



BUREAU OF TRANSPORT AND REGIONAL ECONOMICS

Searching for small area
(SLA) drivers of growth in the
Sydney Greater Metropolitan
Region, Australia



WORKING PAPER

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FOREWORD

This working paper presents the results from a collaborative project between the Planning Research Centre at the University of Sydney and the Bureau of Transport and Regional Economics (BTRE).

The project was made possible by a coincidence of interests between (at the BTRE) Dr Judith Winternitz's interest in urban areas as important and interesting topics for regional research and (at the University of Sydney) Professor Edward Blakely's long and distinguished background in Urban and Regional Planning.

The study reports interesting results about the drivers of growth at small area level – the level of a statistical local area as defined by the Australian Bureau of Statistics. It finds that key factors that affect the rate of growth in Sydney include industry structure, the extent to which districts in the Sydney are specialised. There are as a result the mix and locations and places with internal drivers among them that shape each locations destiny. The research also offers researchers and policymakers new tools for analysing the drivers of small local areas in a large region economy to determine strong and weak socio-economic performance spatially.

The project was led by Professor Edward Blakely who is Professor and Chair of Urban and Regional Planning at the University of Sydney, Australia. Other members of the research team were Dr Santosh K. Bista (a researcher at the Planning Research Centre, University of Sydney) and Dr Godfrey Lubulwa (at the Bureau of Transport and Regional Economics). An earlier version of the report was presented at the 2005 Australia New Zealand Regional Science Association (ANZRSIAI) conference, Manukau City, Auckland, New Zealand. The comments of those at the ANZRSIAI conference and the inputs, at various stages of the project, of Dr Judith Winternitz and Leanne Johnson, are gratefully acknowledged. The content of the paper however remains the responsibility of the authors.

Dr Phil Potterton

Executive Director

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December 2005

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EXECUTIVE SUMMARY

Sydney is the largest city and one of the fastest growing metropolitan regional areas of Australia. This study presents results from a study of 54 Statistical Local Areas (SLAs) in what is commonly referred to as the Sydney Greater Metropolitan Region over the period 1991 to 2001. Using New South Wales as the reference region, we look at the economic geography to find the local economic drivers in each SLA across the region.

We find that key factors that affect the rate of growth in Sydney include industry structure, the extent to which Statistical Local Areas in the Sydney Greater Metropolitan Region are specialised.

Our research offers to researchers, policymakers and other new tools for analysing the drivers of small local areas in a large region economy to determine strong and weak socio-economic performance spatially.

CHAPTER 1 INTRODUCTION

Why do some areas in the same region perform better than others in a vigorous and growing regional economy? Central metropolitan and suburban development has become a central issue in regional economic research in the last several decades. Australia's metropolitan regions have not developed evenly and localities within cities have shown sharp distinctions in their relative development patterns. While considerable Australian research has focused on sub-state regional differences, and on rural, peri-urban and isolated communities less research has examined the internal dynamics of places within growing metropolitan regions (BTRE, 2003).

It is clear that the older core manufacturing metropolitan regions have suffered massive job losses triggering lower economic growth compared with the nation and the non-manufacturing areas within the metropolitan region as a whole. For example, Newcastle and Wollongong, the steel fabricating areas of the pre-1970s within the Sydney Greater metropolitan region, were dramatically affected by deregulation and globalisation of this industry. Similar fates occurred to other manufacturing areas of Melbourne and Adelaide and to a lesser extent Brisbane and Perth. While attention to these places has produced evidence of decline in the form of persistent high levels of unemployment, wage decline, and net out-migration of youth, as well as reductions in services, little work has looked at the forces that are allowing some of these places to rebound and others to remain stagnant. In this report we examine the factors that underlie or drive the economies of small areas, in the transition of the Sydney Greater Metropolitan Region to a global city-region. Some places in the Sydney GMR are starting to prosper and others continue to lag (Myrdal, 1957).

1.1 SCOPE OF THE STUDY

This study uses regional economic analysis tools to look at the structure of Sydney's sub-regions or districts (Illawarra, Hunter, Western Sydney etc) as well as of 54 statistical local areas that cover all of the Sydney Greater Metropolitan Region. We undertake a comprehensive analysis using income growth and population growth as proxies for socio-economic prosperity in the localities studied. We select these variables because in combination they show socioeconomic health. Population loss could be an indicator in a mature economy of community decline. On the other hand, rising incomes are a strong measure of increasing wealth. There are circumstances where these variables might be false signals. For example, an old community might have high

incomes but is ageing in place with a declining population. Or, a fast growing place with new lower socioeconomic or new immigrant residents might seem like it is doing well but the human resources and skill levels base might not produce a strong economy despite apparent population growth. So in this study, we look at both population and income from various perspectives to determine the drivers of growth in statistical local areas, larger districts and the economy of the Sydney Greater Metropolitan region as a whole. We use Statistical Local Areas as the basis of the analysis. We want to see if there are differences in outcomes for small areas located in common economic catchments because of differing economic drivers. In essence do some places perform better or worse than their neighbours within the same economic space? If so, what are the drivers for these divergences in performance?

1.2 DATA SOURCES AND THEIR LIMITATIONS

We use Australian Bureau of Statistics (ABS) data for 1991-2001 and data sets developed by the Bureau of Transport and Regional Economics (BTRE) from ABS data for the areas studied. Much of the data are 5 years old and, in a rapidly changing dynamic economy, they may be illustrating past performance not indicators of future directions or barriers. On the other hand, they are the best data available. We also, use fairly conventional regional economic analysis to examine deep trends in local economies. More sophisticated econometric tools might well be employed. But, we suspect they would only confirm our assessments since we tested these approaches and found no profound differences in results. Finally, we wanted to employ tools that are transparent and can be used by regional economists in Sydney and other regions.

1.3 KEY FINDINGS

Among other contributions this report provides insights and illustrations on the following phenomena:

- There are significant differences in economic conditions across the Statistical Local Areas within the Sydney Greater Metropolitan Region (see section ===).
- Spatial economic inequality in the Sydney GMR may be a drag factor, holding back the possible growth influences from the global economy;
- There are different drivers of growth for different levels of geography. The balance of key drivers are different in larger districts versus those operating in individual statistical local areas in the Sydney GMR (see section =====).

- There may be ‘glass ceilings’ to growth – that is a district or larger region may be able to grow up to a certain point, after which the growth path plateaus out, and may even start declining because of internal unevenness (see section ==).).
- Self-sufficiency at a small area level is not feasible. Some activities are only possible at a larger district level and districts that are more internally linked grow better than those with poor links among their component small areas (see section ==).

1.4 CONTEXT OF THE STUDY

Uneven regional spatial outcomes has been a key research issue among Australian regional scientists for many years. (BTRE, 2003b). One part of this research deals with the core-periphery thesis with respect to the differences between regional centres and the nation’s capital city economies. The other, more recent, work deals with differences within capital city economies. O’Connor et al (2001) noted that there are significant areas within, and outside of, city regions that are part of the globally exposed economic system. Metropolitan regions are composed of globally advantaged areas linked externally with disadvantaged areas that are part of the older industrial economy with few links to the domestic economy acting as the labour pool for lower skilled jobs that service the global economy (Baum et al 1999).

Another view of this phenomenon is expressed in the work of Vinson (2004) who examines unequal spatial outcomes in Sydney and shows a pattern similar to the work of Orfield (1997) in the US. That is, there are favoured quarters of economic privileges in Sydney’s metropolitan region in spite of the intentions of government policy in the distribution of education, health, transport and other resources. He illustrated this with maps of severe socio-economic outcomes. Randolph and Holloway (2005) focuses on Australian suburbanisation and describes the change in Sydney-area uneven economic fortunes and shows a spatial polarization of middle ring and other suburbs that have been largely been bypassed by the changing global economy.

Summary

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This report is a useful document for use by economic development specialists as they examine the fortunes of smaller areas than entire regions undergoing economic transition. We look at a collection of data from several different perspectives to unlock locally driven or influenced economic change. In a region no small area is an economic island, particularly in a global economy. While this report offers a way to examine the context and dimensions of economic performance, it cannot, due to data limitations identify all of the forces that do affect economic performance. However, local actors such as Mayors, local elected councils, local businesses view their areas as economic

units and act to strengthen them. This report provides some clues as to how they might better understand and guide their communities' economic options. While this report focuses on Sydney its methods are valuable for other city-regions in Australia.

CHAPTER 2 REGIONAL ECONOMIC PLANNING IN SYDNEY

The Sydney economy has grown for the last three decades adding jobs and people. Sydney grew 707,075 jobs over twenty-five years and population by 1,113,601 over the same period a ratio of 0.63. Sydney is the largest recipient of international immigration and internal emigration in the nation. The new human resources added to Sydney are an economic plus since many come with high skills or come seeking educations and remain in Sydney adding to the regional skill pool, which attracts new firms and enhances existing firms' competitiveness (O'Connor, 1999).

Sydney is undergoing a new regional strategic planning process. Unlike former regional plans that focused almost exclusively on allocating land for housing estates, this one puts a greater emphasis on using tools to affect spatial economic outcomes. The new Sydney Strategic Plan is designed to influence the spatial allocation of job creation opportunities and to improve spatial economic well being across the entire metropolitan area (Sydney Metropolitan Strategy, 2005). Sydney is not alone in seeking to use planning tools for more just socio-economic outcomes. The new London Plan has the same goals with only slightly different emphasis. Similar ideas are in regional plans for Long Island in New York, Seattle, San Francisco and Paris. The theme of spatial inequality is central to regional science. But most regional science tools are aimed at large areas.

The earliest notions of regional economic interventions are those in work by Rostow (1960) on the role of industrialization and national economic outcomes. In the latter part of the 20th century the focus of regional science changed, from industrial structure, since global and not local forces became pivotal to regional economic outcomes. The work of Piore and Lester (2004) articulated the increasing differences between local regions with global attributes like Silicon Valley in California. Subsequent work by Saxanian (1996), Porter (1998) enlightened and enlivened the debates over regional competitiveness. Regions with Rostow's industrial base were doomed as regions marched up the high tech curve. Regional economic development became enamoured with tech parks and new higher education programs to transfer more knowledge into the local regional economy and thus make it more able to survive and thrive in a global economic race (Porter, 1995). Michael Porter argues persuasively that even low-income areas could and should transform their asset base into metro-global competitive capacity.

Putnam and others (1970) put human social capital at the forefront of resources for a global economy and argue that small locality can affect their own economic destiny by harnessing its social and institutional mechanisms. Florida (2002) in his book, *Rise of the Creative Class* added to these debates of place-based economy by suggesting any place with creative people can become economically competitive and globally connected. These ideas came across the Pacific as Australia was liberalizing its economy and moving to a knowledge intensive economic base (Stilwell, 2005). There were obvious spatial and structural imbalances from this shift across Australia. In the Sydney GMR steel producing areas, like the Illawarra and Newcastle, suffered massive economic shocks. But these areas have started to recover and find new economic bases (Fagan and Webber, 1999). Some areas in many regions around the world are gaining economic advantage, like Harlem in New York, most of San Francisco including Oakland and San Jose in the Bay area of California as well as many inner city areas of Melbourne and Sydney. Blakely and Bradshaw (2003) argue that city based economic development strategies can make a profound difference for economic options and outputs in a new globally based economy. But the uneven effects of the new economic drivers are little known..

This study unpacks the directions of growth in small areas within the Sydney GMR. Our contribution improves understanding of the competitive mix of areas that make up the economy of the Sydney Greater Metropolitan Region. Any region's competitive advantage depends on its endowments, such as, the quality of human resources, specialised technologies, the clusters of industries with global reach, and various institutional arrangements. Our analysis acknowledges that these endowments vary across the Sydney GMR economic space because districts and statistical local areas are not homogenous. Within an advanced district it is possible to find lagging areas and areas without the endowments that are critical to the regional economy.

Summary

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CHAPTER 3 THE RESEARCH APPROACH

3.0 THE SMALLEST UNIT FOR ANALYSIS

In this study we base our examination of the smallest unit for analysis on the statistical local area (SLA), an ABS geographic category for the collection of statistics, roughly approximating suburbs or closely related groups of suburbs. Since the Sydney Greater Metropolitan Region has 54 units of SLAs¹ our fine grain analysis is richer than that possible in most regions in the United States, for example, where data is only available for cities and counties which are larger units masking much fine grained spatial differences.

3.1 DISTRICTS

SLAs are small and are not perfect proxies for sub-regional economies. We group the 54 statistical local areas into nine (9) natural economic units or districts. These districts are: East Central Sydney, West Central Sydney, North Sydney, South Sydney, North West Sydney, South West Sydney, Illawarra, Newcastle, and Central Coast. Some of these districts remain known for their old economic base while others are clearly influenced by new information industries and new technology. So, we look both at SLAs across the larger Sydney GMR and SLAs are small economic districts that correspond to local government areas—imperfectly but a good proxy. They allow us to use a fixed area that most locals can identify with as a location of working and living to see what the drivers of growth are.

3.2 INDICATORS OF GROWTH

Our analytical framework looks at two variables to ascertain regional economic growth—total population and aggregate taxable income. We assess the “drivers” or forces that produce either or both. Thus the target or dependent variables are growth in

¹ The count of SLAs in the Sydney GMR was 58 in 2001. However there were only 54 SLAs in the Sydney GMR in 1991 – the base year for our analysis. Fortunately between 1991 and 2001 the increase in SLA counts was largely due sub-dividing SLAs without significant changes in boundaries. For purposes of this study, sub-divided SLAs are merged back to their 1991 boundaries as follows: Warringah and Pittwater (A) = Warringah/Pittwater which equates to Warringah in 1991; Sutherland Shire (A) - East and Sutherland Shire (A) - West = Sutherland Shire; and Blacktown (C) - North, Blacktown South East & Blacktown South West = Blacktown.

total population (human resources) and growth in aggregate taxable income. We select these variables because in combination they show socioeconomic health.

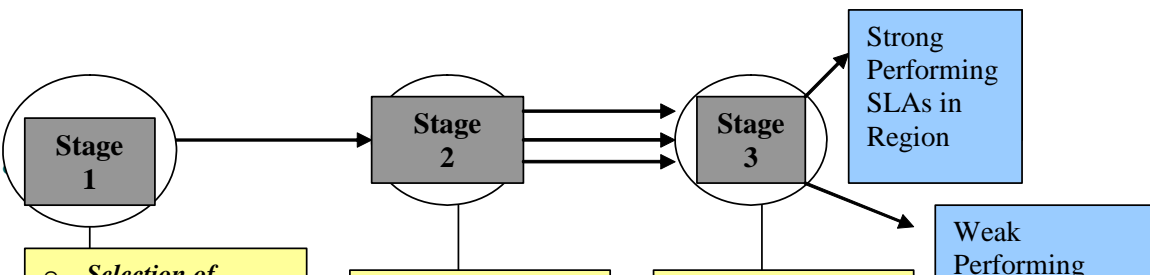
Changes in population size of an area are often associated with changes in a region’s economic activity. In the past, because of a lack of better indicators, population change has often been used as an indicator of regional growth. Rising incomes in a region are strongly related to increasing wealth.

Nonetheless there are circumstances where these variables might be false signals. For example, an old community might have high incomes but is ageing in place with a declining population. Or, a fast growing place with new lower socioeconomic or new immigrant residents might seem like it is doing well but the human resources and skill levels base might not produce a strong economy despite apparent population growth.

3.3 ANALYTICAL METHODS

Our analytical approach is in three stages. First, we use location quotients to measure the performance of each statistical local area. Location quotients are ideal for ascertaining the performance of places and variables over the same period and using the same base. But they measure the outcomes, not the inputs that generate relative performance. So, our second stage examines key economic growth activities using economic base analysis methods, and correlation analysis to show the relationships between factors associated with economic growth in a SLA to see which of these are significant. Finally, we take the results of the first two measures and filter them through regressions (multivariate linear) to see the influences of the significant economic drivers spatially within SLAs in the Sydney GMR. Our analytical approach is similar to the work done by Toft and Stough (1986) who look at economic spatial shifts and use shift share with location quotients to measure “... rates of growth among regions and particularly comparing regional competitiveness ...in (selected) industries” (Stimson, et al, 2002 p. 87). A similar strategy to that in Stimson et al (2002) was used in (Blakely, 1994, p.113) to develop economic development pathways in the sub-regions of the Brisbane/Southeast Queensland economy. Our approach is outlined in Figure 3.1 which is a guide to the process used in our analysis.

FIGURE 3.1 A SCHEMATIC OVERVIEW OF THE APPROACHES USED IN THE STUDY



Summary

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CHAPTER 4 UNIVARIATE ANALYSES AND RESULTS

4.1. LOCATION QUOTIENTS

This technique is applied to the following variables in this study: population in a region, taxable income in a region, and to employment in industries located in the 54 SLAs. This technique was employed to identify the change in selected variables for districts and SLAs between 1991 and 2001. We use the state of NSW as the reference region as has been done in earlier studies (for example, see Stimson et al, 2002). The location quotient contains notion of competition by considering a location's share of the NSW population. We use the location quotient in the same manner that Mikelbank (2005) did to assess the performance of a large number of suburbs in the United States. As he says, the location quotient can be calculated

“ for consistent geography, the task was to investigate population change over the time period. The calculation of a simple percentage change would be an obvious choice. However, the use of a location quotient has two distinct advantages. First, the construction of the location quotient makes use of a reference region, which in this case is the metropolitan area in which the individual suburb is located. It is this locally based comparison, inherent in the location quotient, makes it especially relevant in the analysis ... Secondly, the location quotient also contains the idea of competition by considering a location's share of the metropolitan population. (Mikelbank, 2005, p.9)

4.1.1 Location quotients - population

In the case of population for a SLA, the location quotient (LQ) of population for suburb *i* is calculated as:

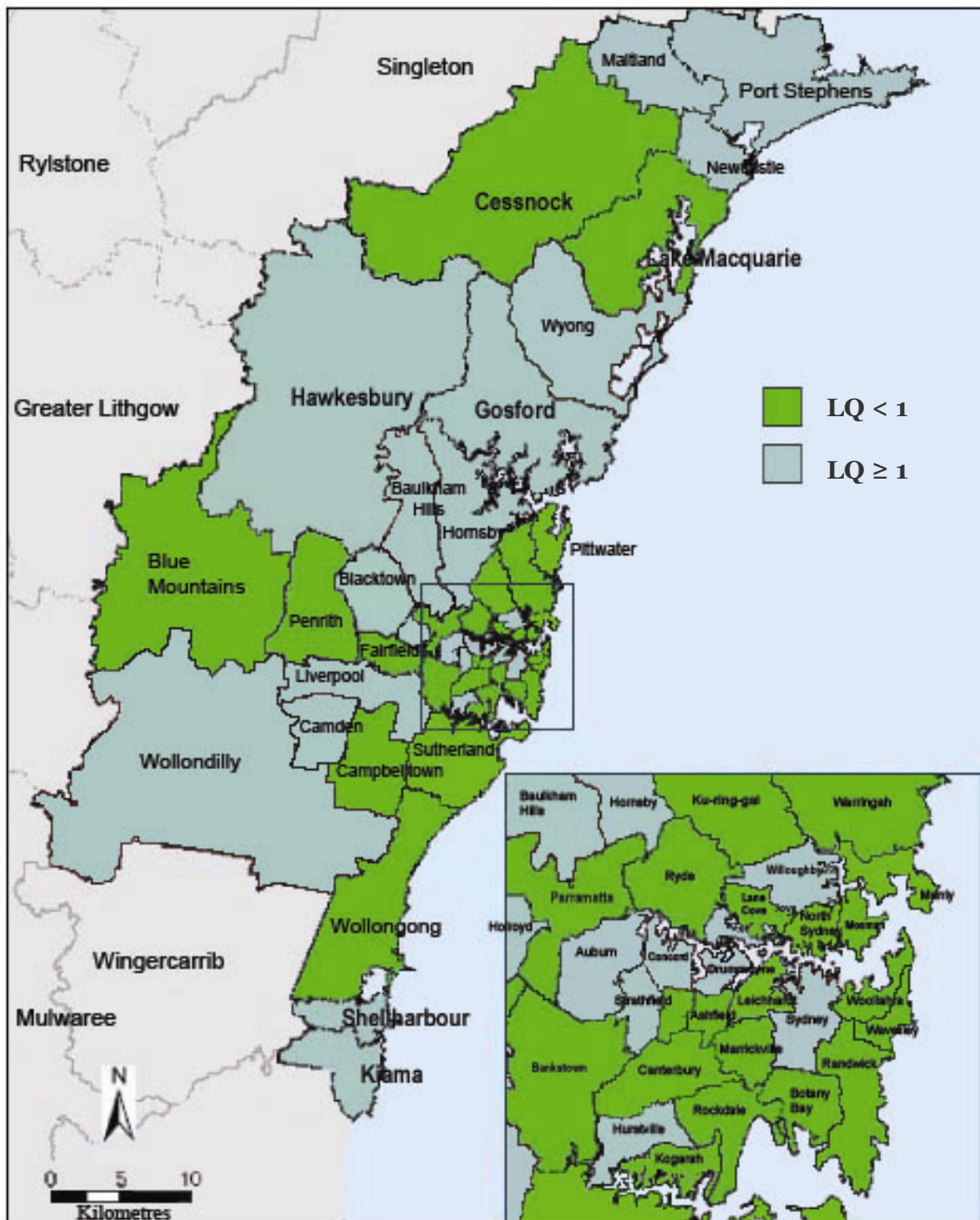
$$LQ_i = \frac{\text{Population}_{i,2001} / \text{Population}_{NSW,2001}}{\text{Population}_{i,1991} / \text{Population}_{NSW,1991}}$$

The numerator (denominator) represents SLA *i*'s proportion share of the NSW population in 2001 (1991). Thus, any SLA with a $LQ > 1$ increased its population share over the period. Conversely, a $LQ < 1$ indicates a decline in that SLA's NSW population share.

The population location quotients with News South Wales as a reference region show whether a given region grew faster than NSW (ie its LQ >1) or slower than NSW (ie its LQ <1). The LQ analyses taking 1991 and 2001 population reveal that out of 54 SLAs, 26 were had LQ values greater than 1 as shown in the map in Figure 4.1.

The detailed results from this analysis are in Appendix 1. Table 4.1 gives a summary showing the SLAs with LQ values greater than 1.

FIGURE 4.1 POPULATION LOCATION QUOTIENTS OF THE STATISTICAL LOCAL AREAS IN SYDNEY GREATER METROPOLITAN REGION, 1991-2001



Source: Australian Bureau of Statistics, Census of Population, 2001

Note: LQ calculation for Blacktown & Newcastle are based on the average of their respective two cities

TABLE 4.1 RESULTS: NUMBERS AND NAMES OF SLAS WITH POPULATION LOCATION QUOTIENT GREATER THAN 1 IN THE SYDNEY GMR, 1991- 2001

Name of the Districts in the Sydney Greater Metropolitan Region	Number of SLAs with LQ>1	Name of the SLAs	Total SLAs in the Districts
<i>Eastern Core</i>	<i>6</i>	<i>South Sydney, Sydney Inner, Sydney Remainder, North Sydney, and Willoughby</i>	<i>21</i>
<i>Western Core</i>	<i>1</i>	<i>Auburn</i>	<i>5</i>
<i>North</i>	<i>1</i>	<i>Hornsby</i>	<i>5</i>
<i>South</i>	<i>1</i>	<i>Sutherland Shire West</i>	<i>5</i>
<i>North West</i>	<i>5</i>	<i>Baulkham Hills, Blacktown North, Blacktown South West, Hawkesbury, and Penrith</i>	<i>7</i>
<i>South West</i>	<i>3</i>	<i>Camden, Wollondilly, and Liverpool</i>	<i>4</i>
<i>Central Coast</i>	<i>2</i>	<i>Gosford, and Wyong</i>	<i>2</i>
<i>Illawarra</i>	<i>2</i>	<i>Kiama, and Shellharbour</i>	<i>3</i>
<i>Newcastle</i>	<i>3</i>	<i>Maitland, Newcastle Inner, and Port Stephens</i>	<i>6</i>
<i>Total</i>	<i>24</i>		<i>54</i>

Source: Derived from Appendix 1.

Table 4.1 shows that the statistical local areas in the following districts: North West of Sydney, South West of Sydney, Central Coast and Illawarra regions (ie the urban fringe), stand out as attracting population. On the other hand Eastern Core Sydney, Western core, North and South Sydney (traditionally referred to as the global arc) all

have at least 2/3 of their statistical local areas with location quotients less than 1. Over the period covered by this study, the global arc lost population share.

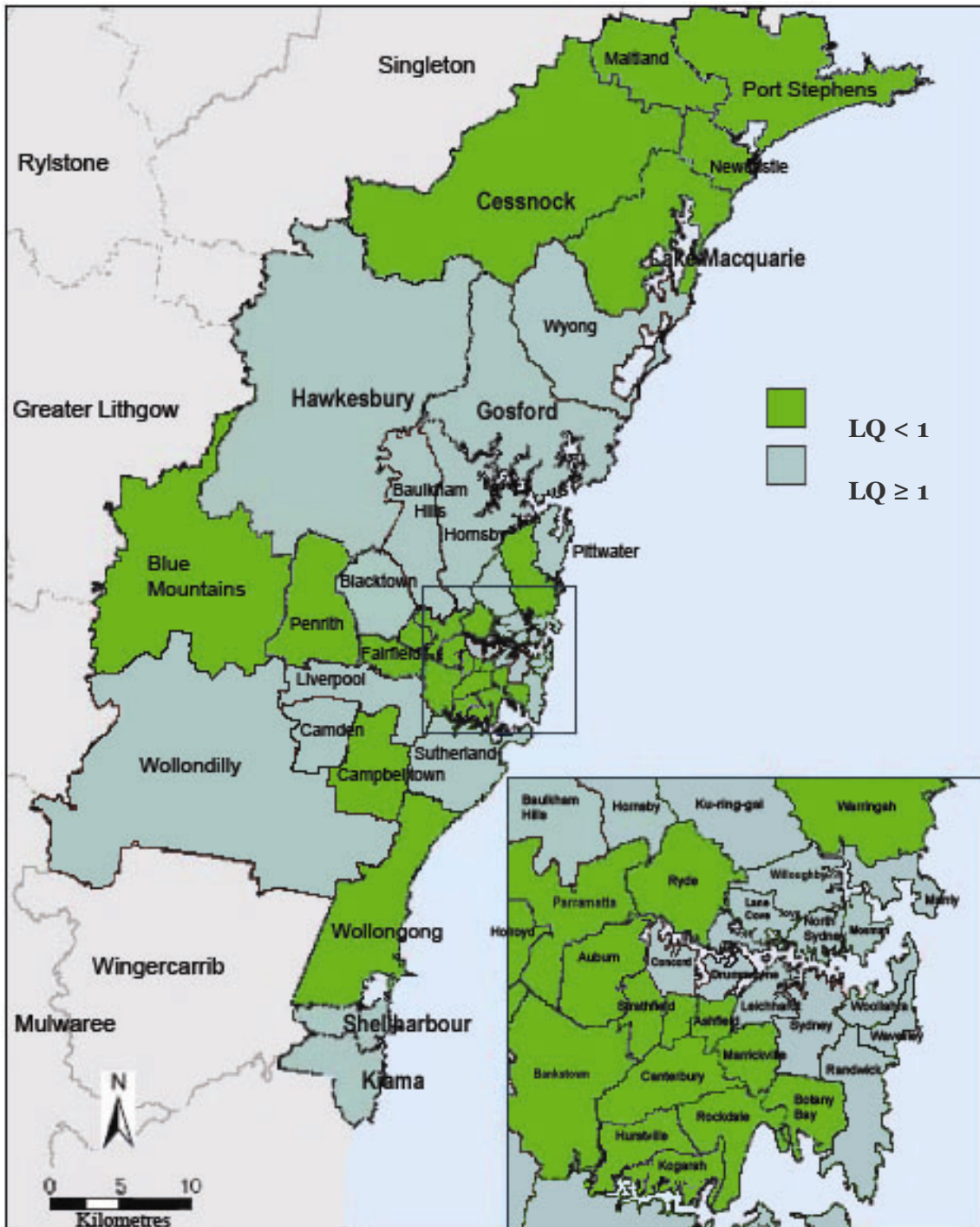
4.1.2. Location Quotients - Taxable income

Income is clearly a mark of economic strength. BTRE (2005) has argued that aggregate real taxable income in an area can serve as a proxy not only for wealth but also productivity. We look at taxable income changes over the study decade 1991-2001. Column 3 in Appendix 1 shows the results for location quotient analysis of aggregate taxable income for statistical local areas in the Sydney GMR. We used the following equation:

$$LQ_i = \frac{Income_{i,2001} / Income_{NSW,2001}}{Income_{i,1996} / Income_{NSW,1996}}$$

The interpretations of the results for taxable income are similar to those for population. The taxable income location quotients with New South Wales as a reference region show whether a given SLA's taxable income grew faster than NSW (i.e. $LQ > 1$) or slower than NSW (i.e. $LQ < 1$) as shown in the map in Figure 4.2.

FIGURE 4.2 TAXABLE INCOME LOCATION QUOTIENTS OF THE STATISTICAL LOCAL AREAS IN SYDNEY GREATER METROPOLITAN REGION, 1991-2001



Source: Derived from Bureau of Transport & Regional Economics (BTRE), 2005
 Note: LQ calculation for Blacktown, Newcastle and Sutherland Shire are based on the average of their respective two cities

TABLE 4.2 RESULTS: NUMBERS AND NAMES OF SLAS WITH TAXABLE INCOME QUOTIENT GREATER THAN 1 IN THE SYDNEY GMR, 1991- 2001

Name of the Districts in the Sydney Greater Metropolitan Region	Number of SLAs with LQ>1	Name of the SLAs	Total SLAs in the Districts
<i>Eastern Core</i>	<i>14</i>	<i>Leichhardt, South Sydney, Sydney Inner, Sydney Remainder, Randwick, Waverley, Woollahra, Concord ,Drummoyne, Hunter's Hill, Lane Cove, Mosman, North Sydney ,and Willoughby</i>	<i>21</i>
<i>Western Core</i>	<i>0</i>	<i>-</i>	<i>5</i>
<i>North</i>	<i>4</i>	<i>Hornsby, Ku-ring-gai, Manly and Pittwater</i>	<i>5</i>
<i>South</i>	<i>1</i>	<i>Sutherland Shire West</i>	<i>5</i>
<i>North West</i>	<i>3</i>	<i>Baulkham Hills, Blacktown North, and Hawkesbury</i>	<i>7</i>
<i>South West</i>	<i>3</i>	<i>Camden, Wollondilly, and Liverpool</i>	<i>4</i>
<i>Central Coast</i>	<i>2</i>	<i>Gosford, and Wyong</i>	<i>2</i>
<i>Illawarra</i>	<i>2</i>	<i>Kiama, and Shellharbour</i>	<i>3</i>
<i>Newcastle</i>	<i>1</i>	<i>Newcastle Inner</i>	<i>6</i>
<i>Total</i>	<i>9</i>	<i>30</i>	<i>54</i>

Source: Derived from Appendix 1.

Re-write is this the re-write???

There is a relation ship between places that had population growth and those with

income growth. Table 4.2 shows 14 of 21 SLAs in the Eastern core had income growth while Table 4.1 showed 6 had population improvements. On the other hand no Western Core area had any income growth and few had population growth. The fact that these are not perfect matches calls for more analysis which we do in the next section.

The statistical local areas in the Eastern core of Sydney and in North Sydney perform more strongly in terms of income than they do for population. Statistical local areas in the Central coast, Illawarra, and the South West of Sydney do well in terms of both population growth and income growth.

4.2 EMPLOYMENT SPECIALISATION BY STATISITCAL LOCAL AREAS

4.2.1 The data used

The data used to determine employment specialisation by statistical local area is a subset of the ABS Census data generally referred to as Journey to Work (JTW) data. Information about journey to work has been collected from the Australian Census of Population and Housing since 1971 (Robertson, 2000). JTW data is put to many uses. One of these is to monitor land use and industry density in an area. The data used in this study was collected from the following three questions on the census forms in 1991 and 2001:

- The respondents enumeration address;
- For the main job held last week what was the employer's workplace address?
- What kind of industry, business or service is carried out by the employer? (For example dairy farming, footwear manufacturing)

Destination zones (DZNs)

Answers to the above questions are used to code the number of people employed in different industries in different Destination Zones that are prepared for the ABS by State government authorities (who are the major users of JTW data). Each DZN is a geographical unit designed to represent areas with working populations of at least 100 persons. DZNs aggregate to statistical local area boundaries.

Industry classifications

In 1991 industries were classified using the Australian Standard Industry Classification (ASIC). However by the 2001 census, the relevant scheme for industry classification had changed to the Australian and New Zealand Standard Industrial Classification (ANZSIC). The ANZSIC accommodates more industry categories than the ASIC. The ABS applied a concordance between ANZSIC and ASIC to generate data on persons employed by industry of employment in each of the 54 statistical local areas. The industry listing used was closer to the 1991 listing. Thus at the 2 digit level our data set has 45 industries as opposed to 53 industries recognised in ANZSIC. The two industry classifications and the associated concordances are described in ABS (1993)

Data quality

While there are some data quality issues associated with the JTW data (Robertson, 2000), this type of data is the best available for describing industry structure of the Sydney GMR between 1991 and 2001. Nevertheless the following issues need to be kept in mind. First, the JTW data can be compromised due to poor responses to the work place address question (for example not providing the street name or number of their work place). To eliminate cases where respondents report the address of a head office rather than their workplace address, the 2001 census asked to for the person's workplace address rather than the employer's workplace address. Second, the JTW data can be contaminated in the processing procedures and the strategies used for assigning respondents to DZN codes. However, Robertson (2000) reports that after analysing inconsistent responses in output validation, ABS found that only a small proportion of the overall population was affected by this issue. Finally the JTW data has had significant quality improvements between 1991 and 2001. These have included improvements in the census question instructions and in coding strategies.

Comparability over time²

The data from 1991 Census are not strictly comparable with 2001 Census. For 1991, Journey to work was only coded for people enumerated within a JTW study area - these study areas only covered metropolitan areas - in NSW - roughly the stat divisions that cover Newcastle, Sydney and Wollongong. People counted outside these areas did not have their JTW recorded. While this might not have had a great impact on central Sydney - where it could be presumed that most people would have come from within the NSW JTW study area, it may have impacted on those locations nearer the edges of the JTW study area where people may have travelled from outside the JTW study area to work within the JTW study area. Also, usual residents not enumerated in their JTW area of usual residence on census night were excluded from JTW coding. Thus people Sydney in another part of NSW or interstate were also excluded from being coded.

² Comments in this section were provided by Paul Williams, Australian Bureau of Statistics in December 2005.

These constraints in the data have been taken into account in the analysis. For example no inter-temporal comparisons in industry structure have been undertaken because of the lack of comparability of Journey to Work data over time.

4.2.2 Estimating employment specialisation

We also undertook a location quotient analysis of employment in 9 sectors. The selection of these 9 industries was based on the following criteria:

* INCLUDE WHY THESE OUT OF 17 *

. The location quotient (LQ) of employment for SLA i is calculated as:

$$LQ_i = \frac{e_i / e_t}{E_i / E_t}$$

Where,

LQ_i = Location Quotient for industry (i)

e_i = SLA's employment in industry (i)

e_t = SLA's total employment (t)

E_i = NSW's employment in industry (i)

E_t = NSW's total employment (t)

Through the use of this tool, we identified which industries each statistical local area specialised in, as against the reference region (NSW). The technique measures the extent to which the study statistical local area is specialised, relative to the reference region (Klosterman, 1990:129).

If for a given industry, eg manufacturing, the ELQ is greater than 1 for a SLA, the share of people employed in manufacturing jobs in that SLA's total employment is larger than the share of NSW people employed in manufacturing jobs in NSW's total employment. If manufacturing is more important than it is (on average) for the state of New South Wales, the SLA is considered to specialise in manufacturing.

Similarly if for a given industry, eg manufacturing, the ELQ is less than 1 for a SLA, the share of people employed in manufacturing jobs in that SLA's total employment is less than the share of NSW people employed in manufacturing jobs in NSW's total employment.

4.2.3 Results on employment specialisation

The results for each of the industries by statistical local area are given in Appendix 1 for 2001. The numbers in bold are statistical local areas with ELQ values greater than 1.

Key results from the employment specialisation analysis are as follows. The ELQ for the retailing sector is, for most regions, less than 1.00. Thus the share of retailing jobs in total employment, for most areas, is less than the share of NSW retailing jobs in NSW's total employment. Retailing is less important (in terms of the employment) than it is (on average) for the state of New South Wales. Thus most SLA is considered to be importers (from other regions) of retailing sector products and services.

Each SLA has at least one of the major industries (except Retailing) with an ELQ greater than 1. These sectors are indicators of a region's strength compared to the rest of New South Wales.

Some SLA, particularly those in the core areas of Sydney GMR have more industries of employment specialisation. Some industries (for example, Technology and Knowledge Intensive Industries or Finance, Insurance, Property and Business Services) have a lot more local government areas specialising in them. These sectors are critical in a global economy.

The anchor of the Sydney's economy is Finance, Trade, and Knowledge Sector jobs. Sydney's Western Suburban cities were home to manufacturing jobs. Sydney's south is y much looks like construction core whereas Newcastle seems to be specialising in health related jobs.

TABLE 4.3 RESULTS: NUMBERS AND NAMES OF SLAS WITH EMPLOYMENT LOCATION QUOTIENTS GREATER THAN 1 FOR SELECTED INDUSTRIES IN THE SYDNEY GMR, 1991- 2001

4.3 ESTIMATES OF BASIC EMPLOYMENT FOR SELECTED INDUSTRIES

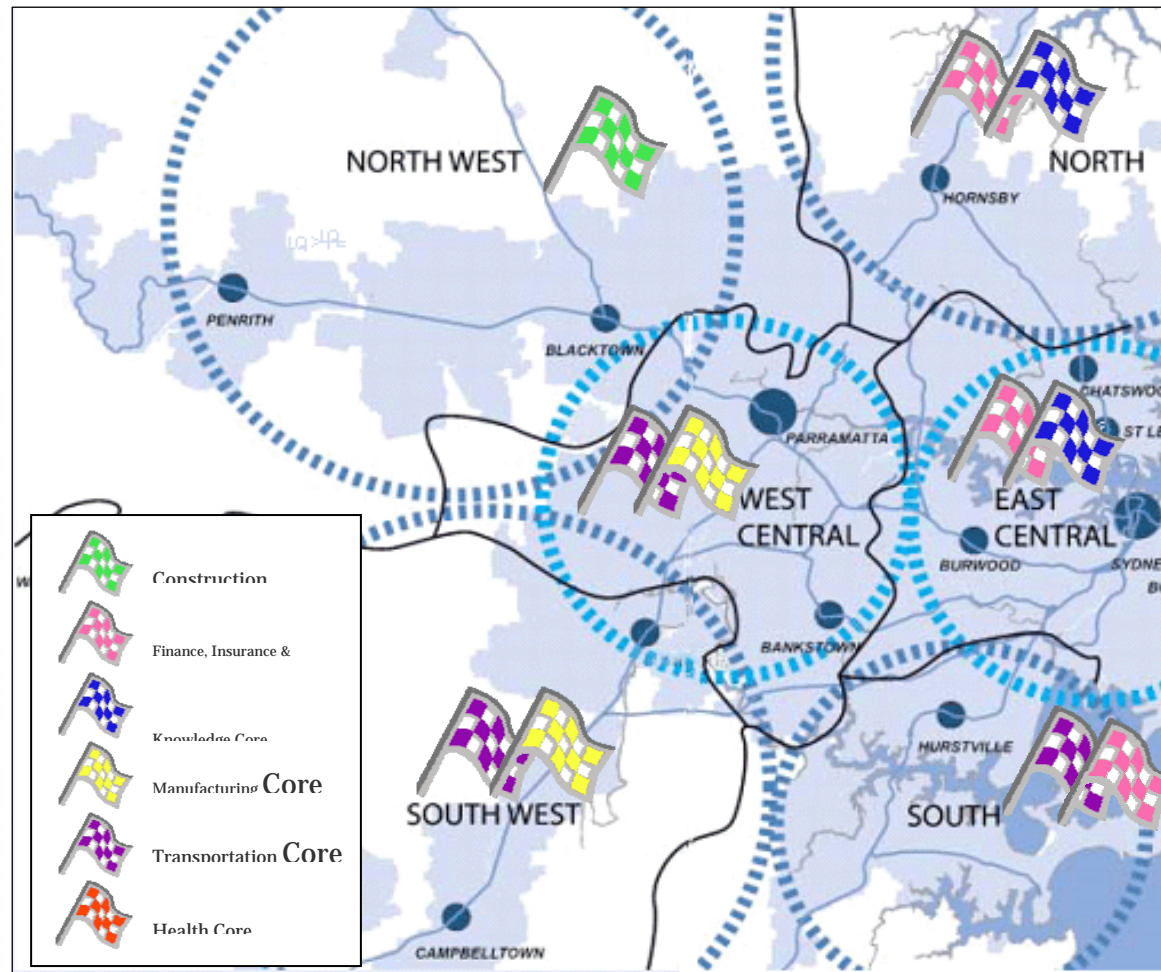
We employed another level of analysis to see what industries had impacts on local and sub-regional economic areas. Klosterman et al, (1993) proposed a technique which we use in this section to further examine the statistical local areas by dividing employment in selected industries into in two categories:

- basic (or non-local) sector; and
- non-basic (or local) sub-sector.

This technique leads to the identification of the sectors in a statistical local area serve the local market and which is independent of the local market (i.e. non-local). The non-local employment is called Basic Employment. The results from the application of this technique for the statistical local areas in the Sydney GMR are shown in Appendix 2. For each statistical local area, a positive entry indicates the number of non-local jobs in the statistical local areas. A negative entry indicates that for that industry, there are no basic (ie non-local) jobs in the statistical local areas. Strengthening and growing the local economy is often related to enhancing the basic sector employment. It also often assumed that the basic sector is the engine of growth of local economies (Klosterman, 1990: 115). The map in Figure 4.3 summarises the results on clusters for the 9 districts in the Sydney GMR.

TABLE 4.4 **TABLE**

FIGURE 4.3 INDUSTRIAL CLUSTERS IN SYDNEY GREATER METROPOLITAN REGION, 1991-2001



Summary

CHAPTER 5 MULTIVARIATE ANALYSES OF POTENTIAL DRIVERS OF GROWTH

5.1 GROWTH IN POPULATION AND AGGREGATE TAXABLE INCOME

Sydney's population is growing. Most of Sydney GMR's growth is from natural increase. The rest comes from Sydney's attractiveness to people from other parts of Australia and overseas. Population forecasts suggest that about half a million new jobs will be needed over the next 25 years to meet the ever growing population.

Table 5.1 summarises the growth rates of the 54 SLAs in the Sydney GMR. The last four columns give the growth rates and corresponding rank order of a region within the Sydney GMR, for taxable income and regional population. The ordering of SLAs generally differs between the two indicators of growth. Based on taxable income the 10 fastest growing statistical local areas were: Sydney Remainder, Sydney Inner, Camden, Hunter's Hill, Mosman, Blacktown, South Sydney, Liverpool, Woollahra, and Leichhardt. Three out of the 10 SLAs with the fastest growth in taxable income are outer fringe SLAs. These are Blacktown, Camden and Liverpool.

Based on population the 10 fastest growing regions in the period from 1990 to 2001 are: Sydney-Remainder, Sydney-Inner, Camden, Liverpool, Blacktown, Newcastle – Inner, Baulkham Hills, Concord, Port Stephens, and Wyong.

These places can be divided into fast growing “sea change” areas on the coast like Port Stephens; urban fringe/ commuting areas like Wyong, recovery industrial areas like Newcastle, Liverpool and Blacktown; and emerging areas like Baulkham Hills, Concord and Camden with the middle ring areas just outside the CBD core area reflecting continued urban transformation as these areas transition with added new immigrant populations or gentrification.

One possible explanation for the fast growth in outer/ fringe areas of the Sydney GMR are the the high prices of houses in areas closer to the Sydney Commercial business district.

TABLE 5.1 GROWTH IN SUB-REGIONS OF THE SYDNEY GREATER METROPOLITAN REGION:1991-2001

No	Sydney GMR District	SLA Number	SLA Name	Taxable Income LQ
1	Eastern Core (GMR East Central)	17202	Sydney (C) - Remainder	1
2	1-Eastern Core (GMR East Central)	17201	Sydney (C) - Inner	1
3	6-Southwest	11450	Camden (A)	1
4	1-Eastern Core (GMR East Central)	14100	Hunter's Hill (A)	1
5	1-Eastern Core (GMR East Central)	15350	Mosman (A)	1
6	1-Eastern Core (GMR East Central)	17070	South Sydney (C)	1
7	6-Southwest	14900	Liverpool (C)	1
8	1-Eastern Core (GMR East Central)	18500	Woollahra (A)	1
9	1-Eastern Core (GMR East Central)	14800	Leichhardt (A)	1
10	1-Eastern Core (GMR East Central)	18250	Willoughby (C)	1
11	1-Eastern Core (GMR East Central)	15950	North Sydney (A)	1
12	1-Eastern Core (GMR East Central)	14700	Lane Cove (A)	1
13	3-North	15150	Manly (A)	1
14	1-Eastern Core (GMR East Central)	11900	Concord (A)	1
15	5-Northwest	10500	Baulkham Hills (A)	1
16	1-Eastern Core (GMR East Central)	18050	Waverley (A)	1
17	1-Eastern Core (GMR East Central)	12550	Drummoyne (A)	1
18	6-Southwest	18400	Wollondilly (A)	1
19	3-North	14500	Ku-ring-gai (A)	1
20	5-Northwest	13800	Hawkesbury (C)	1

21	7-Central Coast	18550	Wyong (A)
22	7-Central Coast	13100	Gosford (C)
23	5-Northwest	Ddd??	Blacktown (C) -
24	3-North	14000	Hornsby (A)
25	8-Illawara	14400	Kiama (A)
26	3-North	Ddd??	Pittwater (A)- Warringah
27	1-Eastern Core (GMR East Central)	16550	Randwick (C)
28	9-Newcastle	15901	Newcastle (C) - Inner
29	4-South	Ddd??	Sutherland Shire (A)
30	8-Illawara	16900	Shellharbour (C)
31	5-Northwest	16350	Penrith (C)
32	5-Northwest	10900	Blue Mountains (C)
33	9-Newcastle	16400	Port Stephens (A)
34	4-South	14450	Kogarah (A)
35	4-South	14150	Hurstville (C)
36	6-Southwest	11500	Campbelltown (C)
37	1-Eastern Core (GMR East Central)	11100	Botany Bay (C)
38	1-Eastern Core (GMR East Central)	16700	Ryde (C)
39	9-Newcastle	15050	Maitland (C)
40	1-Eastern Core (GMR East Central)	17100	Strathfield (A)
41	1-Eastern Core (GMR East Central)	15200	Marrickville (A)
42	2-Western Core (GMR West Central)	16250	Parramatta (C)
43	1-Eastern Core (GMR East Central)	10150	Ashfield (A)
44	2-Western Core (GMR West Central)	10200	Auburn (A)
45	1-Eastern Core (GMR East Central)	11300	Burwood (A)
46	8-Illawara	18450	Wollongong (C)
47	4-South	16650	Rockdale (C)
48	9-Newcastle	14650	Lake Macquarie (C)
49	9-Newcastle	15902	Newcastle (C) - Remainder
50	2-Western Core (GMR West Central)	12850	Fairfield (C)
51	2-Western Core (GMR West Central)	10350	Bankstown (C)
52	2-Western Core (GMR West Central)	13950	Holroyd (C)
53	9-Newcastle	11720	Cessnock (C)
54	1-Eastern Core (GMR East Central)	11550	Canterbury (C)

5.2 POTENTIAL DRIVERS OF GROWTH

One of the aims of this paper is to identify factors or variables that are associated with growth of total population and or of aggregate taxable income in a statistical local area. We use multivariate linear and logistic regression techniques to analyse relationships between various possible drivers of growth and the two measures of growth. The structure of these local economies and what factors improve or weaken their performance can be examined by determining the depth and type of economic activity gives rise to differing income and population performance.

5.2.1 The extent to which a region is specialised

We use the Herfindahl industrial diversity index to measure the extent to which a statistical local area is specialised. We use the following formula from Bradley and Gans (1998):

$S(i, t) = (e_{1it} / E_{it})^2 + (e_{2it} / E_{it})^2 + \dots + (e_{44it} / E_{it})^2$; where

$S(i, t)$ is the Herfindahl industrial diversity index for SLA i at time t ;

e_{jit} is the total number of people (15 years and over) employed in industry j in SLA i at time t , where $j = 1, 2, \dots, 44$ and $i = 1, \dots, 54$. These counts are based on Journey to Work data from ABS Census.

E_{it} is the total number of people (15 years and over) employed in SLA i at time t . These counts are based on Journey to Work data from ABS Census.

The variable S has the following intuitive interpretation. When S is zero this shows a region that is diversified (with employment spread evenly across all industries, and zero specialisation), while a value of 1 indicates a region's employment is fully concentrated in a single industry.

Bradley and Gans (1988, p. 269) concluded that for an area specialisation does have negative risk implications but can also have higher productivity due to an encumbered exploitation of comparative advantage. Another study, Kaufman (1993), of the importance of industrial diversity for a region concluded that 'industrial diversity is closely linked to stability of economic performance, rather than to economic growth per-se. These earlier studies suggest that industrial diversity is worth including in an investigation of potential drivers of the SLAs in the Sydney GMR.

5.2.2 Degree of industry localisation in a statistical local area

Localisation is the degree to which an industry's economic activity takes place in one or a small number of geographical areas (Bostic et al (1997)). Various theoretical studies (for example, Marshall (1920), Hoover (1937) have predicted that industry localisation has positive impacts on growth of a given area.

The effect of industry localisation depends on the number of localised industries in a statistical local area. Inclusion of industry localisation effects in this study involved the following steps. We first decided a threshold share of NSW employment that an industry in an SLA will need to employ for the industry to be considered localised in an SLA. In the study we experiment with three possible threshold shares: 1%, 2% and 5%.

Then for each SLA we determined which industries were localised. For example, if the threshold is 5% then for manufacturing to be considered localised in a given SLA, the manufacturing jobs in the SLA must be 5% or more of the manufacturing sector jobs in NSW.

An SLA's 'overall' degree of localisation is estimated as the total employment in localised industries divided by total employment in a SLA. The degree of localisation

for each SLA changes depending on the threshold share. In the study we report results for each of the three threshold shares. Apart from using thresholds which reflect data on the SLAs in the Sydney Greater Metropolitan Region, the formula for industry localised effects is the same as that proposed by Bostic et al (1997):

$$LOC_{c,i} = E_{c,i} / \sum_c$$

Changing the threshold share in the definition of localised industries changes the number of localised industries. When the threshold is set at 5% only four industries are classified as localised: manufacturing, construction, wholesale trade and retail trade. Lowering the threshold to 2% increases the localised industries by 3 (electricity, water and gas supply, property and business services, and education, museum & library services) to a total of seven. Further reducing the threshold to 1% increases the localised industries by 4 (accommodation, cafes and restaurants, transport and storage, finance and insurance services, health services) to a total of 11 localised industries. Localisation is an industry-specific effect. For each of the localised industries we define industry-specific localisation variables using the following equation:

5.2.3. Human Capital

Recent international studies (OECD, 2001a, b, c) of the role of education, skills and qualifications in regional economic performance suggest that human capital has a favourable impact. In this study we explore the relationship between the growth of a statistical local area and the following proxies for human capital in a SLA:

- The percentage of a SLA's population who have a degree or higher in 1991; and
- The percentage of a SLA's population who have completed skilled vocational training in 1991.

We expect these variables to have positive impacts if there is (as some studies have found) a positive relationship between a statistical local area's human capital and growth.

5.2.4 The size of a SLA's commuting population

We use the percentage of a city's population that live in one city but work in another region as a proxy for connectivity. This variable could also be an indicator of various other aspects of an area – for example high values for some areas indicate that the area is residential and thus has limited opportunities for work. We hypothesise that there is

a positive relationship between the ‘percentage of a region’s population that live in one region but work in another’ and the growth of the SLA they live in.

5.2.5 The role of government

We use, as an indicator for the role of government, the share of employment in the government sector in a statistical local area. Bradley & Gans (1998) suggest that government plays a role in any region. The variable that Bradley & Gans use to measure role of government was significant but had a negative value in their regression equation. They recommend caution in interpreting the negative sign associated with this variable.

5.2.6 Industrial Structure

In this study it was possible to define 44 industries in the Sydney Greater Metropolitan Region. Appendix 3 gives a list of the industries. For each SLA we compute the number of people employed in each of the 44 industries as a percent of the total number of people employed in a SLA (as derived from the ABS Census journey to work data). This vector of shares of employment in the different industries defines what we refer to as ‘industry structure’ of a SLA. Much regional literature, for example Bradley and Gans (1998), Blakely and Bradshaw (2002, p 67), suggest that industry structure affects the rate of growth of a region. in a reformulation of the components of local economic development To test this hypothesis data on the share of employment in selected ANZSIC³sectors are used to examine the total economy by population size and economic structure.

5.2.7 A statistical local area’s population Size in 1991

The regional research literature, for example, Bradley and Gans (1998) suggests that size of a region influences regional growth in two diametrically opposite ways. First, regions with a large population may grow slower because of diseconomies of regional size. A region with a large population tends to experience rising housing costs and commuting costs. These factors exacerbate socio-economic differences across the region and may lead to perceived changes in quality of life in a region and may contribute to lower growth rates. On the other hand regions with large populations can grow faster because of agglomeration effects (Feser, 2001) including productivity because of a larger labour pool, and because of inter-industry knowledge spill-overs between co-located industries which can lead to product variety and diversity and overall, better quality of life. It is difficult to determine a priori the value of a SLA’s population size. It may be positive, negative or zero depending on whether the growth enhancing factors are stronger, or weaker or counter-balance the growth depressing factors.

³ ANZSIC stands for the Australian and New Zealand Standard Industrial Classification

5.2.8 Population density

Australian Bureau of Statistics (2002) suggests that there may be a relationship between population density and population growth of an area. We hypothesise that growth (particularly population growth) will be higher in statistical local areas which in 1991 had lower population densities.

5.3. MULTIVARIATE ANALYSIS OF DRIVERS OF GROWTH FOR SYDNEY GMR: 1991 - 2001

5.3.1 Analytical Approach

This part of the research involved two steps. Firstly exploratory pair-wise correlation analyses were undertaken to assess whether a relationship could be established between the potential drivers of growth and each one of the indicators of growth – population growth and taxable income. The pair-wise correlations between ‘possible drivers of growth’ and indicators of growth, while useful in the exploratory stages of a study, assume separability in the way variables impact growth, but growth is a much more complex process. These preliminary correlation analyses are not discussed here. They were a tool in the selection of variables for inclusion in the regression equations.

Secondly, two regression were run. One equation had as the dependent variable the POPULATION location quotient values (with NSW as the reference region) for all SLAs in the Sydney GMR. Another equation had as the dependent variable the AGGREGATE TAXABLE INCOME location quotient values (with NSW as the reference region) for all SLAs in the Sydney GMR. These more complex models where growth depends on more than one variable at a time are discussed below.

In these equations growth of a SLA between 1991 and 2001 is expressed a linear relationship of the socio-economic attributes of the statistical local areas as they were in 1991 – that is:

Growth in a SLA (between 1991 and 2001)

= Constant + α * (Extent to which a SLA is specialised in 1991)

+ β * (Proxies for a SLA’s human capital in 1991)

+ π * (Proxy for the extent to which a SLA’s is open in 1991)

- + ρ * Proxy for a SLA's connectivity in 1991
- + μ * Role of government in 1991 in the SLA
- + λ * Proxies for Industry structure of the SLA in 1991
- + θ_1 Population in SLA in 1991
- + θ_2 * A SLA's population density in 1991
- + Error term.

Two regressions are undertaken - one for population growth in a SLA and another for growth in aggregate taxable income in a SLA.

CHAPTER 6 RESULTS: DIFFERENCES BETWEEN STRONG AND WEAK PERFORMING SLAS

6.1 RESULTS FROM MULTIVARIATE ANALYSES

Table 6.1 presents the results of the two regression analyses. The coefficients for those variables that are significant⁴ drivers of growth are in bold italics and underlined. In interpreting the results from the multivariate analysis we are interested in two aspects. First we examine the strength or significance of the relationship. Second we comment on whether the estimate has a positive or negative value.

⁴ A rule of thumb test for significance is that the estimate must be larger than twice the associated standard error.

TABLE 6.1 INDICATORS OF A SLA'S GROWTH (1991 TO 2001) AS A FUNCTION OF SELECTED POSSIBLE DRIVERS OF GROWTH: ALL CITIES

	TAXABLE INCOME GROWTH	Standard errors	POPULATION GROWTH	Standard errors
0- Constant	<u>1.830</u>	0.289	<u>1.352</u>	0.321
1- Specialisation	<u>2.247</u>	0.731	<u>2.117</u>	0.812
2- A SLA's human capital - % of population with a degree or higher	<u>0.155</u>	0.051	<u>0.161</u>	0.057
3- A SLA's human capital - % of population who have completed skilled vocational training	0.025	0.089	0.082	0.099
4- Openness of a SLA's - Percent of non-local jobs in the region's manufacturing sector (proxy for openness, 1991)	0.000	0.003	0.006	0.003
i- Openness of a SLA's -- Percent of non-local jobs in the region's finance sector (proxy for openness, 1991)	<u>0.015</u>	0.003	<u>0.015</u>	0.004
6- Commuters - % of population who work outside the SLA	<u>0.054</u>	0.021	0.032	0.023

7- Role of government in a SLA.	0.485	0.423	0.443	0.470
The share of Government Administration & Defence' in a region's employment, 1991				
Industry structure: Share of employment in a sector (1991)				
9- Agriculture, Forestry & Fishing	0.063	0.282	0.115	0.313
10 –Manufacturing	<u>-0.480</u>	0.145	-0.432	0.161
11-Electricity, gas & and water supply	-0.130	0.584	0.101	0.649
12 – Construction	<u>-0.457</u>	0.186	<u>-0.740</u>	0.207
13 -Retail trade	<u>-0.535</u>	0.187	-0.111	0.208
14 - Transport & storage	<u>-0.656</u>	0.170	<u>-0.703</u>	0.189
15 -Communications services	-0.710	0.548	-0.105	0.609
16-Finance	<u>-1.193</u>	0.259	<u>-0.871</u>	0.287
17-Property and business services	-0.184	0.266	-0.633	0.295
18-Health &Community services	<u>-1.137</u>	0.192	<u>-0.994</u>	0.214
19- Education	<u>-0.621</u>	0.171	<u>-0.583</u>	0.190
Other variables				
20- Log (Population-1991)	0.033	0.018	<u>-0.016</u>	0.020
22- Population density	<u>-8.216</u>	1.976	<u>-7.506</u>	-2.19

Adjusted R-squared	0.8107	na	0.8940	Na
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Note: 'Underlining' and 'bolding' indicates that the variable is significant in the equation at 5% level of significance. The value of its coefficient is larger than twice the standard error.

6.2 INTERPRETATION OF RESULTS

***** Overall there are some interesting differences between the results in BTRE (2003a) and those in this paper. BTRE (2003a) reports results on regressions across all 425 labour markets in Australia. The explanatory power of the regressions reported in this paper is markedly higher (=== for the population growth equation, and ==== for the taxable income equation) compared to 40% in BTRE (2003a). One possible explanation for this difference is that the statistical local areas in Sydney greater Metropolitan Region in this report are being driven by a common set of factors. However it is much harder to explain growth across a more diverse set of regions where the drivers differ.

Human capital has a significant positive for the statistical local areas in Sydney greater Metropolitan Region, but was negative (and borderline significant) across all Australia's labour markets in BTRE (2003a). One of the reasons for this is that Sydney is a centre of finance, import and export, education and research where the national economy is more heavily weighted toward traditional primary and manufacturing economies. In this respect, Sydney looks more like global knowledge intensive cities described by Florida as 'creatively driven' with human capital's capacity to produce ideas, services and knowledge rather than products as the primary drivers. While it is clear that 'smoke stack chasing is dead'; too many of our sample small areas in the Sydney metropolitan region remain locked in the past economic structure or use retail services that do not generate new economic wealth but consume wealth and pay low wages so they add little to the local small area economies in the Sydney metropolitan region. We anticipate this is the case for many communities both locally and internationally that seek jobs of any kind such as retail employment without looking carefully at the flow on wealth generating aspects of their economic development choices (JAPA WalMart article cite here)

Similarly the specialisation/ diversity variable was significant in the statistical local areas in Sydney greater Metropolitan Region, but not across Australia's regions. Again, the specialisation of knowledge intensive areas generates economic agglomeration for

the region as a whole. On a national level dispersed specialisations, particularly in dying or static industries drags down the local economy (Blakely and Bradshaw, 2003)

6.2.1 Interpretation: The extent to which a region is specialised

The extent to which a region was specialised in 1991 seems to be strongly positively correlated with a region's growth, in the subsequent period, in the Sydney GMR. Table 6.1 shows that this variable was significant for population growth and the aggregate taxable income regression equations. This result differs from Bradley & Gans (1998) who find that specialisation is negatively correlated with population growth in 104 Australian cities. The result also differs from *** BTRE (2003a) who find that the initial level of industrial diversity (and by deduction, our derived variable S) was not a significant explanatory of variation in income growth across regions. The BTRE result is based on an analysis of 425 specially defined BTRE labour market regions. These two results based on Australian data try to estimate an Australia-wide average relationship. Our result may be showing no more than Sydney is different from 'the average' region in Australia because it is globally and not nationally driven. Similar results would be found for other international/global cities like San Francisco, Vancouver, Singapore and Auckland that are of similar size to Sydney (Blakely, 2005 ANZRS Conference speech)

6.2.2 Interpretation: the degree of industry localisation in a SLA

Two sectors are considered in this study under this heading –manufacturing and the finance sector. For these two sectors we compute non-local jobs in a region as a proportion of a region's labour-force. The two variables are used as a proxy for a region's degree of openness.

Both variables are found to have a positive relationship with population growth and growth in aggregate taxable income. Thus the more open regions in 1991 tended to grow faster in the period from 1991 to 2001.

Of the two proxies for regional openness the share of non-local jobs in the finance sector in a region is significant in both regressions.

6.2.3 Interpretation: Human Capital

In this study two variables are used as proxies for a region's human capital:

- the share of a region's population with a Bachelor's degree or higher, and

– the share of a region’s population that have a skilled vocational qualification. Exploratory analyses ruled out the use of other possible proxies which were often insignificant.

Table 6.1 shows that these two proxies for human capital are positively related with population growth and with growth in aggregate taxable income in a region. This suggests that regions which had higher levels of human capital in 1991 grew relatively faster in the period from 1991 to 2001.

Of the two proxies for human capital in a region, only one, the share of a region’s population with a Bachelor’s degree or higher – is statistically significant in both regression equations.

6.2.4 Interpretation: A region’s level of connectivity

For many areas in the Sydney GMR this variable (the percentage of a city’s population that live in one city but work in another) could be a proxy for connectivity that Blakely (2004) recently defined as ‘high quality and reliable, telecommunications --- and efficient cross regional connectivity by public and private transportation systems’. We hypothesised that there is a positive relationship between the ‘percentage of a region’s population that live in one region but work in another’ and growth.

Table 6.1 shows as expected that this variable is positively correlated with growth in both a region’s population and growth in aggregate taxable income. Table 6.1 also shows that the variable is significant in the aggregate taxable income equation.

6.2.5 Interpretation: The role of government

In Table 6.1, the proxy variable for the role of government is the number of people employed in ‘Government, Administration and Defence’ as a percent of a region’s employed person. We find a positive relationship between this variable and growth in taxable income. The variable is positive in the population equation but it is not statistically significant.

6.2.6 Interpretation: Industrial Structure

The sectors used in this study to proxy the industrial structure of a statistical local area are: Agriculture; Forestry & Fishing; Manufacturing; Electricity, gas and water; Construction; Retail trade; Transport & storage; Communication services; Finance and Insurance; Property & Business services; Health & community services; Education; and Government administration & Defence. The results for variables under this heading can be put into groups.

There are only two variables of this type – the share of employment in Agriculture; Forestry & Fishing and the share of employment in Government administration & Defence, and the share of employment in Electricity, gas and water supply (in the

population equation only). Agriculture, Forestry & Fishing are of limited importance in the industrial structure of the Sydney GMR. Thus it is not surprising that this sector is associated with only a small positive value in explaining growth – SLA's total population or aggregate taxable income – in the Sydney GMR. Table 6.1 shows further that this proxy for industrial structure is insignificant in both equations.

Table 6.1 suggests (contrary to Bradley & Gans, 1998) that there is a positive relationship between the share of a regions employment in Government administration & Defence and growth in both population and aggregate taxable income. However the association is not statistically significant in both equations.

The rest of the industry structure proxies, Manufacturing; Electricity, gas and water; Construction; Retail trade; Transport & storage; Communication services; Finance and Insurance; Property & Business services; Health & community services; and Education have negative and significant values in population growth and aggregate taxable growth equations. This result is consistent with earlier results in Bradley & Gans (1998). One possible interpretation of this result is that industry structure is a drag on a region. The higher the region's share of employment in any of these sectors the lower is its growth between 1991 and 2001. The negative signs capture the effect of having a strong presence of slow-growing industries over the period. For example, a region with a high share of its employment in manufacturing in 1991 showed lower income growth because the manufacturing industry did not perform well nationally (an in the Sydney Greater Metropolitan Region) between 1991 and 2001.

Work through by industry—not sure why this is needed.

6.2.7 Interpretation: SLA's real income per tax payer in 1991

A statistical local area's real income per taxpayer in 1991 is not significant in explaining both population growth and growth in aggregate taxable income between 1991 and 2001 in the Sydney GMR.

6.2.8 Interpretation: SLA's Population Size in 1991

Table 6.1 shows that a statistical local area's population size in 1991 negatively correlated with the growth in population of statistical local areas between 1991 and 2001. This negative correlation is consistent with the result from Bradley and Gans (1998).

However Table 6.1 also shows that for the Sydney GMR, a statistical local area's population size in 1991 was insignificant in explaining the growth of statistical local

areas between 1991 and 2001. This result was found for population growth and growth in aggregate taxable income. This result differs from Bradley and Gans (1998) who found a significant negative relationship between a region's starting population size and subsequent growth. The result from Bradley and Gans (1998) was derived using data on 104 Australian cities between 1981 and 1991. The difference between our result and that from Bradley & Gans may be due (a) a different period – we use data on the period from 1991 to 2001 – where the congestion effects may have been weaker; (b) a difference in scope – the Bradley & Gans study cover cities in the whole of Australia, whereas our study is focussed on the Sydney GMR. It is likely that the Bradley & Gans result for an average city in Australia does not reflect the conditions in Sydney GMR.

6.2.9 Interpretation: Population density

As expected population growth is negatively correlated with population density. Growth between 1991 and 2001 seems to have been higher in districts or local government areas with lower population densities. In Table 6.1 population density is associated with a small but significant negative value in the equation relating growth to this potential driver of growth. The variable is insignificant in the equation for growth in aggregate taxable income.

There are different methods one can adopt to explore this question. One method uses the quintile regression analysis technique. This method starts with ordinary least squares (OLS) methods relating growth rates to a number of variables which influence growth. Barreto and Hughes (2004) used this method to study the unobserved factors (i.e., those factors not included in the regression model) and their possible contribution of to regional STRONG performance or WEAK performance. Barreto and Hughes (2004) are of the opinion that for WEAK-performing regions, the most significant determinant of growth was latitude (a proxy for 'tropicalness' of a region), social infrastructure, civil liberties and liquid liabilities. For STRONG performing regions, Barreto and Hughes (2004) found that the determinants of growth included trade (and in particular export share), social infrastructure, government expenditure share, investment share and investment prices. It is not possible to apply these techniques in this study because of data constraints.

Instead we use an alternative (non-econometric) approach to supplement the analysis in earlier sections of the paper and find the possible sources of divergence between regions in the Sydney GMR. This approach was recently applied by Mikelbank (2005). We use two Figures 6.1 and 4 to summarize key difference between STRONG city/suburbs and WEAK city/suburban areas related to the values of selected variables.

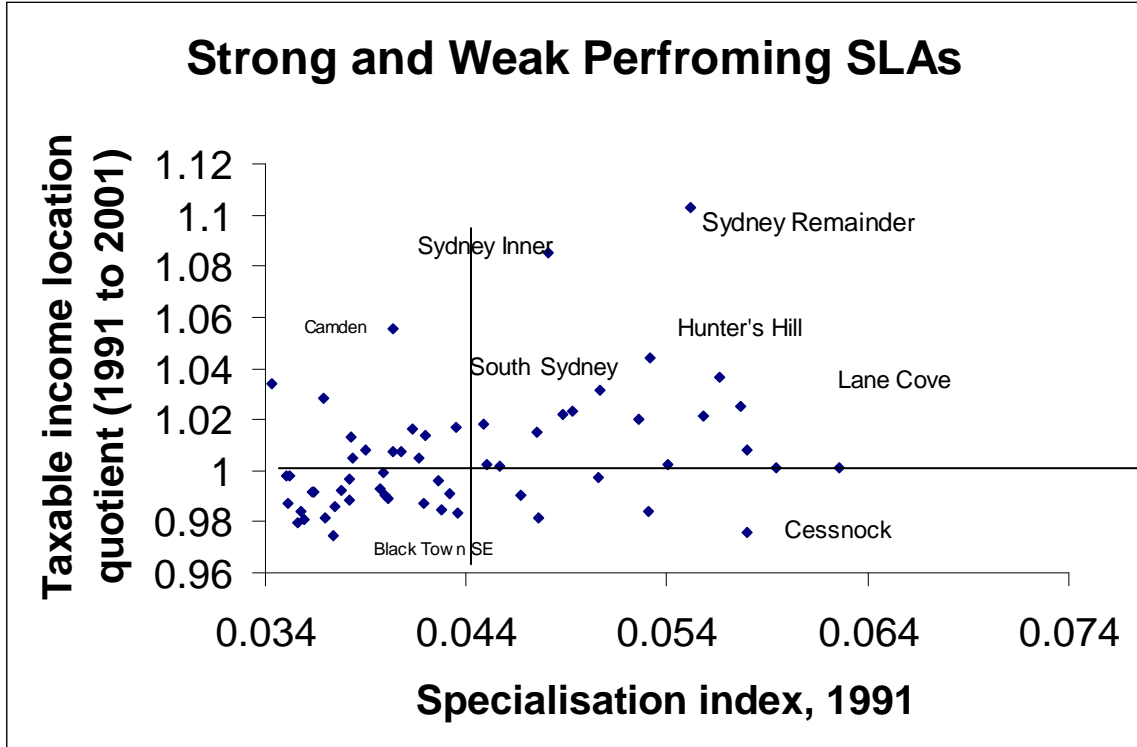
In Figure 4 and Matrix of Performance Table 61, we conclude our analysis that STRONGLY-performing city/suburbs have higher average population and income LQ than under-performing regions. One significant difference between strong-performing and weak-performing regions is in its industrial diversity & openness Average manufacturing share in over-performing regions is found to be negative but the share

in knowledge intensive & finance & insurance sectors are positively correlated with regional growth. It means regions with high values for human capital variables are likely to grow faster. Government employment is an inducer of better economic activity but it does not in itself stimulate a strong economy. It means government income support can help a region grow.

The matrix in Table 6.1 provides a clear picture of current performance and economic options. The lower right corner is the poorest performers across most dimensions in our study and they are characterised as in free fall. In the upper left quadrant are those places that are receiving new people but not yet specialising, usually computer communities that have not galvanized and economic base. The other side of the line are the upper right quadrant of places globally exposed and able to forge a new destiny because they have population and globally oriented specialization. The lower right corner is the economies with strongest income bases but stagnant in human resources capital.

They will need to improve their human capital base to forge to a new economic destiny.

FIGURE 6.1 STRONG AND WEAK PERFORMING REGIONS BASED ON INCOME AND LEVEL OF SPECIALISATION



Source: The Authors from the Data

The matrix in Table 6.1 brings all of our argument together by showing how the mix of industry from the drivers of location and human resources as they play out in the regional economy. The upper right corner communities have industrial specialisations in areas that are related to geographic location and access but are not building on their human asset base. The globally oriented areas next to them on the matrix are human resource based. While the lower left corner communities remain locked into the old economy and the ones next to them remain locked into the older human resource base but have the endowments to move beyond this stage as they alter their human and institutional resources.

FIGURE 6.2 MATRIX OF STRONG AND WEAL PERFORMING CITY/SUBURBS (SLA LEVEL)

**MODEST PERFORMING REGIONS:
POPULATION GROWTH LEAD INCOME**

Transitional Economies

Drivers: Construction/Logistics

Port Stephens, Burwood, Ryde, Lake
Macquarie,
Strathfield,
Newcastle - Remainder
Blue Mountains,
Penrith
Parramatta,
Campbelltown

**STRONG PERFORMING REGIONS:
POPULATION AND INCOME GROWTH**

Globally Exposed

***Drivers: Human Resources,
Finance, Technology***

Drummoyne, Concord
Manly, Hornsby, Randwick,
Waverley, Sydney - Inner
Willoughby, Leichhardt,
South Sydney, Lane Cove,
Hunter's Hill, Kiama,
Sydney - Remainder
North Sydney, Mosman,
Woollahra, Ku-ring-gai,
Shellharbour
Newcastle - Inner

Wollongong
Blacktown South East
Blacktown South West
Holroyd, Rockdale
Bankstown, Botany Bay,
,Fairfield,
Canterbury, Auburn, Hurstville,
Kogarah, Warringah, Maitland,

Blacktown – North
Liverpool, Wollondilly,
Sutherland Shire- West,
Hawkesbury, Wyong,
Camden, Pittwater, Baulkham Hills,
Gosford
Cessnock
Sutherland Shire – East,

Marrickville
Ashfield

**VERY WEAK PERFORMING REGIONS:
POPULATION AND INCOME DECLINE**

**WEAK PERFORMING REGIONS:
POPULATION STATIC INCOME HIGH**

Economic Free Fall Regions

Static Communities

Drivers: Manufacturing, Transport, Retail

Drivers: Health, Tourism, Business Services

FIGURE 6.2 STRONG PERFORMING REGIONS BASED ON INCOME AND LEVEL OF SPECIALISATION??WHY ARE THESE REPEATED

FIGURE 6.3 STRONG PERFORMING REGIONS BASED ON INCOME AND LEVEL OF SPECIALISATION

FIGURE 6.4 STRONG PERFORMING REGIONS BASED ON INCOME AND LEVEL OF SPECIALISATION

FIGURE 6.5 WEAK PERFORMING REGIONS BASED ON INCOME AND LEVEL OF SPECIALISATION**Summary**

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These charts reinforce the story of small area change within a larger globalising region. Regions, like Sydney, do not globalise evenly across all space. Some areas lag behind because of a variety of factors and forces. In some cases, previous success in a sector such as Wollongong's success as a steel city retards the transition to a new economic order. In some respects, having an old economic engine that is highly productive, influences as we show the potential future economic scenarios dramatically. So, the 1991 economic engine, as our data show is a predictor of post 2000 success for city/suburbs post 2000. Thus, a community like Newcastle, that underwent a more rapid decline, is able to rebound faster than one that slowly declines. On the other hand, areas with endowed human capital institutions like hospitals, universities and well positioned land with good housing stocks are both better off today and have more options for their economic futures.

CHAPTER 7 STRONG AND WEAK PERFORMING SLAS – WHAT DO WE LEARN?

As Lang and Blakely (2005) city/suburbs are heterogenous even when they occupy the same economic geography. Each suburb has endowments for the past, industries, natural resources etc. Each of these places can grow or languish on how they capitalize on the past and view the future. As the techniques we employed show, not all factors are equally important for the economic growth of a suburb. Some cities have human resource assets, while others have manufacturing or retail attributes as building blocks. But this is not true universally. So, each city has in essence, a recipe for success that differs in some degree with other nearby areas. Cities can compliment areas of weakness like human resource capacity while being mindful of other assets like occupational structure in fields that represent economic growth like computer or other technology occupations. It appears from our analysis the Sydney Strategic Plan and similar regional economic plans require a strong not only population increases but economic and diverse population improvements across sub-regions for optimum outcomes for the entire region since slow growth areas create a drag on both income and jobs for the entire GMR. The change in how our economy operates makes issues like quality of life, telecommunications and workforce development as important as good transportation, land availability and inexpensive utilities. This is especially true for some of the regions of Sydney GMR, which has a strong manufacturing base.

Sydney has a strategic advantage in the global economy with its access to sophisticated technology, highly skilled and multilingual labour force. All cities of Sydney GMR, including those with high unemployment, can capitalise on these opportunities through innovative and productive partnerships that build on existing alliances.

The job market in Sydney GMR is changing fast. Manufacturing employment has largely given way to “Technology & Knowledge Intensive” & “Finance, Insurance, Property & Business Services” jobs are at the heart of the Sydney as a global city, a financial hub linked to all corners of the world. Sydney’s jobs will need to be highly productivity, innovation related and knowledge-based to support its aging population and compete internationally. Employment is an important factor in determining macroeconomic policy settings.

While the Sydney GMR as a whole has experienced strong employment growth in the period 1996-2001 (1.6%), there have been some emerging sectoral and spatial imbalances as confirmed by this study. The industries of the future in the Sydney GMR

region need a more educated workforce and the ability to quickly develop and adapt technology. Creativity as a new growth theory is emerging as the most important factors of production today. Not surprising, it improves labour and capital and extends older resources such as manufacturing, agriculture and engineering as well. What is more, creativity increases the quantity of final goods and services and some of them in turn enlarge the creativity itself. Finally, creativity tends to increased productivity across all sectors of the local economy. Therefore, in that sense, low skilled workers cannot be a job base and in fact impede economic growth and firm creation in cities where they are concentrated. Strategies that increased mixed incomes, especially high density approaches to concentrate higher and mixed income groups near transport nodes may have the twin impact of increasing housing supply and job growth without pushing out lower income groups in the same area.

What a community has to do is list strong and weak performing sectors in its local economy. Then it can build an economic development strategy as Blakely and Bradshaw (2003) suggest on the area's attributes and reduce its deficiencies. Thus, community X may need to bolster its industrial diversity even though it has excellent human resources. This brings more science to the process versus the imitation approaches that are frequently embarked on based on the latest economic development fad. Moreover, these data are fine grained, to a particular city in a complex economic web. Finally, these techniques are simple but powerful for economic development. They are tiered so the vagaries of a single analytical template do not give false response or easy answers for complex problems. They can be fashioned to the region under study as long as reasonable data are available. And they can be used to monitor interventions at a micro/suburban area overcoming current technical difficulties of assessing differential performance in over a well performing region.

APPENDIX A TITLE OF APPENDIX A

APPENDIX B TITLE OF APPENDIX B

APPENDIX C LIST OF INDUSTRIES ACCORDING TO 1991 ABS CENSUS

No	Industry name according to 1991 ABS Census	
1	Agriculture	Agriculture
2	Services to Agriculture; Hunting and Trapping	Services to Agriculture; Hunting and Trapping
3	Forestry and Logging	Forestry and Logging
4	Commercial Fishing	Commercial Fishing
5	Coal Mining	Coal Mining
6	Oil and Gas Extraction	Oil and Gas Extraction
7	Metal Ore Mining	Metal Ore Mining
8	Other Mining	Other Mining
9	Services to Mining	Services to Mining
10	Food, Beverage and Tobacco Manufacturing	Food, Beverage and Tobacco Manufacturing
11	Textile, Clothing, Footwear and Leather Manufacturing	Textile, Clothing, Footwear and Leather Manufacturing
12	Wood and Paper Product Manufacturing	Wood and Paper Product Manufacturing
13	Printing, Publishing and Recorded Media	Printing, Publishing and Recorded Media
14	Petroleum, Coal, Chemical & Associated Manufacturing	Petroleum, Coal, Chemical & Associated Manufacturing
15	Non-Metallic Mineral Product Manufacturing	Non-Metallic Mineral Product Manufacturing
16	Metal Product Manufacturing	Metal Product Manufacturing
17	Machinery and Equipment Manufacturing	Machinery and Equipment Manufacturing
18	Other Manufacturing	Other Manufacturing
19	Electricity and Gas Supply	Electricity and Gas Supply
20	Water Supply, Sewerage and Drainage Services	Water Supply, Sewerage and Drainage Services
21	General Construction	General Construction
22	Construction Trade Services	Construction Trade Services
23	Wholesale trade	Wholesale trade
24	Retail trade	Retail trade
25	Accommodation, Cafes and Restaurants	Accommodation, Cafes and Restaurants
26	Road Transport	Road Transport
27	Rail Transport	Rail Transport
28	Water Transport	Water Transport
29	Air and Space Transport	Air and Space Transport
30	Other Transport	Other Transport
31	Services to Transport	Services to Transport
32	Storage	Storage
33	Communication Services	Communication Services
34	Finance	Finance
35	Insurance and Services to Insurance	Insurance and Services to Insurance
36	Property+ Business services	Property+ Business services

37	Government Administration	Government Administration
38	Defence	Defence
39	Health Services	Health Services
40	Motion Picture, Radio and TV Services	Motion Picture, Radio and TV Services
41	Education, Museum, Library Services	Education, Museum, Library Services
42	Personal Services	Personal Services
43	Other Community Services	Other Community Services
44	Private Households Employing Staff	Private Households Employing Staff

ABBREVIATIONS

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