HLFS, and are used in all analyses in this paper.

The IS also records the geographical location of all interviewed households. This is coded in two separate variables: the first records the Local Government Region (LGR) of each household;[11] the second records whether the household is in a Main Urban Area,

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8 We recognise that comparing regions' economic performance over time spans of a relatively few years runs the risk of confounding medium-term and cyclical factors - if the timing of the latter vary across regions. For example, (i) the timing of the impact of commodity price cycles may well vary between rural and urban regions, and (ii) the employment and earnings of lower-skilled and younger people is more volatile over the cycle and the proportions of these groups are likely to vary across regions. This caveat should be kept in mind for the comparisons in our study.

9 June quarter data are collected in April, May, and June. Most income and wage data are measured for the reference week prior to the survey and are not seasonally adjusted in the analysis undertaken in this paper. In principal, seasonality may differ across regions, thus impacting our results. However, we believe that seasonal effects are likely to be small in the survey months (as opposed to in the summer and winter months) and that wage rates for adult wage/salary workers, one focus of our analysis, are unlikely to be significantly affected by seasonality. Fortunately, self-employment income, which is likely to have a large seasonal component, is measured for the entire previous year.

10 Data are imputed for all HLFS sample members who fail to complete the IS. Individuals with imputed data are dropped from all analyses in this paper because, as discussed in Hirsch and Schumacher (2004), including imputed data leads to biased income gap estimates when the attribute being studied (here, geographical location) is not a criterion used in the imputation procedure. While non-income measures are unaffected by this issue, it was decided to keep all measurements based on a common sample.

11 Sixteen LGRs are recognised by SNZ: Northland, Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, Manawatu-Wanganui, Wellington, Nelson, Tasman, Marlborough, West Coast, Canterbury, Otago, Southland. Because of confidentially restrictions, Hawke's Bay and Gisborne, as well as, Nelson, Tasman, Marlborough, and West Coast are aggregated together in the data made available to the authors.

Secondary Urban Area, Minor Urban Area, or Rural Centre and other rural areas.[12] These variables can be used together to uniquely identify most main urban areas. For example, Auckland is the only main urban area in the Auckland LGR and thus all households located in the Auckland urban area are identified in the IS. In contrast, both the Wellington and Kapiti urban areas are in the Wellington LGR and thus it is not possible to differentiate in the IS between households located in these two urban areas.[13]

3.1.2 Analysis Sample

The sample for all analyses in the paper is adults aged 25–59 years (prime-age) with non-imputed income data in the 1997-2004 IS. This restricted age range drops most individuals who are studying or retired. As discussed in previous sections, this paper examines the economic performance of the Auckland urban area (population 1,074,507 in 2001 census) in comparison to other areas of New Zealand. Four comparison areas are focused on in all analyses: 1) the Wellington and Kapiti urban areas (population 373,416 in 2001 census), 2) the Christchurch urban area (population 334,104 in 2001 census), 3) a composite of all other main urban areas (population 872,823 in 2001 census),[14] and 4) a composite of all rural areas and minor urban areas (population 845,778 in 2001 census). Secondary urban areas are excluded from the comparison groups; these are large rural towns and it was unclear whether to include these in the other urban or rural comparison area.[15] Appendix Table 1 displays the sample size for each area in each IS year.

A subset of the analyses in this paper examines economic performance within the Auckland urban area. Auckland is divided by SNZ into four zones (see Appendix Figure 1), Northern (population 219,936 in 2001 census), Western (population 173,643 in 2001 census), Central (population 359,469 in 2001 census), and Southern (population 321,465 in 2001 census), which can be identified in the IS data.[16] Appendix Table 2 displays the sample size for each zone in each IS year.

3.1.3 Measures of Economic Performance

A range of measures of economic performance are examined in order to capture differences in both productivity and labour utilisation between Auckland and other areas in NZ (and within Auckland). The analyses in this paper focuses on six measures.[17]

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12 Urban Areas are statistically defined areas with no administrative or legal basis. Main urban areas are very large urban areas centred on a city or major urban centre and have a minimum population of 30,000. Secondary urban areas have a population between 10,000 and 29,999 and are centred on the larger regional centres. Minor urban areas are urbanised settlements (outside main and secondary urban areas), centred around smaller towns with a population between 1,000 and 9,999. The remaining population is in rural centres, which have a population between 300 and 999, and rural areas.

13 Other main urban areas that are in the same LGR include Tauranga and Rotorua, Gisborne and Napier-Hastings, and Wanganui and Palmerston North. All other main urban areas (Whangarei, Hamilton, New Plymouth, Nelson, Christchurch, Dunedin, and Invercargill) can be uniquely identified in the IS.

14 Whangarei, Hamilton, Tauranga, Rotorua, Gisborne, Napier-Hastings, New Plymouth, Wanganui, Palmerston North, Nelson, Dunedin, and Invercargill.

15 These are Pukekohe, Tokoroa, Taupo, Whakatane, Hawera, Feilding, Levin, Masterton, Blenheim, Greymouth, Ashburton, Timaru, Oamaru, and Gore (population 235,686 in 2001 census).

16 Urban areas in the main conurbations have been divided by SNZ into urban zones, with each urban zone defined as a separate urban area. The five criteria used for determining these zones were: 1) strong economic ties; 2) cultural and recreational interaction; 3) services for major business and professional activities; 4) an integrated public transport network; and 5) significant workplace commuting within the zone.

17 All wage and income variables are converted into June 2004 real dollar values using the Consumers Price Index (CPI). Three additional measures of economic performance, the self-employment rate, the unemployment rate, and annual real non-labour income, are also examined. The results for these measures tell a similar story as those for the included variables, and thus are not presented to save space, but are available from the authors by request.

The first three measure overall economic performance (income) and workplace productivity (wages) in each area:

(1) Real Annual Labour Income, which is the sum of actual income from wage/salary employment in the last week multiplied by 52 and actual self-employment income in the last year.[18]

(2) The Real Hourly Wage for Wage/Salary Workers, calculated by dividing actual earnings from wage/salary employment in the last week by actual hours worked in wage/salary employment in the last week.[19] The self-employed are excluded from this measure of labour productivity because hourly wages are notoriously hard to calculate for these workers due to the difficulty in separating investment returns from self-employment income and in reporting accurate measures of work hours. The next measure captures labour productivity for the self-employed subject to these caveats.

(3) Real Hourly Wage for All Workers, calculated by dividing annual labour income by actual total hours work in the last week multiplied by 52.

The second three measure labour supply utilisation in each area:

(4) Employment, which is whether an individual worked any hours in the last week for pay, was away from work but receiving ACC, or worked any unpaid hours for a family business.

(5) Weekly Hours Worked by the Employed, which is directly reported in the HLFS.

(6) Benefit Receipt, which is whether an individual received income from the tax or benefit agency for any social benefit besides superannuation or student allowances in the previous fortnight.

3.2 Methodology

Two descriptive methodologies are used to examine differences in economic performance and economic growth across the five 'regional' areas and four Auckland zones.

3.2.1 Graphical Analysis

Graphs are used to display the mean (average level) of each of the six measures of economic performance in each year for the five areas and four Auckland zones. These graphs indicate the relative level of economic performance in each area/year without controlling for any of the underlying differences in the population of these areas. These graphs also display the mean of each measure of economic performance in each year indexed to the level of that measure in 1997 in each of the areas and four Auckland zones. These graphs indicate the relative change in economic performance in each area/year, again without controlling for any of the underlying differences in the population of these areas.

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[18] Individuals reporting real annual labour income less than -$100,000 or greater than $250,000 are dropped from all analyses for this measure. This is done because the income data has a small number of very large outliers that have a considerable impact on mean comparisons. It is assumed that these outliers are reporting errors. Large outliers in the wage data are also dropped for this reason.

[19] Individuals reporting real wages less than $4 or greater than $150 are dropped from all analyses for this measure as well as the next.

Graphs are also used to display the overall distribution (ie. the 10th, 25th, 50th (median), 75th, and 90th percentile) of the two Hourly Wage measures in each year for the five 'regional' areas. We compare wages across areas at different points in the distribution to give further insight into relative productivity performance in each area. Again, these graphs do not control for any of the underlying differences in the population of the different areas in New Zealand. Thus, we next turn to a regression analysis to examine whether the graphical differences are statistically significant and whether controlling for differences in the attributes of individuals living in different areas 'explains' difference in regional economic performance.[20]

3.2.2 Regression Analysis

Individual level regression models are estimated using IS unit record data. Ordinary Least Squares (OLS) regression models are used to estimate mean differences in the six measures of economic performance across the five 'regional' areas and separately across the four Auckland zones in parallel to the graphical analysis. All of these estimates are weighted to create correct inferences based on the full prime-age population. Quantile regression models, also known as Least Absolute Value (LAV) regressions, are used to estimate hourly wage differences at various points in the distribution across the five 'regional' areas. Sample weights cannot be incorporated into these analyses. Instead, bootstrapping (replication analysis) is used to estimate standard errors for these models.[21]

Two specifications of the OLS and LAV regression models are estimated for each measure of economic performance:

(1) The *levels* specification examines the relative level/distribution of economic performance in each area/zone. This specification estimates the relative difference in the average level (or a different point in the distribution) of each outcome measure during the sample period in each region compared to Auckland (or in each zone of Auckland compared to the Northern zone)

(2) The *growth* specification examines the relative change in economic performance in each area/zone between 1997 and 2004. This specification estimates the relative difference in the change in the outcome measure between 1997 and 2004 in each region compared to Auckland (or in each zone of Auckland compared to the Northern zone).[22]

We present results from both:

(1) "unadjusted" regression models that include no control variables besides indicator variables controlling for aggregate differences in outcomes across years; and

[20] Statistical significance is an important criterion for judging whether observed differences in the data are 'true' but caution should be used in relying solely on this criteria because with the smaller sample sizes used for this regional analysis 'true' difference may not be statistically significant. The overall magnitude of the differences and of trends over time are also useful criteria for judging the 'economic' significance of different results.

[21] The reported standard errors for both the OLS and LAV models are adjusted to account for the clustering of survey households at the primary sampling unit (PSU) level. One hundred replications are used for bootstrapping standard errors.

[22] The 'growth' specification of the LAV model estimates the relative difference in the change in the outcome measure at a particular point in the distribution of that measure between 1997/98 and 2003/04 in each region compared to Auckland.

(2) "adjusted" regression models that include additional control variables for age, gender, ethnicity, immigration status, educational qualifications, occupation, industry, and employment type.[23]

The "adjusted" regression models allow individuals with particular characteristics to have different outcomes than other individuals regardless of their location and reveal whether controlling for differences in the attributes of individuals living in different areas 'explains' differences in regional economic performance.[24] These models are purely descriptive models which partition the difference in economic performance across areas into components that are correlated with differences in attributes and those which are 'unexplained'. These attributes account statistically for the 'explained' variation in outcomes across areas, but do not necessarily have a casual impact on economic performance.[25]

4. Empirical results

4.1 Mean Comparisons Across Regional Areas

We begin by discussing our results comparing the average level and average growth of the six measures of economic performance across the five 'regional' areas. First, we present the graphical analysis for these results and then the regression analysis.

4.1.1 Graphical Analysis

Figure 2 presents the graphical results for Real Annual Labour Income, the Real Hourly Wage for Wage/Salary Workers, and the Real Hourly Wage for All Workers. The left column presents the 'levels' results and the right column the 'growth' results. Auckland has the second highest average labour income behind Wellington, but ahead of all other areas. Wellington and Auckland have the highest average wages with the other areas clustered much lower. In general, wages are higher when the self-employed are included, but the differences between areas are similar. Labour income growth in Auckland is middle of the pack, faster only than in Wellington, but wage growth for wage and salary

[23] Age is controlled for using seven indicator variables for five-year age groups. Ethnicity is controlled for using ten indicator variables for complex combinations of multiple ethnicities (i.e. instead of using prioritised ethnicity, we account explicitly for multiple response). Immigration status is controlled for using seven indicator variables capturing whether an individual is born in New Zealand, and if not, how long they have been in New Zealand. The categories are: 5 years or less, 6 to 10 years, 11 to 20 years, 21 to 30 years, more than 30 years, and foreign born but unknown number of years in New Zealand. Educational qualifications are controlled for using seven indicator variables combining information on highest school qualifications, vocational qualifications, and university qualifications to create a more complete picture of an individual's educational background. The categories are: no qualifications, only vocational qualifications, only school certificate (or other low school qualification), school certificate and vocational qualifications, only six-form (or other higher school qualification), six-form and vocational qualifications, university qualifications. Occupation is controlled for using twenty-six indicator variables for each of the two-digit NZSOC90 classification groups. Industry is controlled for using fifty-four indicator variables for each of the two-digit ANZSIC classification groups. Employment type is controlled using four indicator variables for: wage/salary employment, employer of others, self-employed, unpaid family worker. Additional indicator variables are included to control for missing values in any of the above characteristics. Industry, occupation, and employment type cannot be included as control variables when the examined outcome is employment. Appendix Table 3 display the percentage of the working-age population in each region/zone with certain characteristics. This is displayed for each of the covariates used in the regression models but some are simplified to more aggregate categories.

[24] We estimate no models where the 'returns' to characteristics are allowed to vary across areas, thus we are assuming that regional differences in economic performance are homogenous across the population.

[25] It is not possible to identify casual effects because differences in the attributes of the population in each area are likely to be endogenously related to past and expected future economic performance.

workers has been strongest in Auckland by a fair margin. Wage growth for all workers is also strongest in Auckland but much more similar to the other areas.

Figure 2 – Income and Wages Across Regional Areas

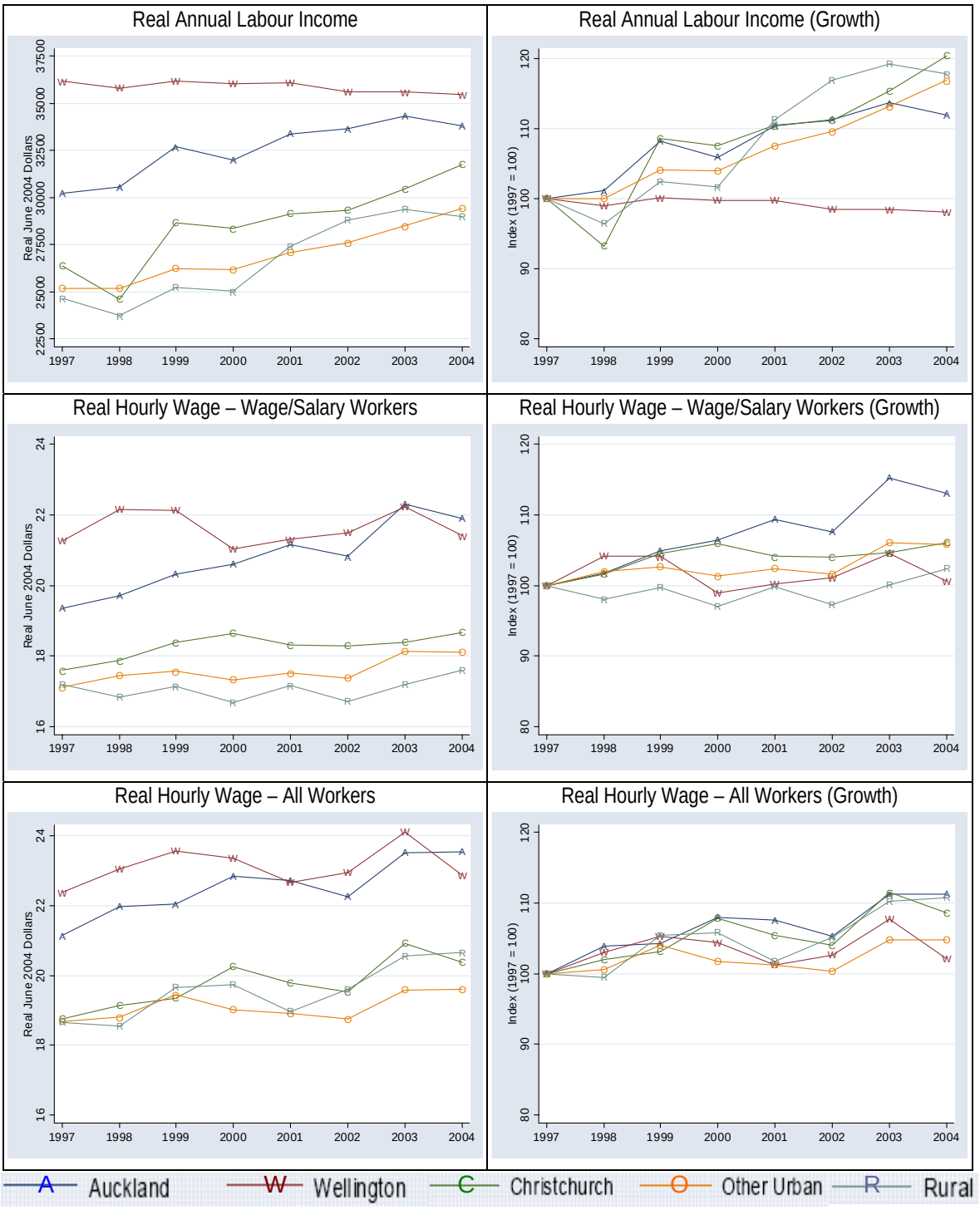


Figure 3 presents the graphical results for Employment Rates, Weekly Hours Worked by the Employed, and Benefit Receipt Rates. This figure follows the same layout as the previous. Employment rates in Auckland are lower than all other areas besides Other Urban. Workers in Auckland work similar hours to those in Wellington and Rural, but more than those in Christchurch and Other Urban. Auckland has lower levels of benefit receipt than all comparison areas other than Wellington. Employment growth occurred in all areas other than Auckland (and Wellington) and by 2004 employment rates in Auckland were much lower than in the other areas. There has been a small increase in work hours in Christchurch relative to the other areas but no other changes during the

sample period. Benefit receipt has declined in Auckland (and Christchurch) relative to the comparison areas.

Figure 3 – Non-Wage Outcomes Across Regional Areas

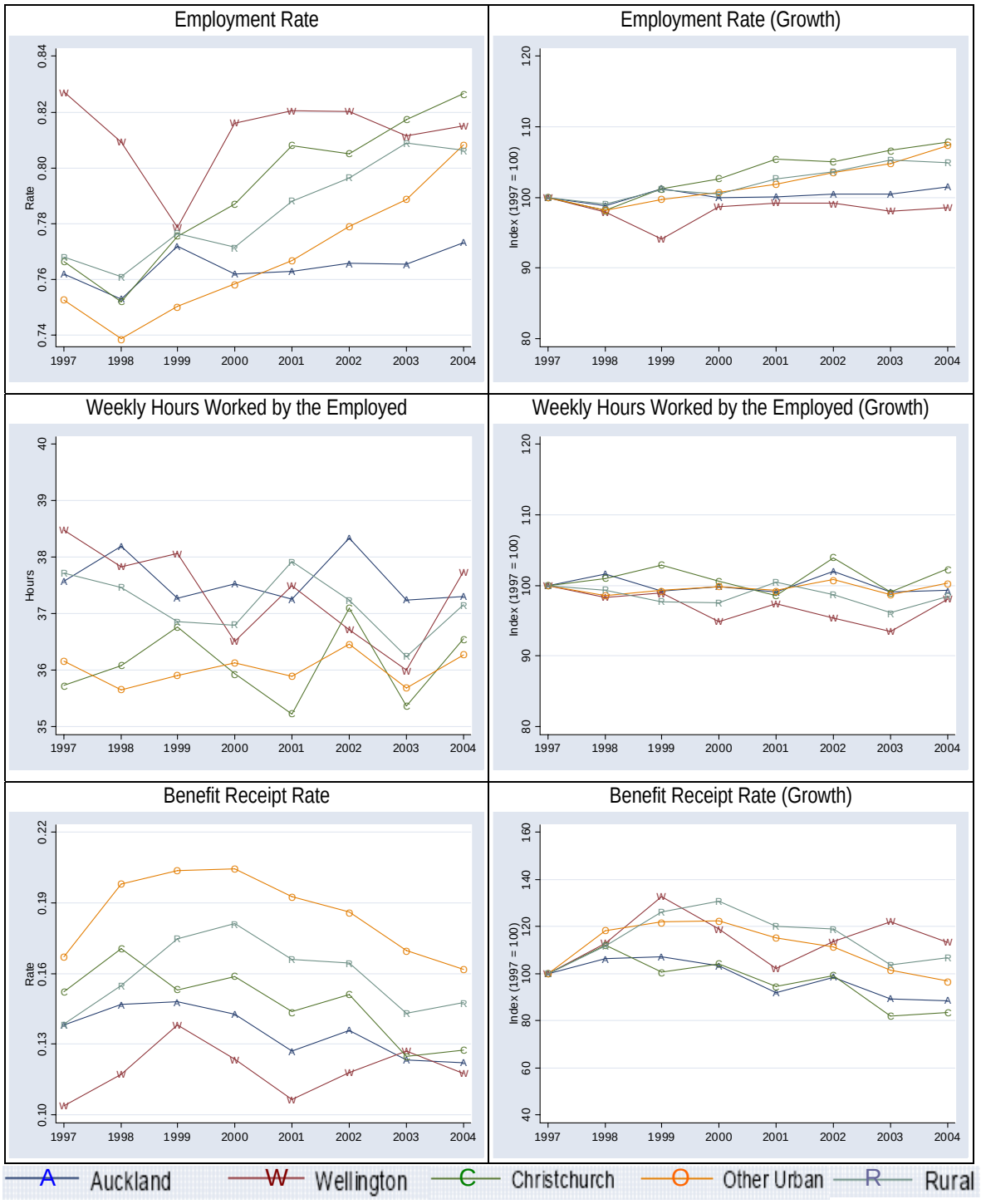


Table 1 – Mean Economic Performance Across Regional Areas

	Real Annual Labour Income	Real Hourly Wage – Wage/Salary Workers	Real Hourly Wage – All Workers	Employment Rate	Weekly Hours Worked by the Employed	Benefit Receipt Rate	Real Annual Labour Income	Real Hourly Wage – Wage/Salary Workers	Real Hourly Wage – All Workers	Employment Rate	Weekly Hours Worked by the Employed	Benefit Receipt Rate
v. Auckland	Unadjusted 1997-2004						Unadjusted Growth Between 1997 and 2004					
Wellington	3,336**	0.84	0.61	0.048**	-0.22	-0.016	-4,303	-2.40	-1.91	-0.023	-0.46	0.030
	(1096)	(0.43)	(0.51)	(0.009)	(0.24)	(0.011)	(3956)	(1.61)	(1.90)	(0.037)	(1.01)	(0.043)
Christchurch	-3,954**	-2.53**	-2.74**	0.029**	-1.47**	0.012	1,772	-1.46	-0.77	0.049	1.10	-0.009
	(833)	(0.38)	(0.46)	(0.008)	(0.28)	(0.010)	(2865)	(1.49)	(1.64)	(0.028)	(0.90)	(0.040)
Other Urban	-5,638**	-3.22**	-3.41**	0.004	-1.56**	0.050**	658	-1.54	-1.49	0.044	0.38	0.011
	(663)	(0.30)	(0.34)	(0.007)	(0.19)	(0.008)	(2513)	(1.24)	(1.42)	(0.027)	(0.78)	(0.033)
Rural	-5,920**	-3.74**	-2.95**	0.020**	-0.42	0.024**	785	-2.13	-0.39	0.027	-0.30	0.025
	(687)	(0.30)	(0.35)	(0.007)	(0.23)	(0.008)	(2420)	(1.29)	(1.42)	(0.027)	(0.89)	(0.032)
Observations	123,731	74,395	84,875	123,942	93,590	123,942	123,731	74,395	84,875	123,942	93,590	123,942
R-Squared	0.02	0.03	0.01	0.00	0.00	0.00	0.02	0.03	0.01	0.00	0.00	0.01
v. Auckland	Adjusted For All Covariates 1997-2004						Adjusted Growth Between 1997 and 2004					
Wellington	-510	-0.42	-0.38	0.014*	-0.26	0.006	-2,504	-1.36	-1.17	-0.016	-0.44	0.005
	(426)	(0.23)	(0.28)	(0.006)	(0.24)	(0.005)	(1394)	(0.73)	(1.03)	(0.022)	(0.88)	(0.018)
Christchurch	-5,065**	-2.58**	-2.50**	-0.007	-2.05**	0.029**	-615	-1.67*	-1.17	0.049*	0.89	0.008
	(327)	(0.21)	(0.27)	(0.005)	(0.16)	(0.005)	(1325)	(0.77)	(0.99)	(0.020)	(0.78)	(0.021)
Other Urban	-4,710**	-2.60**	-2.60**	-0.016**	-2.14**	0.042**	-739	-1.46*	-1.36	0.040*	0.67	0.029
	(284)	(0.16)	(0.19)	(0.004)	(0.12)	(0.004)	(1015)	(0.66)	(0.85)	(0.017)	(0.75)	(0.016)
Rural	-4,718**	-2.58**	-2.39**	-0.002	-2.15**	0.027**	470	-1.48*	0.28	0.027	0.45	0.028
	(311)	(0.16)	(0.22)	(0.005)	(0.13)	(0.004)	(1165)	(0.72)	(0.85)	(0.018)	(0.91)	(0.016)
Observations	123,731	74,395	84,875	123,942	74,395	123,942	123,731	74,395	84,875	123,942	93,590	123,942
R-Squared	0.46	0.26	0.14	0.11	0.23	0.28	0.46	0.27	0.14	0.11	0.17	0.28

Notes: All amounts are in June 2004 Dollars. Standard errors which account for clustering at the PSU level are in parentheses. Coefficients with * are significant at the 5% level and those with ** at the 1% level.

4.1.2 Regression Analysis

Table 1 presents the 'regional' regression coefficients from the mean (OLS) regression for each of the six measures of economic performance. In the left panels, the coefficients indicate the average relative difference in the mean level of economic performance over the entire sample period in each comparison area relative to Auckland. In the right panels, the coefficients indicate the change in the relative difference in mean economic performance between 1997 and 2004 in each comparison area relative to Auckland. The top panels present the "unadjusted" regression coefficients. These are identical to the differences graphed in the previous figures averaged over entire sample period. These coefficients allow us to examine whether the observed graphical differences are statistically significant. The bottom panels present the "adjusted" regression coefficients controlling for all covariates discussed in the prior section. These coefficients allow us to examine whether controlling for differences in the attributes of individuals living in different areas 'explains' any of the differences between these areas.

The difference in labour income between Wellington and Auckland is entirely explained by differences in characteristics, but Auckland (and Wellington) has significantly higher labour income than all other areas even after controlling for all characteristics. Auckland (and Wellington) also have significantly higher wages than other areas even after controlling for all characteristics; the results are almost the same whether examining just wage/salary workers or all workers. Once accounting for differences in attributes, Auckland had similar growth in labour income as all comparison areas besides Wellington (where it grew much faster than) and significantly faster wage growth for wage/salary workers than all areas besides Wellington. Auckland has also experienced faster overall wage growth than all other areas, but this is less so than for wage and salary wages alone and is not significantly different.

Adjusting for characteristics, Auckland has slightly lower employment rates than Wellington, higher than Other Urban, and the same as Christchurch and Rural, but the unadjusted differences are mostly explained by differences in characteristics. Aucklanders (and Wellingtonians) work significantly more hours than workers in Rural, Christchurch, and Other Urban areas once controlling for differences in characteristics. Auckland and Wellington have significantly lower rates of benefits receipt than Other Urban and Rural. Once adjusting for attributes, these rates are also significantly lower than Christchurch's. Auckland has significantly slower employment growth than Christchurch and Other Urban once controlling for differences in characteristics and insignificantly slower growth than Rural. Adjusted differences in growth in hours worked and benefit receipt rates are similar to the unadjusted results and none of the differences are statistically significant.

4.2 Distributional Comparisons Across Regional Areas

We next discuss our results comparing the wage distribution across the five 'regional' areas. First, we present the graphical analysis for these results and then the regression analysis.

4.2.1 Graphical Analysis

Figure 4 graphs the 10th, 25th, 50th (median), 75th, and 90th percentile and mean of the Real Hourly Wage Distribution for Wage/Salary Workers in each year for the five 'regional'

areas. Auckland (and Wellington) have higher unadjusted wage/salary wages across the entire wage distribution. The magnitude of these differences are larger at the upper-end of the wage distribution. For example, unadjusted differences are $0.70-$1.40 at the 25th percentile, $1.00-$2.25 at the median, and $1.70-$3.10 at the 75th percentile.

Figure 5 graphs the 10th, 25th, 50th (median), 75th, and 90th percentile and mean of the Real Hourly Wage Distribution for All Workers in each year for the five 'regional' areas. Wages for the self-employed have greater variance leading to a reduction in percentiles at the median and below, but an increase in the 75th and 90th percentile in all areas. Unadjusted wage differences between Auckland and other regions are generally larger at all points in the wage distribution when including the self-employed. The difference in unadjusted wages between Auckland and Rural is much larger at the 10th and 25th percentile of the distribution but smaller at the 75th percentile.

Figure 4 – Real Hourly Wage Distribution for Wage/Salary Workers Across Regional Areas

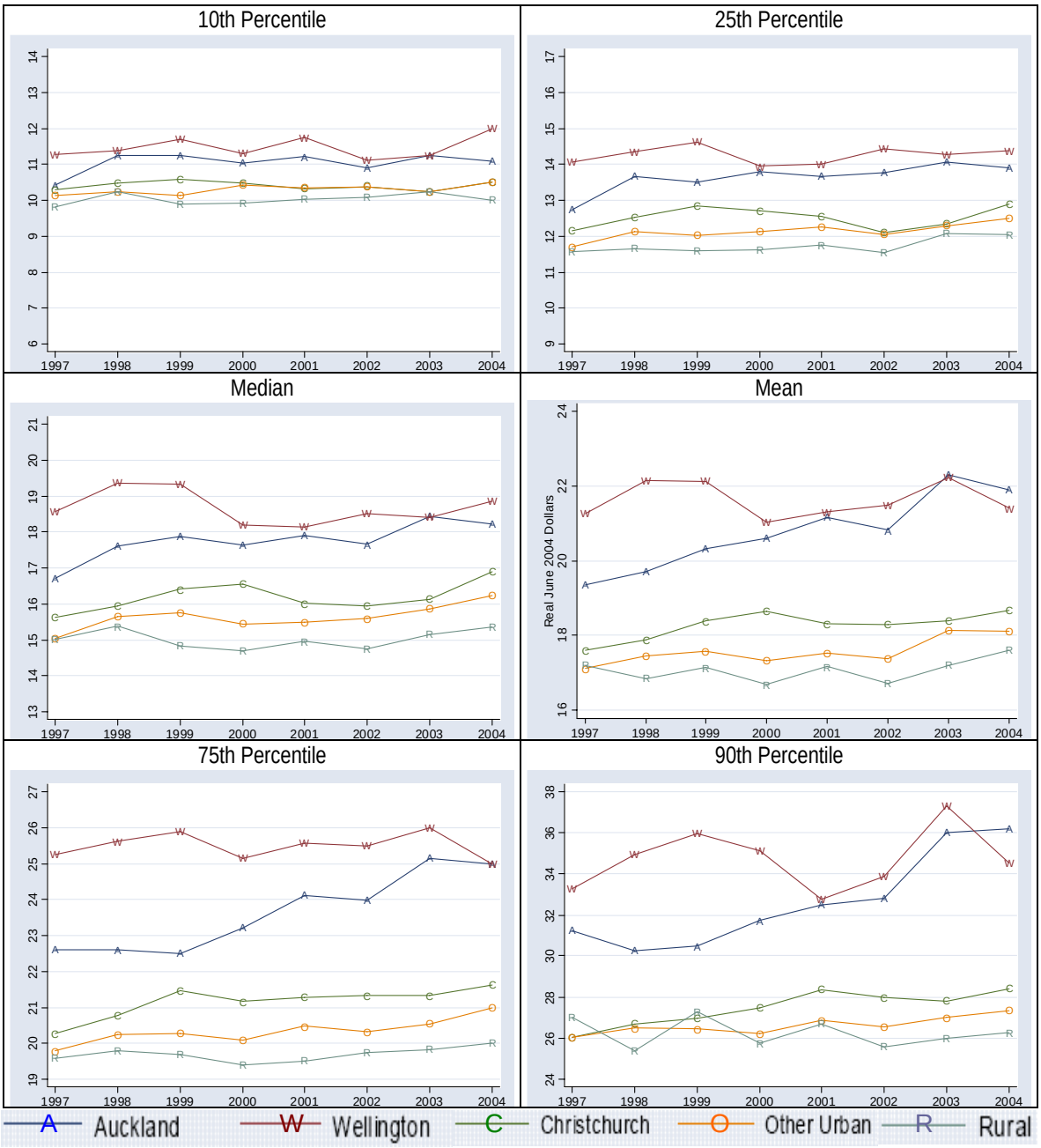
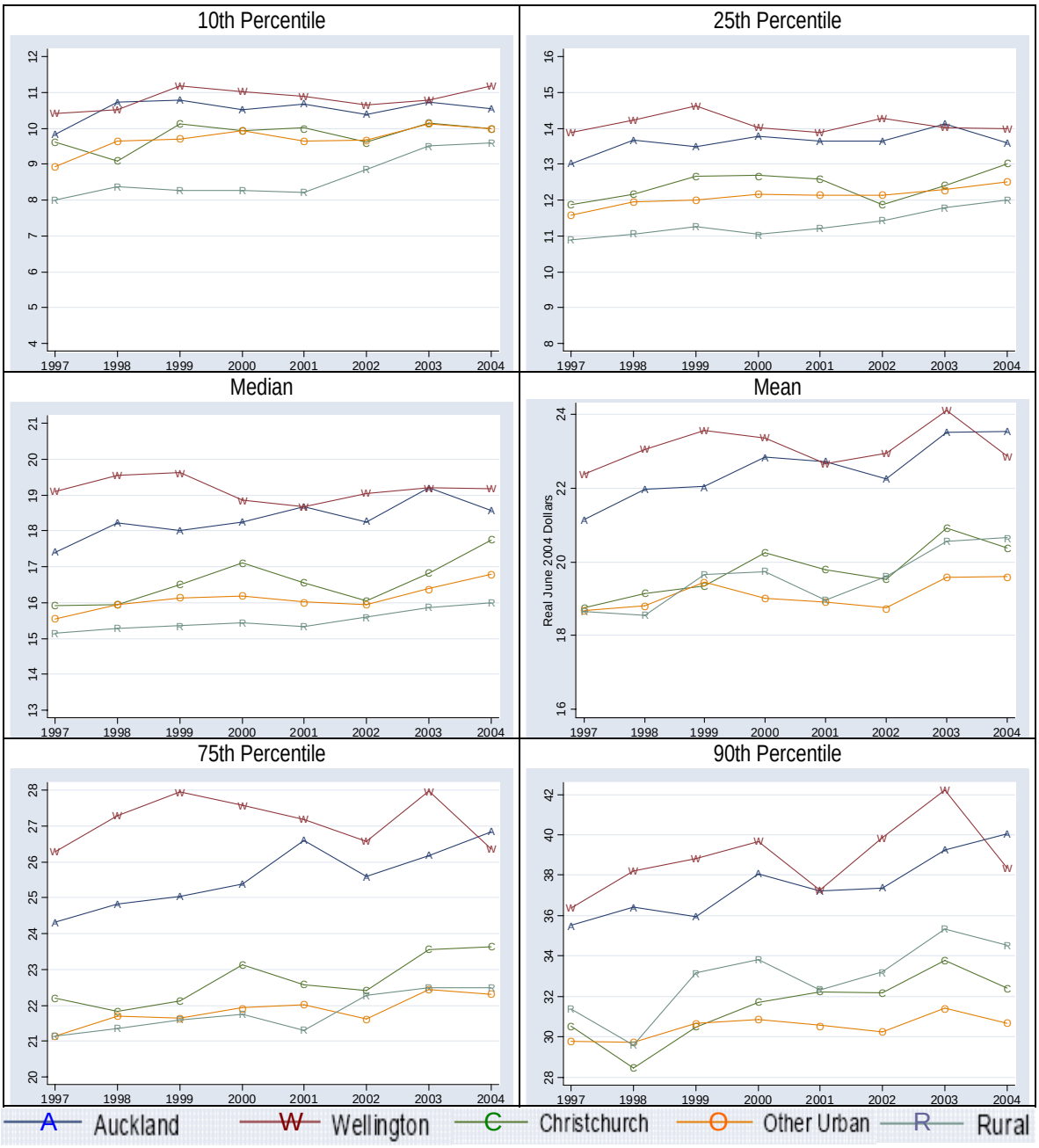


Figure 5 – Real Hourly Wage Distribution for All Workers Across Regional Areas



4.2.2 Regression Analysis

Table 2 presents the 'regional' regression coefficients from LAV regressions of the 10th, 25th, 50th (median), 75th, and 90th percentile of the Real Hourly Wage Distribution for Wage/Salary Workers. In the left panels, the coefficients indicate the average relative difference in Real Hourly Wages for Wage/Salary Workers at various points in the distribution over the entire sample period in each region relative to Auckland. In the right panels, the coefficients indicate the change in the relative difference in Real Hourly Wages for Wage/Salary Workers at various points in the distribution between 1997/98 and 2003/2004 in each comparison area relative to Auckland. The top panels present the "unadjusted" regression coefficients. Again, these are identical to the differences graphed in the previous figures averaged over entire sample period. The bottom panels present the "adjusted" regression coefficients controlling for all covariates. Again, these

coefficients allow us to examine whether controlling for differences in the attributes of individuals living in different areas 'explains' any of the differences between these areas.

Adjusting for characteristics explains all of the difference in wage/salary wages between Auckland and Wellington at all points in the distribution besides the median, but almost none of the difference in wages between Auckland and the other comparison areas at any point of the distribution below the 90th percentile. Adjusting for characteristics does explain 16% of the difference in 90th percentile wages between Auckland and Christchurch, 30% between Auckland and Other Urban, and 47% between Auckland and Rural. While Auckland has faster unadjusted wage/salary wage growth across the entire wage distribution than all comparison areas, the magnitude of these differences are fairly small and insignificant below the median, and differences in characteristics explain most of the (larger) differences between Auckland and the other areas above the median wage. Overall, adjusted wage/salary wages have grown in Auckland by an additional $0.25-$0.60 at the 25th percentile, $0.40-$0.90 at the median, $0.40-$0.70 at the 75th percentile, and $0.70-$1.55 at the 90th percentile compared to the other areas.

Table 2 – Real Hourly Wage Distribution for Wage/Salary Workers

	Mean	10th Pctile	25th Pctile	Median	75th Pctile	90th Pctile	Mean	10th Pctile	25th Pctile	Median	75th Pctile	90th Pctile
v. Auckland	Unadjusted 1997-2004						Unadjusted Growth Between 1997/98 and 2003/04					
Wellington	0.84	0.45**	0.65*	1.03**	1.86**	2.47**	-2.40	-0.19	-0.84	-1.05	-1.85	-3.65
	(0.43)	(0.13)	(0.26)	(0.32)	(0.51)	(0.93)	(1.61)	(0.40)	(0.56)	(0.70)	(1.27)	(2.21)
Christchurch	-2.53**	-0.34**	-0.69**	-1.00**	-1.70**	-3.39**	-1.46	-0.37	-0.46	0.05	-0.93	-2.97
	(0.38)	(0.11)	(0.23)	(0.27)	(0.39)	(0.79)	(1.49)	(0.21)	(0.54)	(0.77)	(1.78)	(1.82)
Other Urban	-3.22**	-0.57**	-1.08**	-1.53**	-2.45**	-4.33**	-1.54	-0.12	-0.14	-0.05	-1.45	-4.42**
	(0.30)	(0.08)	(0.18)	(0.15)	(0.28)	(0.62)	(1.24)	(0.20)	(0.37)	(0.64)	(0.95)	(1.48)
Rural	-3.74**	-0.78**	-1.38**	-2.23**	-3.08**	-5.06**	-2.13	-0.16	-0.32	-0.66	-1.73*	-5.30**
	(0.30)	(0.10)	(0.18)	(0.18)	(0.29)	(0.61)	(1.29)	(0.30)	(0.33)	(0.51)	(0.88)	(1.41)
Observations	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395
Pseudo R-SQ	0.03	0.01	0.01	0.01	0.02	0.02	0.03	0.01	0.01	0.01	0.02	0.02
v. Auckland	Adjusted For All Covariates 1997-2004						Adjusted Growth Between 1997/98 and 2003/04					
Wellington	-0.42	-0.02	-0.10	-0.31**	-0.26	-0.45	-1.36	-0.28	-0.62**	-0.87**	-0.72	-0.70
	(0.23)	(0.08)	(0.07)	(0.11)	(0.24)	(0.33)	(0.73)	(0.33)	(0.21)	(0.31)	(0.73)	(0.79)
Christchurch	-2.58**	-0.74**	-0.98**	-1.59**	-2.05**	-2.86**	-1.67*	-0.25	-0.41*	-0.76**	-0.59	-1.30
	(0.21)	(0.12)	(0.09)	(0.08)	(0.16)	(0.33)	(0.77)	(0.26)	(0.19)	(0.23)	(0.43)	(0.66)
Other Urban	-2.60**	-0.83**	-1.10**	-1.64**	-2.14**	-3.04**	-1.46*	-0.08	-0.23	-0.53*	-0.69*	-1.55*
	(0.16)	(0.09)	(0.07)	(0.07)	(0.12)	(0.23)	(0.66)	(0.15)	(0.16)	(0.22)	(0.30)	(0.63)
Rural	-2.58**	-0.97**	-1.19**	-1.71**	-2.15**	-2.67**	-1.48*	-0.14	-0.27**	-0.41	-0.38	-1.32
	(0.16)	(0.07)	(0.07)	(0.08)	(0.13)	(0.23)	(0.72)	(0.19)	(0.10)	(0.25)	(0.45)	(0.68)
Observations	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395	74,395
Pseudo R-SQ	0.26	0.11	0.16	0.21	0.23	0.24	0.27	0.11	0.17	0.21	0.23	0.24

Notes: All amounts are in June 2004 Dollars. Bootstrapped standard errors which account for clustering at the PSU level are in parentheses. Coefficients with * are significant at the 5% level and those with ** at the 1% level.

Table 3 – Real Hourly Wage Distribution for All Workers

	Mean	10th Pctile	25th Pctile	Median	75th Pctile	90th Pctile	Mean	10th Pctile	25th Pctile	Median	75th Pctile	90th Pctile
v. Auckland	Unadjusted 1997-2004 (June 2004 Dollars)						Unadjusted Growth Between 1997/98 and 2003/04 (June 2004 Dollars)					
Wellington	0.61	0.31*	0.55*	0.88**	1.42*	2.36	-1.91	0.05	-0.63	-1.04	-2.08	-1.30
	(0.51)	(0.13)	(0.22)	(0.32)	(0.59)	(1.23)	(1.90)	(0.30)	(0.49)	(0.79)	(1.76)	(3.22)
Christchurch	-2.74**	-0.49**	-0.87**	-1.23**	-1.95**	-3.66**	-0.77	0.41	0.47	0.35	-0.50	-0.62
	(0.46)	(0.08)	(0.19)	(0.33)	(0.43)	(1.04)	(1.64)	(0.49)	(0.42)	(0.82)	(1.27)	(2.43)
Other Urban	-3.41**	-0.69**	-1.14**	-1.72**	-2.90**	-4.82**	-1.49	0.26	0.18	0.08	-1.04	-2.54
	(0.34)	(0.09)	(0.16)	(0.17)	(0.36)	(0.77)	(1.42)	(0.31)	(0.46)	(0.58)	(1.01)	(1.75)
Rural	-2.95**	-1.60**	-1.83**	-2.32**	-3.01**	-3.14**	-0.39	0.71*	0.34	-0.22	-0.92	-0.83
	(0.35)	(0.06)	(0.15)	(0.19)	(0.39)	(0.76)	(1.42)	(0.31)	(0.44)	(0.58)	(1.20)	(2.07)
Observations	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875
Pseudo R-SQ	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Adjusted For All Covariates 1997-2004 (June 2004 Dollars)						Adjusted Growth Between 1997/98 and 2003/04 (June 2004 Dollars)					
Wellington	-0.38	0.01	-0.24*	-0.34*	-0.46*	-0.70	-1.17	-0.34	-0.59*	-0.74**	-0.40	0.27
	(0.28)	(0.06)	(0.11)	(0.17)	(0.20)	(0.40)	(1.03)	(0.24)	(0.30)	(0.27)	(0.86)	(0.76)
Christchurch	-2.50**	-0.93**	-1.16**	-1.73**	-2.17**	-3.29**	-1.17	0.20	-0.23	-0.28	0.31	0.24
	(0.27)	(0.15)	(0.10)	(0.10)	(0.27)	(0.45)	(0.99)	(0.31)	(0.24)	(0.24)	(0.56)	(1.49)
Other Urban	-2.60**	-0.94**	-1.25**	-1.80**	-2.26**	-3.34**	-1.36	0.14	-0.13	-0.18	-0.36	-0.76
	(0.19)	(0.11)	(0.08)	(0.05)	(0.17)	(0.06)	(0.85)	(0.23)	(0.15)	(0.34)	(0.26)	(0.69)
Rural	-2.39**	-1.12**	-1.39**	-1.85**	-2.25**	-2.90**	0.28	0.25	-0.05	-0.11	0.08	0.10
	(0.22)	(0.07)	(0.12)	(0.09)	(0.26)	(0.25)	(0.85)	(0.29)	(0.17)	(0.21)	(0.44)	(0.93)
Observations	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875	84,875
Pseudo R-SQ	0.14	0.08	0.10	0.13	0.14	0.17	0.14	0.08	0.10	0.13	0.14	0.17

Notes: All amounts are in June 2004 Dollars. Bootstrapped standard errors which account for clustering at the PSU level are in parentheses. Coefficients with * are significant at the 5% level and those with ** at the 1% level.

Table 3 presents the 'regional' regression coefficients from LAV regressions of the 10th, 25th, 50th (median), 75th, and 90th percentile of the Real Hourly Wage Distribution for All Workers. The layout of this table is identical to the previous table. Once again adjusting for characteristics, the results are very similar to those found using only wage/salary wages, and controlling for characteristics explains almost all of this difference between Auckland and Rural at the bottom and top of the all-workers versus wage/salary worker wage distribution. Including the self-employed, Auckland has similar unadjusted wage growth as the comparison areas at and below the median, and faster, but insignificantly different, wage growth at the upper-end of the distribution. Adjusting for characteristics also explains most of difference found between wage growth in Auckland and the comparison areas.

4.3 Mean Comparisons Across Auckland Zones

Lastly, we discuss our results comparing the average level and average growth of the six measures of economic performance across the four Auckland zones. First, we present the graphical analysis for these results and then the regression analysis.

4.3.1 Graphical Analysis

Figure 6 presents the graphical results for Real Annual Labour Income, the Real Hourly Wage for Wage/Salary Workers, and the Real Hourly Wage for All Workers. The left column presents the 'levels' results and the right column the 'growth' results. Labour income and average wages are higher in Northern and Central Auckland than in Southern and Western Auckland, regardless of whether the self-employed are included in the wage rates. Labour income growth has been similar in all Auckland zones besides the Northern zone which has had slower growth and wage growth has been similar in all Auckland zones.

Figure 7 presents the graphical results for Employment Rates, Weekly Hours Worked by the Employed, and Benefit Receipt Rates. This figure follows the same layout as the previous. Employment rates are highest in Northern Auckland, then Western and Central, and lastly Southern Auckland. Conversely, employment growth has been slowest in Northern, then Western, Central, and fastest in Southern Auckland. Aucklanders in the Central and Southern zones work more hours than those in the Northern and Western zones and work hours have increased in the Southern, Central, and Western zones relative to the Northern zone. Benefit receipt rates are lowest in Northern Auckland, followed by Western and Central, and highest in Southern Auckland, but receipt rates have greatly declined in Southern Auckland relative to all other Auckland zones.

4.3.2 Regression Analysis

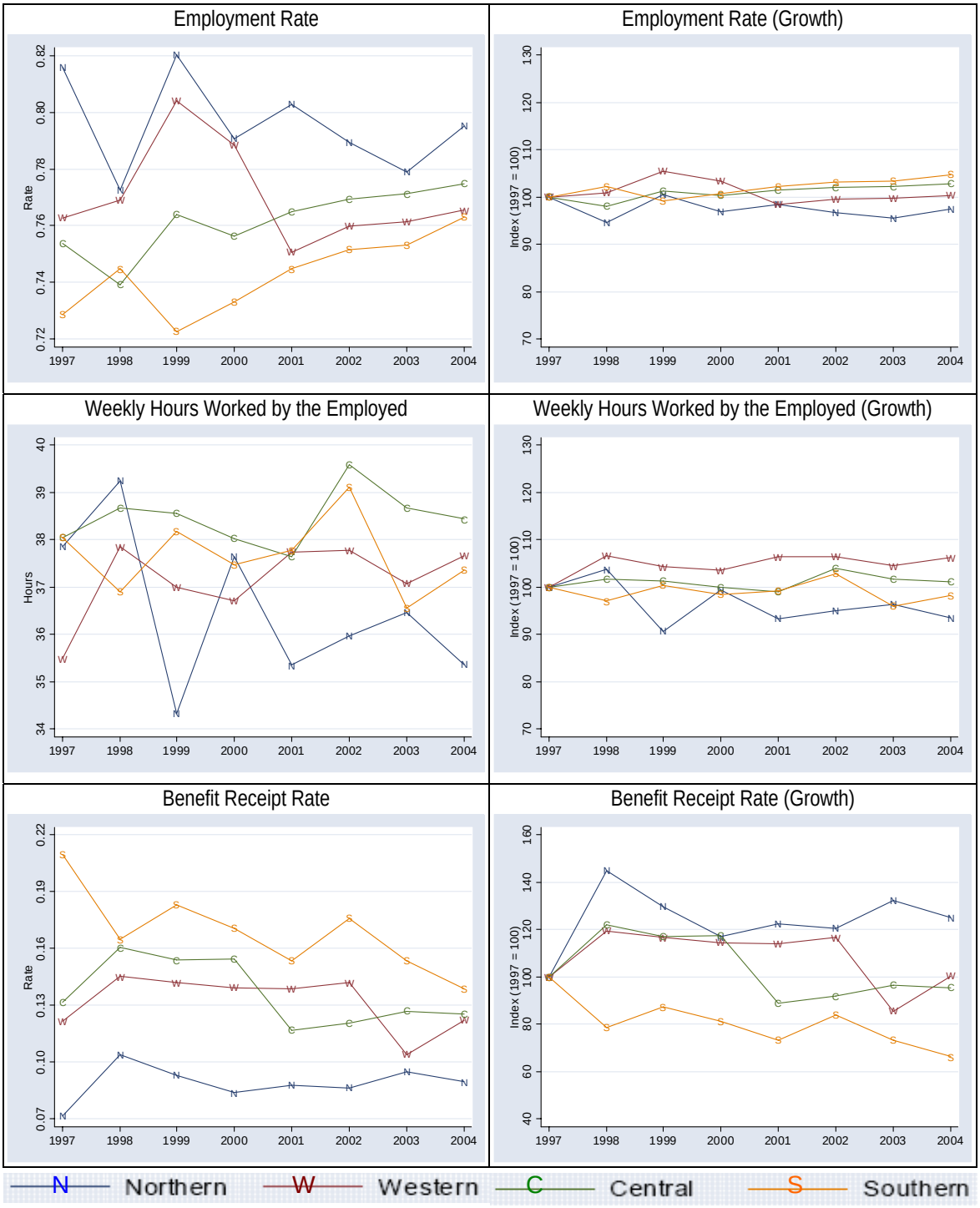
Table 4 presents the 'Auckland zone' regression coefficients from the mean (OLS) regression for each of the six measures of economic performance. The layout is the same as in previous tables. In the left panels, the coefficients indicate the average relative difference in the mean level of economic performance over the entire sample period in each zone area relative to Northern Auckland. In the right panels, the coefficients indicate the change in the relative difference in mean economic performance between 1997 and 2004 in each zone relative to Northern Auckland. The top panels

present the "unadjusted" regression coefficients. The bottom panels present the "adjusted" regression coefficients controlling for all covariates.

Differences in labour income, employment, and benefit receipt rates within Auckland are entirely explained by differences in characteristics. All of the difference in average wages for wage/salary workers and for all workers between the Southern zone and the rest of Auckland and two-thirds of the difference between the Western zone and the rest of Auckland is explained by differences in characteristics. Aucklanders in Central and Southern zones work significantly more hours than those in Northern and Western zones; adjusted differences are smaller, but still significantly different between the Central and Northern zones. Adjusted work hours have also increased significantly in the Western zone relative to the Northern zone.

Figure 6 – Income and Wages Across Auckland Zones

Figure 7 – Non-Wage Outcomes Across Auckland Zones



4.4 Summary

The results presented above tell a fairly consistent story. Auckland and Wellington have the highest levels of economic performance based on almost all measures. In particular, both have significantly higher average levels of labour income, hours worked, and wage rates than the three other comparison areas. These differences remain even after controlling for differences in population attributes across the areas, although 'unadjusted' differences between Auckland and Wellington, which generally show Wellington to have higher levels of economic performance, are 'explained' by differences in characteristics in

Table 4 – Mean Economic Performance Across Auckland Zones

	Real Annual Labour Income	Real Hourly Wage – Wage/Salary Workers	Real Hourly Wage – All Workers	Employment Rate	Weekly Hours Worked by the Employed	Benefit Receipt Rate	Real Annual Labour Income	Real Hourly Wage – Wage/Salary Workers	Real Hourly Wage – All Workers	Employment Rate	Weekly Hours Worked by the Employed	Benefit Receipt Rate
v. Northern	Unadjusted 1997-2004						Unadjusted Growth Between 1997 and 2004					
Western	-5,200**	-3.63**	-3.65**	-0.025*	0.64	0.043**	2,803	0.23	-0.71	0.023	4.69*	-0.018
	(880)	(0.45)	(0.61)	(0.011)	(0.56)	(0.010)	(3398)	(1.94)	(2.33)	(0.037)	(2.09)	(0.036)
Central	-848	-0.46	-0.21	-0.034**	1.89**	0.047**	3,368	0.54	0.37	0.042	2.89	-0.024
	(994)	(0.46)	(0.60)	(0.010)	(0.55)	(0.010)	(3882)	(1.82)	(2.05)	(0.036)	(1.81)	(0.036)
Southern	-5,806**	-3.01**	-3.52**	-0.052**	1.13*	0.079**	2,714	0.04	-0.13	0.055	1.81	-0.089
	(967)	(0.46)	(0.60)	(0.012)	(0.48)	(0.013)	(3500)	(1.68)	(1.94)	(0.046)	(1.86)	(0.047)
Observations	27,211	16,106	18,431	27,289	19,952	27,289	27,211	16,106	18,431	27,289	19,952	27,289
R-Squared	0.01	0.02	0.01	0.00	0.00	0.01	0.01	0.02	0.02	0.00	0.01	0.01
v. Northern	Adjusted For All Covariates 1997-2004						Adjusted Growth Between 1997 and 2004					
Western	-864	-1.24**	-1.29**	0.014	0.80	0.007	1,765	0.05	-1.44	0.018	4.38*	-0.014
	(567)	(0.31)	(0.49)	(0.011)	(0.57)	(0.009)	(2121)	(1.26)	(1.82)	(0.035)	(2.04)	(0.027)
Central	454	-0.26	-0.17	-0.013	1.49**	0.023**	1,654	-0.14	-0.08	0.017	2.68	-0.006
	(637)	(0.36)	(0.53)	(0.008)	(0.54)	(0.007)	(2327)	(1.25)	(1.54)	(0.030)	(1.70)	(0.025)
Southern	114	-0.18	-0.53	-0.003	0.88	0.018*	710	-0.12	-0.29	0.029	2.09	-0.062*
	(532)	(0.34)	(0.49)	(0.009)	(0.50)	(0.007)	(2082)	(0.92)	(1.31)	(0.037)	(1.78)	(0.024)
Observations	27,211	16,106	18,431	27,289	19,952	27,289	27,211	16,106	18,431	27,289	19,952	27,289
R-Squared	0.47	0.26	0.16	0.13	0.15	0.28	0.47	0.26	0.16	0.13	0.15	0.28

Notes: All amounts are in June 2004 Dollars. Standard errors which account for clustering at the PSU level are in parentheses. Coefficients with * are significant at the 5% level and those with ** at the 1% level.

the two areas.[26] One exception is that Auckland has lower employment rates than Wellington, Christchurch, and Rural, but these differences are 'explained' by differences in characteristics in these areas. Auckland has also experienced stronger growth in wages, in particular for wage/salary workers, than other regions, but this has been accompanied by slower growth in employment rates (differences in attributes 'explain' a fairly limited fraction of these differences).

Wages are generally higher in Auckland (and Wellington) than in the other comparison areas at all points in the wage distribution and the self-employed in Auckland have relatively higher wages than the self-employed in all other areas across the wage distribution. These differences remain even after controlling for differences in population attributes across the areas and are of similar magnitude whether or not the self-employed are included. Auckland has experienced somewhat stronger growth in wages for wage/salary workers across the distribution, but much of this difference is explained by differences in regional attributes. Once self-employed workers are included, wage growth has been similar in all comparison areas (except Wellington where it has been slower).

Within Auckland, Northern Auckland has the highest and Southern Auckland the lowest level of economic performance based on almost all measures. Western and Central Auckland are usually found between these two extremes on most measures. However, differences between Auckland zones are mostly 'explained' by differences in the characteristics of the people who live in these zones and economic performance appears to be converging within Auckland with slower growth found in the Northern zones on most measures of economic performance relative to the Central and Western zone and faster growth found in the Southern zone relative to the other zones. It is also worth noting that these differences reflect where people live within Auckland and may not accurately capture the economic performance of businesses in these zones if many individuals commute across zones.

5. Comparisons with other studies

5.1 NZIER estimates of regional economic performance

In September 2004, the NZIER produced a report for the Ministry of Economic Development, "New Zealand's Regional Economic Performance" (NZIER, 2004). In the absence of official measures, NZIER developed a set of regional GDP and GDP per capita estimates – both levels and growth rates. It used these and also its own estimates of regional labour productivity levels and growth rates as the basis for its report.

NZIER obtained its estimates of regional GDP (RGDP) by allocating official national GDP figures across regions. It did this largely by using regional employment data[27]. Each region's share of the national industry's employment (available from Statistics New Zealand) was used to determine its share of national real GDP in that industry. This

[26] In most cases, differences in educational qualifications and ethnic composition are the main attributes that explain differences in outcomes between Auckland and other regions. Industry, occupation, and employment type also explain differences in certain models. This paper only looks superficially at the role of different attributes in explaining differences and thus these findings may not be robust.

[27] The exceptions to this approach were the GDP associated with the ownership of owner-occupied dwellings, which was allocated to each region according to its share of the national population, and the GDP not assigned to an industry which was split across regions using each regions share of the national labour force. See NZIER (2004) page 10.

approach assumes that the level of labour productivity within an industry is constant across New Zealand.

The NZIER derived its estimates of labour productivity in each region also by assuming that labour productivity is constant within each industry across all regions. The estimate of a region's labour productivity is thus a weighted average of national labour productivity figures by industry where the weights are the share of the region's labour force that works in each industry. The effect of this approach is that regions with greater concentrations of industries that have high productivity (growth) at the national level (e.g. business services) come through as those with higher levels (growth rates) of labour productivity.

Table 5 – NZIER Estimates of Regional Economic Performance

Region	RGDP Growth: Annual Average 2000 – 2004	RGDP Per Capita Growth: Annual Average 1998-2003	Labour Productivity Growth: Annual Average 2000-2004	Unemployment: Average Rate in Year to June 2004	Nominal GDP Per Capita: Year to March 2003
Northland	1.2	2.0	0.0	6.0	$26,600
Auckland (rank)	3.1 (6=)	1.1 (11th)	1.0 (4=)	3.9 (4th)	$30,750 (9th)
Waikato	2.5	1.8	0.5	3.6	$31,100
Bay of Plenty	2.1	2.3	1.0	5.6	$28,500
Gisborne – Hawke's Bay	3.0	3.5	1.2	5.1	$26,600
Taranaki	3.1	4.0	0.5	4.5	$33,100
Manawatu – Wanganui	5.1	4.6	0.6	4.8	$29,900
Wellington	3.9	1.6	1.5	4.9	$36,700
Upper South Island	2.2	0.7	0.6	3.3	$35,800
Canterbury	4.8	3.7	0.8	4.1	$35,650
Otago	3.8	1.8	1.0	5.1	$31,300
Southland	3.8	1.9	1.7	3.1	$33,700
New Zealand	3.5	2.3	0.9	4.3	$32,100

While satisfactory for some purposes, the assumption of constant labour productivity by industry across regions is not appropriate in investigating the sorts of differences in productivity that may arise in cities compared to less densely populated regions (by means of the mechanisms and in line with the evidence reviewed in section 2 above). The NZIER report recognises the limitation of its approach, but was constrained by lack of data. It notes the critical nature of the constant productivity assumption and concludes that it is difficult to draw any firm conclusions about regional productivity levels or growth.[28] We argue that our approach using regional wage and income data from the Income Survey is thus likely to give more satisfactory estimates of regional labour productivity levels and trends.

Table 5 shows the NZIER's estimates of a number of indicators of regional economic performance. The NZIER's 12 regions are based on New Zealand's local government regions (the sixteen regional council areas) with some of the smaller ones combined. Note that these do not correspond with the areas in our study which we chose specifically to investigate differences in performance between large cities, medium sized urban areas and small centres/rural areas. Nevertheless, the Auckland Regional Council area

[28] See NZIER (2004) page 35.

corresponds broadly with "Auckland" in our study. On the other hand, the Canterbury Regional Council area, for example, includes a considerable area of rural land and small centres[29].

The NZIER results indicate that economic performance in most regions is a mixed bag viewed across the various indicators. Three regions stand out as consistently strong performers (Canterbury, Wellington and Southland) and Northland as a weak performer. Auckland on the other hand is very much a middle performer ranking fourth equal in productivity growth, 9th in GDP per head and 11th in growth in GDP per capita.

Our results give a different picture of Auckland's relative performance compared to the one that emerges from these NZIER figures. We find that Auckland has the highest level and growth (or equal first with Wellington) of real hourly earnings of workers, which are likely to reflect labour productivity levels and growth rates[30]. Moreover, the superior performance of Auckland is more marked at the high-wage, high-skill end of the distribution.

We do find lower levels of employment and employment growth in Auckland than in some other areas. Thus, lower labour utilisation may help to explain the lower level of GDP per head in Auckland found in the NZIER study despite our observed high wage levels.

Another possible reason for the different pictures of Auckland to emerge from the two studies is that our study focuses on the age range most likely to be in work, namely 25 to 59 year-olds. Finally, it should be remembered that there is no assumption in our study that average labour productivity by industry is constant across all areas of the country. This permits any effects on productivity arising from the density of economic activity in cities to come through in our measures.

5.2 National Bank estimates of regional economic performance

The National Bank of New Zealand produces quarterly reports on regional economic trends.[31] These are based on the Bank's index of regional economic activity. This is constructed from a mixture of official Statistics New Zealand data and other available regional data together with modelled components to fill in some gaps.[32] The result is a proxy for overall economic activity in each region rather than a true national-accounts type measure of regional GDP.

Each quarter the Bank reports the growth in this index for each region compared to the previous quarter and also the year-on-year growth rate. It also gives regional summaries

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29 In fact, we find that our choice of different geographical areas compared to the regional areas used in the NZIER and National Bank estimates appears to make little difference. When we estimated our measures for the regional council areas, we find similar results with Auckland ranked 1st or 2nd among the 12 regions in terms of income and wage levels and wage growth but 8th or 9th in terms of income growth. These results are unaffected by whether we examine total income or labour income, wages for wage/salary workers or wages for all workers, all individuals 15+, or just prime-age adults, entire regions or just the primary urban areas in each region.

30 There are two caveats here. First, in competitive markets wages reflect the *marginal* product of labour and not total value added per hour worked which is the usual measure of labour productivity. Secondly, if markets are non-competitive, wages may not reflect marginal products.

31 The two most recent reports are available at http://www.nationalbank.co.nz/economics/regional/default.htm

32 Examples of official SNZ series available on a regional basis are retail sales, employment and population. An example of a non-SNZ series available on a regional basis is the quarterly survey of business opinion undertaken by the National Bank. Other examples of regional data that the National Bank uses are new car registrations, job ads, dwelling approvals, commercial building consents and accommodation guest nights.

of the most significant and interesting movements in the individual series that make up the overall activity index. The reports do not present estimates of GDP per capita or labour productivity growth rates or levels, as the data and the approach make it difficult to derive such measures[33].

Figure 8 – National Bank Regional Economic Activity Growth Rates

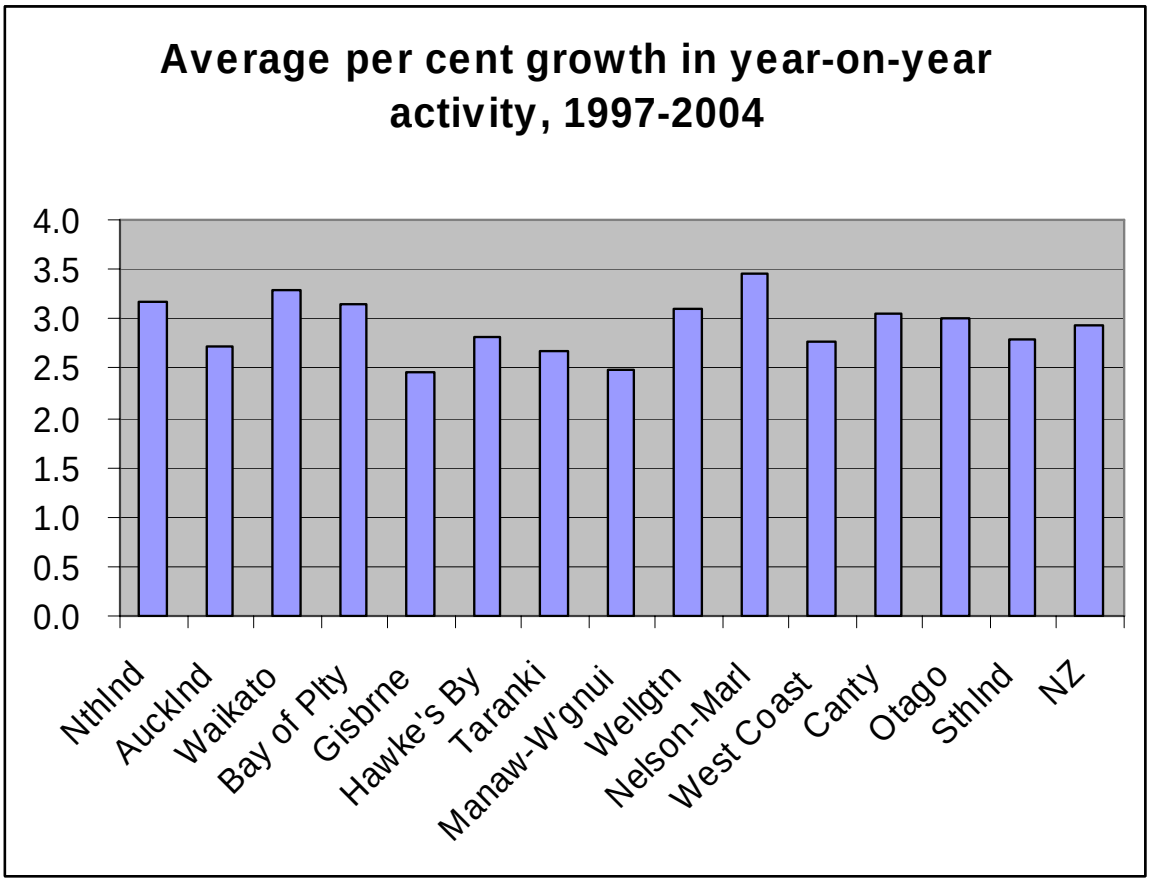

Figure 8 shows the average growth performance of New Zealand's 14 regions as measured by the National Bank's regional activity index. From 1997 to 2004, Auckland's annual average growth rate of 2.7 per cent was fourth slowest and below the rate for New Zealand as a whole. If anything, the picture from the National Bank's measure shows Auckland performing even less well relative to the other regions than what is found in the NZIER study.

The reasons for the different findings between our results and the National Bank's index of regional activity are likely to be similar to those that account for the different results between our research and the NZIER study. First, the National Bank's index is an aggregate measure rather than either a per-person or a per-worker (i.e. productivity) measure. Thus, a region could have slow growth in overall activity because of slow population growth, even though growth in activity per capita might be strong. Alternatively, and more likely in the case of Auckland, high growth in activity per worker (ie productivity) could be offset by low growth in the population of working age or in labour force participation, giving modest rises in overall activity or even in per capita activity. In fact, the unadjusted figures in Table 1 for the growth of real annual labour income (a

[33] The National Bank (2004) has nevertheless published a graphical time series of real activity per capita for Auckland, Waikato, Taranaki and Southland from 1974:1 to 2004:3 based on its index of regional economic activity. This shows the three 'dairy' regions outgrowing Auckland since around 1996.

volume measure that reflects employment rates) shows Auckland in the middle of the pack and is not inconsistent with the National Bank growth rate estimates over the same period. Finally, the different geographical comparison areas in the two studies are also likely to influence the difference in results[34].

6. Summary and conclusions

In this study we set out to investigate Auckland's economic performance relative to other large cities in New Zealand, to medium-sized urban centres and to small towns and rural areas. We also examined relative performance within Auckland by dividing the region into four areas. A key motivation for the study was to investigate the hypothesis that Auckland is "underperforming". If true, this result would be concerning given Auckland's large size in the New Zealand economy and given a body of overseas research and evidence that large cities have the ability to generate innovation, learning and high productivity growth.

Measures of regional economic performance are not well developed in New Zealand because of a relative lack of official data at the regional level. Given our particular interest in productivity arising from agglomeration economies within large cities, we concentrated on measuring productivity levels and growth by examining returns to labour and skills in the form of hourly earnings. We used data from the annual New Zealand Income Survey, a sample of around 16,000 individuals with information on location, measures of income and hours worked, and a range of socio-economic variables.

Two non-governmental organisations have previously attempted to satisfy the widespread interest in regional performance by constructing various estimates of regional economic activity. However, neither the National Bank, nor the NZIER has developed measures that satisfactorily capture productivity performance by areas that are classified according to the density of economic activity that takes place within them. Our approach, and the data source we use, do allow us to achieve this subject to a caveat around possible cyclical effects in the data.

Our results tell a fairly consistent story. Auckland and Wellington have the highest levels of productivity performance based on almost all measures of earnings. In particular, both have significantly higher average levels of labour income, and wage rates than the three other comparison areas. These differences remain even after controlling for differences in population attributes across the areas. Auckland has also experienced stronger growth in wages, in particular for wage/salary workers, than other regions.

When we examined wages across areas at different percentiles in the wage distribution, Auckland wages again tended to be at the top and grow fastest. Consistent with cities being places that foster and use skills, the magnitudes in favour of Auckland tend to be higher at the upper ends of the wage distributions. These differences remain for levels but not growth rates after controlling for differences in population attributes across the areas.

Our findings are not comparable to the National Bank regional activity indicators because the latter do not separately identify any proxies for labour productivity. The NZIER study finds Auckland's labour productivity growth only fourth equal among twelve regions. This is likely to be influenced by the assumption adopted by the NZIER that labour productivity levels by industry are constant across regions.

[34] But see footnote 29.

On measures of labour utilisation, we find that Auckland does not do as well. It has lower employment rates than Wellington, Christchurch, and rural areas, but these differences are 'explained' by differences in characteristics in these areas. Auckland has also experienced slower growth in employment rates (differences in attributes 'explain' a fairly limited fraction of these differences).

A weaker performance in labour utilisation means that Auckland's performance in GDP per capita is "pulled down" compared to its good productivity performance. This is another potential reason for the weaker performance of Auckland that emerges from the National Bank and NZIER measures compared to our results on productivity levels and growth.

Within Auckland, we found that Northern Auckland has the highest and Southern Auckland the lowest level of economic performance based on most measures. However, differences between Auckland zones are mostly 'explained' by differences in the characteristics of the people who live in these zones. Moreover, economic performance appears to be converging within Auckland with slower growth found in the Northern zones in most measures of economic performance relative to the Central and Western zone and faster growth found in the Southern zone relative to the other zones.

Our key findings cast doubt on the hypothesis that Auckland has been a productivity underperformer within New Zealand. In fact, Auckland appears to be a relatively good performer and this is consistent with agglomeration economies being at work in New Zealand's largest urban concentration. However, because we limited our investigations to within New Zealand we are not able to say how Auckland's productivity performance compares to innovative, high-skill cities in other countries. Given New Zealand's overall poorer performance in labour productivity and the rather modest wage rate growth that we find even for Auckland, it is unlikely to have been as good.

From a policy perspective, our study should give pause for thought to those who view Auckland as underperforming and a drag on the rest of the country. Nevertheless, the challenge remains to lift labour productivity across the whole of New Zealand including in her largest city.

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Appendix

Appendix Figure 1 – Map of Statistics New Zealand Auckland Zones

Appendix Table 1 – Sample Size for Regional Analyses

Survey Year	Auckland	Wellington	Christchurch	Other Urban	Rural	Total
1997	3,598	2,016	1,504	5,462	3,261	15,841
1998	3,528	2,030	1,430	5,396	3,283	15,667
1999	3,234	1,760	1,465	5,227	3,383	15,069
2000	3,105	1,750	1,572	5,098	3,734	15,259
2001	3,306	1,606	1,591	5,099	3,650	15,252
2002	3,662	1,746	1,765	5,373	3,771	16,317
2003	3,357	1,685	1,711	5,073	3,602	15,428
2004	3,499	1,683	1,606	4,884	3,437	15,109

Appendix Table 2 – Sample Size for Within-Auckland Analyses

Survey Year	Northern	Western	Central	Southern	Total
1997	552	601	1,261	1,184	3,598
1998	527	639	1,302	1,060	3,528
1999	423	716	1,079	1,016	3,234
2000	468	615	1,084	938	3,105
2001	476	649	1,180	1,001	3,306
2002	546	721	1,221	1,174	3,662
2003	554	688	1,113	1,002	3,357
2004	504	616	1,156	1,223	3,499

Appendix Table 3 – Average Regional Characteristics

	Akl	Wlg	ChCh	Oth Urb	Rural	Northern	Western	Central	Southern
25-29	15%	16%	16%	15%	11%	12%	15%	18%	15%
30-34	17%	17%	16%	16%	15%	14%	18%	18%	16%
35-39	17%	18%	15%	16%	17%	18%	18%	17%	17%
40-44	16%	16%	15%	16%	17%	17%	15%	15%	16%
45-49	14%	13%	14%	14%	15%	15%	13%	13%	14%
50-54	12%	12%	13%	12%	14%	14%	11%	11%	13%
55-59	10%	8%	10%	11%	12%	10%	10%	8%	11%
Male	48%	49%	49%	48%	50%	47%	47%	49%	48%
Female	52%	51%	51%	52%	50%	53%	53%	51%	52%
Pakeha	66%	76%	86%	82%	85%	81%	67%	64%	57%
Maori	8%	8%	5%	12%	13%	4%	9%	6%	13%
Pacific Is	11%	7%	2%	2%	1%	3%	9%	10%	18%
Asian	9%	5%	2%	2%	1%	5%	9%	12%	9%
Other	6%	3%	4%	2%	1%	6%	6%	7%	4%
NZ Born	63%	76%	82%	86%	89%	67%	65%	61%	62%
<=5 Yrs in NZ	12%	5%	6%	4%	2%	13%	10%	14%	9%
6-10 Yrs in NZ	6%	4%	3%	2%	1%	4%	6%	7%	7%
11-20 Yrs in NZ	8%	5%	3%	2%	2%	6%	7%	7%	10%
21-30 Yrs in NZ	6%	5%	4%	3%	3%	5%	7%	6%	7%
30+ Yrs in NZ	4%	4%	3%	3%	2%	4%	4%	4%	4%
No Quals	17%	15%	19%	24%	27%	10%	23%	13%	24%
Vocation Quals	6%	5%	10%	12%	12%	5%	8%	4%	8%
Low School Only	11%	10%	10%	11%	12%	11%	12%	7%	14%
Low Sch and Voc	12%	11%	12%	13%	14%	13%	13%	9%	12%
High Sch Only	14%	13%	11%	10%	9%	15%	15%	14%	12%
High Sch and Voc	21%	21%	21%	18%	17%	26%	16%	22%	20%
University Quals	19%	25%	17%	12%	7%	20%	13%	31%	10%
Wage/Salary	78%	83%	83%	83%	65%	73%	78%	78%	83%
Employer	8%	6%	6%	7%	12%	9%	7%	8%	7%
Self-Employed	13%	10%	10%	9%	21%	18%	14%	13%	10%
Managers	19%	16%	15%	12%	11%	22%	17%	20%	17%
Professionals	17%	22%	17%	16%	10%	16%	12%	23%	13%
Technicians	14%	16%	14%	13%	9%	17%	12%	17%	12%
Clerks	14%	16%	13%	13%	8%	14%	16%	12%	15%
Service/Sales	11%	10%	12%	14%	10%	11%	12%	10%	11%
Agric/Fishery	1%	1%	2%	4%	27%	1%	2%	1%	2%
Trades	10%	8%	10%	10%	8%	10%	13%	7%	12%
Plant/Machine Ops	7%	5%	10%	10%	11%	4%	9%	5%	11%
Elementary Occ	6%	4%	6%	7%	5%	4%	6%	5%	9%
Agric/Fishery	1%	1%	2%	5%	28%	1%	1%	0%	1%
Manufacturing	19%	10%	18%	17%	14%	14%	20%	15%	25%
Construction	7%	6%	7%	7%	6%	8%	8%	5%	8%
Wholesale Trade	7%	5%	6%	5%	3%	7%	7%	6%	8%
Retail Trade	11%	9%	10%	12%	9%	11%	12%	9%	12%
Accom/Restaurant	3%	3%	4%	4%	3%	3%	2%	4%	3%
Transport/Storage	5%	5%	6%	4%	3%	4%	5%	5%	6%
Communication	2%	4%	2%	2%	1%	2%	3%	3%	2%
Finance/Insurance	4%	7%	3%	3%	2%	6%	4%	5%	3%
Property/Business	15%	15%	11%	10%	6%	18%	12%	20%	10%
Government	3%	12%	6%	5%	3%	4%	4%	3%	2%
Education	7%	8%	9%	10%	8%	7%	6%	9%	7%
Health/Community	8%	8%	10%	11%	7%	8%	8%	9%	7%
Cultural/Recreation	3%	3%	2%	2%	2%	3%	2%	4%	2%
Personal/Other Ser	4%	5%	4%	4%	3%	4%	4%	3%	3%

Note: Average characteristics are calculated for the prime-age (25-59) population.