

Understanding Local Competitiveness

Briefing Paper 11: Identifying Key and Strategic
Industries, Kalgoorlie-Boulder 2001-2011

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& FIONA HASLAM MCKENZIE**

**CENTRE FOR REGIONAL DEVELOPMENT
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The views expressed and the conclusions reached in this publication are those of the author(s) and not necessarily those of persons consulted.

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Published in October 2015

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1. EXECUTIVE SUMMARY:

This briefing paper shows that since 2001, mining, construction, health care and social assistance, retail, manufacturing, and agriculture, forestry and fishing were all important industries in Kalgoorlie-Boulder. They were the sectors employing the most people throughout the period 2001-2011. However, in relation to the Western Australian economy overall, the relative growth of Kalgoorlie-Boulder was modest, particularly in the 2006-2011 period. As the Western Australian economy strengthened on the back of the mining boom, Kalgoorlie-Boulder's performance as a local economy was not as strong as other Western Australian regional economies. Of particular concern, the Kalgoorlie-Boulder economy became increasingly oriented to mining with many of the smaller employing sectors showing marginal growth. Kalgoorlie-Boulder's comparative advantage therefore is only marginal. Kalgoorlie-Boulder's competitiveness was similarly modest in promoting employment growth, with the majority of industry sectors identified as underdeveloped in both the 2001-2006 and 2006-2011 periods.

In the **2001-2006 period**, Kalgoorlie-Boulder had **comparative advantage** in the following sectors:

- Mining
- Rental, hiring & real estate services
- Administrative & support services
- Construction
- Transport, postal & warehousing
- Other services
- Industries inadequately described/Not stated

In the same period, Albany had **competitive advantage** in the following sectors:

- Mining
- Other services

In the **2006-2011 period**, Kalgoorlie-Boulder had **comparative advantage** in the following sectors:

- Mining
- Rental, hiring & real estate services
- Transport, postal & warehousing
- Other services

- Industries inadequately described/Not stated

In the same period, Kalgoorlie-Boulder had **competitive advantage** in the following sectors:

- Mining
- Transport, postal & warehousing
- Rental, hiring & real estate services
- Other services

2. The Western Australia Regional Capitals Alliance

This is the latest in a series of reports into the dynamics of competitiveness across the Western Australian settlement system. This research is conducted as part of a strategic collaboration between the *Western Australian Regional Capitals Alliance (WARCA)* and the *Centre for Regional Development* at the *University of Western Australia*. The objectives of this ongoing collaboration are:

- To gain a clear understanding of the opportunities and barriers to regional growth and resilience across Western Australia.
- To facilitate evidence-based policy, indicating specific areas of policy-making that may require revision.

In this report, we explore the local competitiveness of Kalgoorlie-Boulder by identifying the key and strategic industries that have driven job creation over the 2001-2011 resource boom. We address two key questions about the dynamics of growth:

- What are the most important industries in Kalgoorlie-Boulder in terms of employment and job creation?
- What industries constitute the economic base of the Kalgoorlie-Boulder economy?

Using the analysis of this report it is possible to target local economic policy by identifying those industries that are the most important drivers of growth, those that are potentially emerging industries, and those that are most vulnerable.

The information contained in this report is supported by the following documents:

1. UWA/Regional Capitals in the WA Settlement Hierarchy Research:
 - a) Briefing Paper 2 - Employment Change and Job Creation
 - b) Briefing Paper 3 – Employment Diversity and Growth
 - c) Briefing Paper 4 – Endogenous Growth and Local Competitiveness
 - d) Briefing Paper 5 – Identifying Regional Capitals
2. Academic Papers:

Plummer, P., Tonts, M. Martinus, K (2014) “Endogenous Growth, Economic Restructuring and Local Contingency in the Evolution of a Patchwork Economy: Regional Western Australia, 2001-2011” *Journal of Economic and Social Policy* 16(1) 1-31.

3. Planning Documents:

Government of Western Australia (2014) “State Planning Strategy 2050” (<http://www.planning.wa.gov.au/publications/6561.asp>)

3. Job Creation, Economic Diversity and Local Competitiveness

The contemporary Western Australian economy can be characterized by a multi-speed economy, driven by a strong and consistent pattern of job creation. Over the past decade, job creation across industries has not played out evenly across Western Australia. This has resulted in an increasingly ‘patchwork economy’, with larger and more economically diverse economies forging ahead of less resilient smaller settlements. Within this broader context, there is clear evidence that the Regional Capitals are making an increasingly significant contribution to the evolution of employment across the State. In particular, the economic performance of WARCA members relative to the other localities across Western Australia indicates that:

- Engagement in the global economy and broader socio-economic processes have been important in driving economic growth across WARCA members.
- Nonetheless, local competitiveness is critical in both allowing localities to overcome an unfavourable mix of industries or to capitalize on their industry structure.
- The relative importance of local competitiveness and the ways in which localities engage with broader socio-economic processes varies significantly across localities.

Overall, these findings have the following implications for the formation of local economic policy:

- The qualitatively different experience of the WARCA members questions the efficacy of a ‘one size fits all’ policy stance.
- While it is true that local attributes are important in contributing to growth, we should not underestimate the significance of external demand in driving development.
- Caution needs to be exercised in focusing excessively on local competitiveness as a means of developing the economies of the regional capitals.

This briefing report is one of series of complementary reports which begin to unpack the growth experience of each WARCA member, exploring the local competitiveness through the propulsive industries (industries/sectors that are identified as the primary drivers of local economic and employment growth) thus driving the local economy.

4. Unpacking the Dynamics of Local Competitiveness

A recently published report by the *Western Australian Department of Regional Development* (2014) focuses on identifying the key drivers of local competitive and comparative advantage across the Western Australian economy. Similarly, the strategic blueprint reports submitted by the *Regional Development Commissions* in 2014 were required to identify those economic activities in which they have a comparative advantage. In this report series we undertake a preliminary investigation of the dynamics of WARCA members, imputing competitiveness and comparative advantage from the underlying industrial structure and ability of these localities to create jobs.

(A) Local Competitive Advantage: the Ability to Create Jobs Locally

Cities and regions compete with each other for global, national, and local ‘market share’.

Tracking the competitive advantage of the Kalgoorlie economy is imputed from information on local job creation, specifically:

- **SIZE:** The importance of an industry in terms of the number of persons employed in each industry.
- **GROWTH:** The industries growing most rapidly over a particular period of time in terms of their ability to create jobs locally.

For a variety of reasons, industries perform differently in particular locations and, not surprisingly, local and regional economies perform differently to each other. Some of those reasons include natural resources, geographic advantages, access to transport, energy or information networks, local policies and human capital. Human capital brings knowledge, skills and competencies, which have a productive value. Housing, education, amenity and services all shape the availability and employability of human capital.

Using the benchmark of the overall performance of the Western Australian economy, it is possible to categorize local industries in terms of **SIZE** and **GROWTH**:

- **FAST GROWING:** relatively large sectors that have exhibited rapid recent growth.
- **RESTRUCTURING:** relatively large sectors that make a significant contribution to the economic base but with little or no growth over the recent past.
- **UNDERDEVELOPED:** low levels of activity in terms of employment and the contribution to the local economy.

(B) Comparative Advantage: Local Economic Specialization and Interregional-Trade Patterns:

Conventionally it is assumed that localities specialize in those activities in which they have a comparative advantage. **Comparative advantage** is the principle that a country, region or

locality should specialise in producing and exporting goods in which it has comparative or relative cost advantage over others, and import goods in which it has a cost disadvantage. Factors which may influence comparative advantage are natural resources but also development of technology and human skills, economies of scale and access to advantageous trade opportunities (transport, markets etc).

A comparative advantage provides the opportunity to sell goods or services at a lower price than the competitors and thus realise positive margins.

The comparative advantage of a particular economy is imputed, or calculated, using information on:

- **SPECIALIZATION:** The importance of an industry in terms of the degree to which the local economy specializes in that economic activity.
- **ECONOMIC BASE:** A measure of the degree to which economic activity and employment is related to servicing local demand as against servicing demand external to the region.

Determining the pattern of local economic SPECIALIZATION using location quotients identifies the industries that drive and underpin the local economy (see technical appendix). Location quotients (LQ) measure the concentration of an industry or economic activity in a particular location, compared to the State or nation overall. It therefore identifies the specialisation(s) of a particular place or region in relation to the bigger jurisdiction. Put differently, location quotients also indicate the proportion of people employed in an industry in a locality relative to the proportion of people employed in that industry in the larger, reference or benchmark economy (for example, the State economy or that of the nation overall), in this instance Western Australia. If a particular industry's share of regional employment is greater than that industry's share of State employment, i.e. the location quotient is greater than one, (or unity), then the locality is assumed to specialize in that economic activity.

For example, if ten per cent of a region's workforce is employed in agriculture, but only eight per cent of the overall State population is employed in agriculture then the LQ is $(.10/.08)$ 1.25 meaning that agriculture is twelve and half times more concentrated in that region than for the State overall. A LQ greater than one suggests that the particular industry outputs are exported and hence bring income to the region.

Since local economic data on trade flows does not exist, location quotients have also been widely used to infer regional trade patterns:

- **BASIC Sector:** The greater the location quotient above one (or unity), the larger the economy's net sectoral exports from that sector (i.e. the greater the proportion or share of the local economy of a particular industry, and therefore exports from that region).
- **Non-BASIC Sector:** The greater the location quotient below unity (or one), the larger the economy's net sectoral imports from that sector (i.e. the proportion or share of the local economy of a particular industry is less than the overall State proportion, and therefore imports into that region).

- **NEUTRAL Sector:** For a location quotient of unity, (or one), the economy is neither a net exporter nor a net importer for that sector.

The level of **ECONOMIC BASE** in a local economy can be calculated by aggregating export oriented employment across all industries in which the locality is specializing in terms of employment (see technical appendix). A region with a healthy economic base is likely to be one that specializes in industries with **high LQ and high employment**.

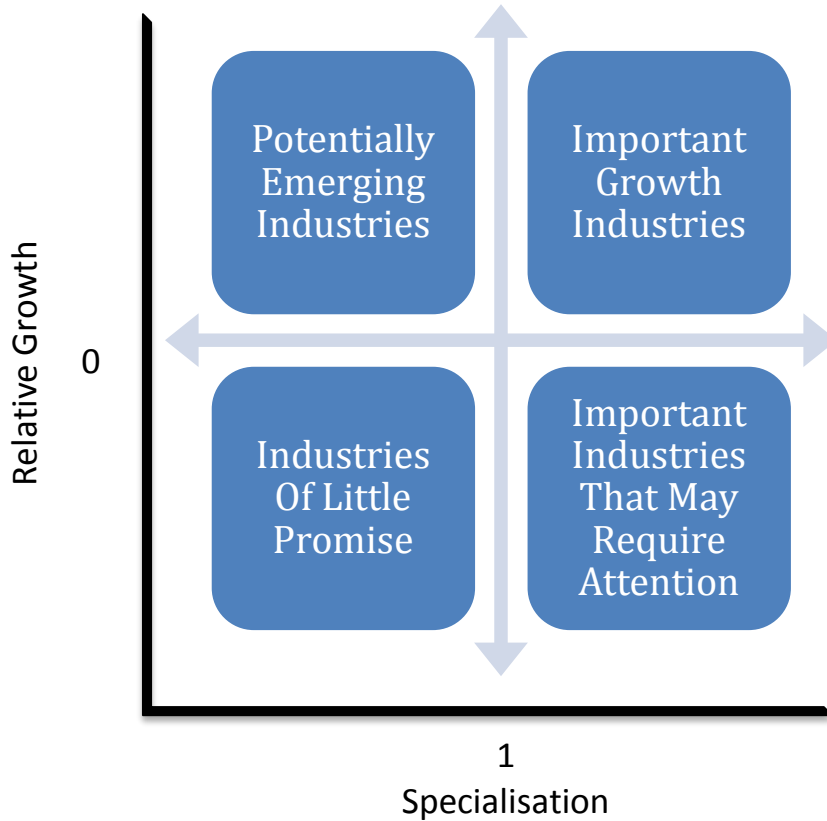
(C) Classifying Industrial Activities

Combining the information on an economy's ability to create jobs locally and identifying the patterns of specialization and inter-regional trade within sectors of the economy, it is possible to classify industries in terms of their growth potential and comparative advantage. Figure 1 classifies the economic structure of a local economy with relative growth measured on the vertical axis and relative specialization measured on the horizontal axis:

- **IMPORTANT GROWTH INDUSTRIES:** characterized by above average employment growth, relative economic specialization, and export orientation.
- **IMPORTANT INDUSTRIES THAT MAY REQUIRE ATTENTION:** characterized by below average employment growth, relative economic specialization, and export orientation.
- **POTENTIAL EMERGENT INDUSTRIES:** characterized by above average employment growth, but currently oriented towards servicing local demand.
- **INDUSTRIES OF LITTLE PROMISE:** characterized by below average employment growth and currently oriented towards servicing local demand.

The potential significance of each industry in terms of size is represented by the corresponding size of the graduated circle representing the industry on the graph.

Figure 1: Classification of Industrial Activities in a Locality



5. Data Description: Employment by Industrial Classification

This report uses Australian Bureau of Statistics (ABS) Census of Population and Housing time series profiles, which count the number of persons in each industry of employment (based on place of enumeration) for all 138 local government areas (LGAs) in Western Australia for the census periods 2001, 2006, 2011. The members of the *Western Australia Regional Capitals Alliance (WARCA)*: Albany, Broome, Greater Bunbury¹, Kalgoorlie-Boulder, City of Greater Geraldton, Port Hedland, and City of Karratha. Boundaries for all LGAs are according to the ABS 2011 definition. To identify the key and strategic industries for each member of WARCA, employment is disaggregated by industrial sector, as defined by the Australian and New Zealand Standard Industrial Classification (ANZSIC) industry coding². It should be noted that one limitation widely reported by regional local governments is the likely undercount of employees by the ABS. This arises out of the difficulty in capturing fly-in/fly-out workers and other temporary residents. There is no immediate means of overcoming this data limitation, except to use ‘place of enumeration’, (in other words, the place where the census participant actually filled out the census form, as opposed to their place of usual residence, which may or may not be different on the particular night of the census), data as has been done here.

¹ Greater Bunbury is an amalgamation of the LGAs of Bunbury, Capel, Dardanup, and Harvey.

² Found at <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2901.0Chapter5802011>

6. The Structure and Dynamics of Local Job Creation: Kalgoorlie-Boulder

(a) Local Competitive Advantage: the Ability to Create Jobs Locally

Figure 2 summarizes the distribution of employment across Kalgoorlie-Boulder's industrial sectors for 2001, 2006, and 2011 whilst Figure 3 provides an overview of the changing distribution of economic activities across this time period.

- In 2001, the highest employing industries were mining (2,734 people, 19% of total employment), retail (1,319 people, 9% of total employment), construction (1,126 people, 8% of total employment), health care and social assistance (943 people, 6.7% of total employment) and manufacturing (921 people, 6.5% of total employment). Other sectors which were important employers were wholesale trade, education and training, accommodation and food services, professional, scientific and technical services and other services.
- In 2006, mining (3,122 people, 22% of total employment), retail (1,364 people, 9.5% of total employment), health care and social assistance (1,058 people, 7.4% of total employment) and manufacturing (1,026 people, 7% of total employment) were still the most important sectors in Kalgoorlie-Boulder. Construction had declined (981 people, 6.8% of total employment), as had wholesale trade, accommodation and food services, professional and scientific and technical services. Education and training was still an important employer and had increased the number of people employed and its share of total employment.
- In 2011, mining maintained its position of biggest employer in Kalgoorlie-Boulder, but its share of total employment declined marginally (3,332 people, 21% of total employment). Construction was once again a major employer (1,329 people, 8.4% of total employment) and manufacturing retained its level of employment share (1,178 people, 7.4% of total employment). Retail (1,394 people, 8.8% of total employment) and health care and social assistance (1,058 people, 7.4% of total employment) increased the number of people marginally. Education and training increased (1,029 people, 6.5% of total employment) the number of people employed and its share of employment marginally.

Figure 2: Kalgoorlie-Boulder employment by industry for 2001, 2006 and 2011.

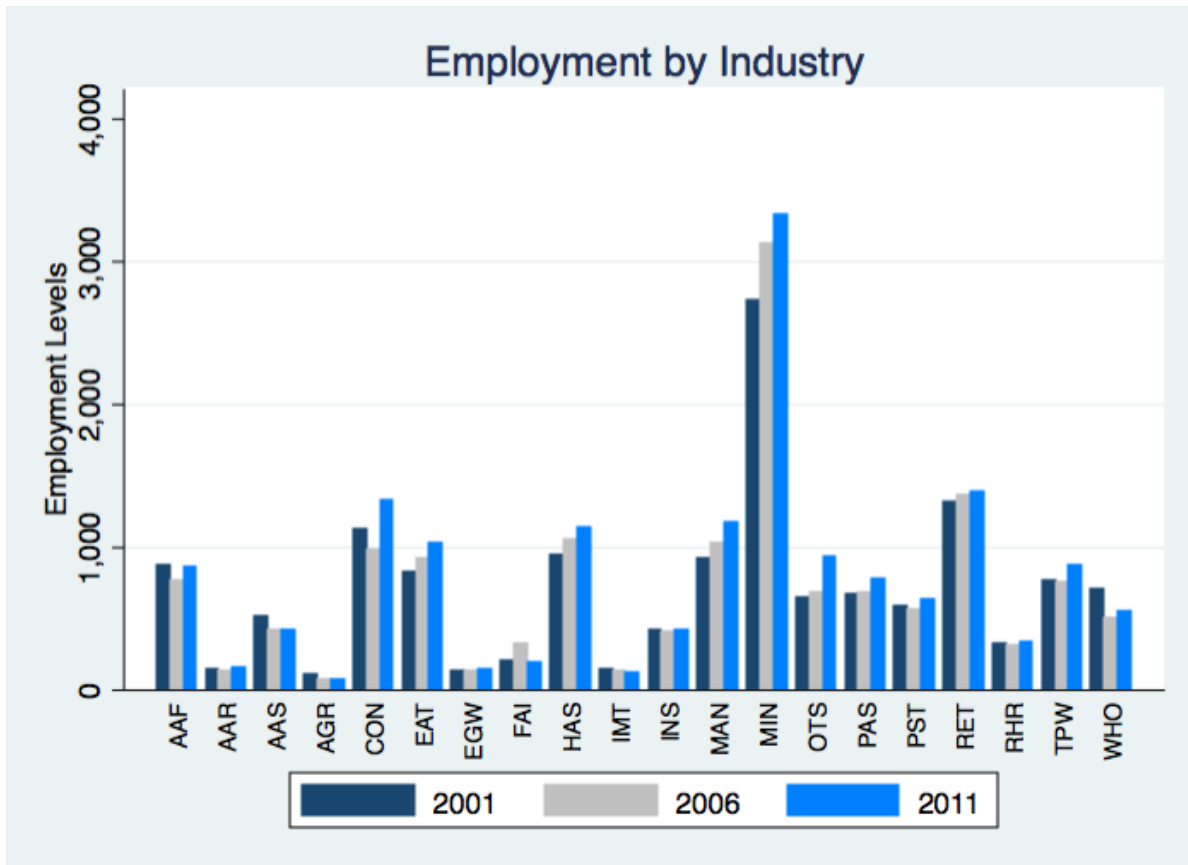
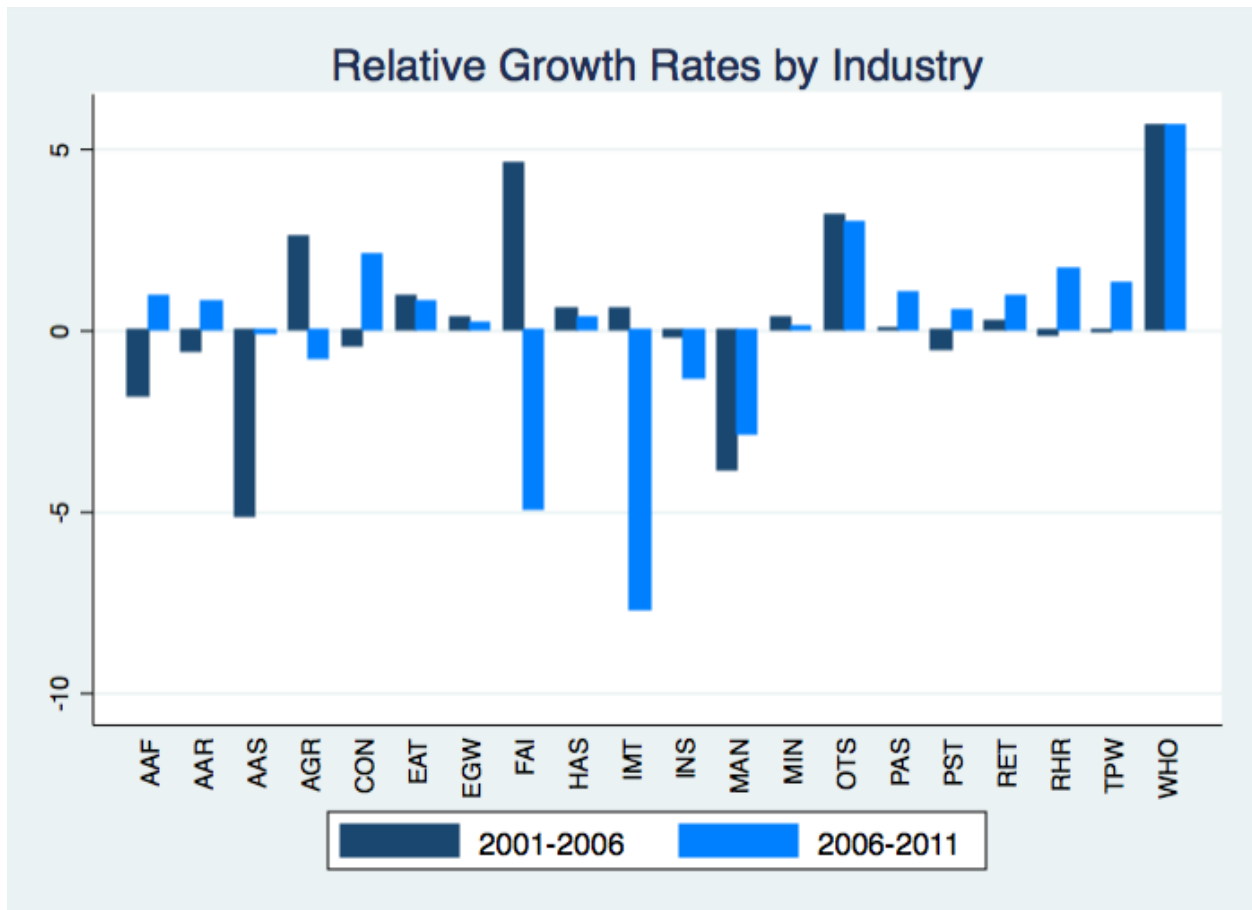


Figure 3 summarized job creation by industrial sector for Kalgoorlie-Boulder relative to the average growth of the same sector across the Western Australian economy:

- Over the 2001-2006 period, the fastest growing industries relative to Western Australia were agriculture, forestry and fishing, financial and insurance services, wholesale trade and other services.
- Over the same period, the slowest growing industries relative to Western Australia were administrative and support services, and manufacturing.
- Over the 2006-2011 period, the fastest growing industries relative to Western Australia were in construction, wholesale trade and other services. Rental, hiring and real estate services and transport, postal and warehousing also increased their importance.
- Over the same period, industries that lost jobs relative to the Western Australian benchmark were financial and insurance services, information media and telecommunications and manufacturing.

Figure 3: Growth rates of Kalgoorlie-Boulder industries relative to Western Australian growth rates.



As the Western Australian economy strengthened on the back of the mining boom, Kalgoorlie-Boulder’s performance as a local economy was not as strong as other local economies, with relatively modest job creation when compared to the rest of the State (see Table 1).

Table 1: Job Creation for Western Australian Regional Centres 2001, 2006 and 2011.

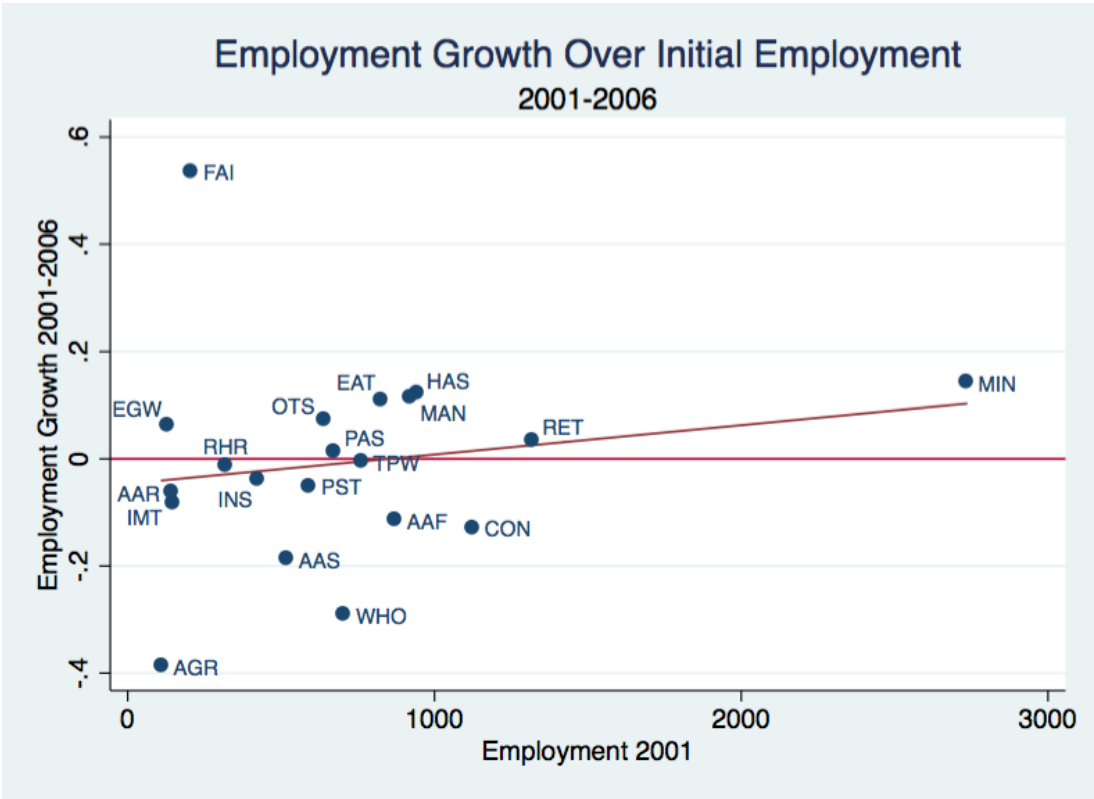
	Growth 2001-2006	Growth 2006- 2011	Growth relative to WA 01-06	Growth relative to WA 06-11
Roebourne	0.165	0.684	0.033	0.507
Albany	0.143	0.067	0.011	-0.11
Geraldton- Greenough	0.115	0.194	-0.017	0.017
Bunbury	0.097	0.063	-0.035	-0.114
Broome	0.053	0.165	-0.079	-0.012
Kalgoorlie- Boulder	0.018	0.106	-0.114	-0.071
Port Hedland	-0.088	0.695	-0.22	0.518

Figure 4 shows the changing pattern of competitive advantage for Kalgoorlie-Boulder in terms of the relationship between absolute growth rates and the size of each industrial sector. Overall, in the period 2001-2006 and 2006-2011 there was a positive relationship between the size of an industry in terms of employment and the growth rate of that industry.

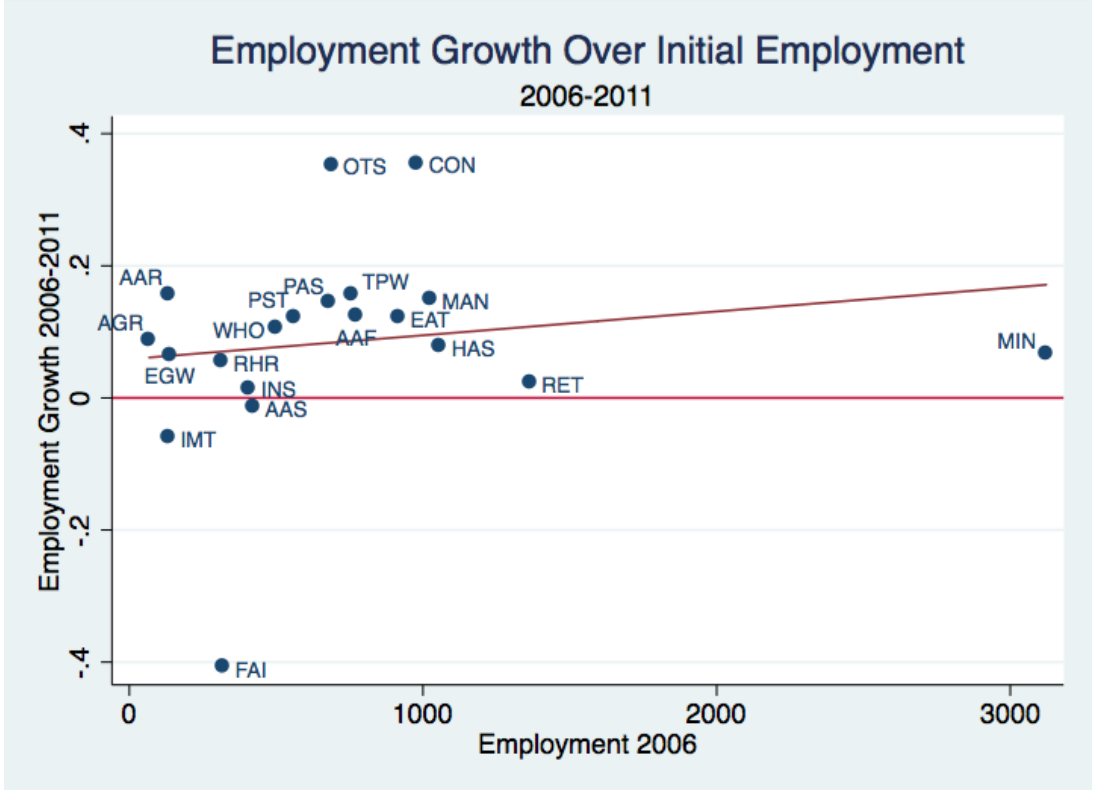
Interpreting Figure 4(a) and (b).

The steady red line at zero signifies the growth threshold. i.e. those industry sectors below that red line have not grown in the intercensal period. It follows then that those sectors above the line have grown. As explained above, of those sectors which grew, those which employed the largest number of people (moving across the horizontal axis), tended to grow faster than the smaller industry sectors, as shown by the red line moving upward. Of concern for Kalgoorlie-Boulder is that in both periods the biggest industry, mining, is dominating that trend towards increased specialization. Furthermore, in the 2006-2011 this trend is reinforced, with continuing economic specialisation in Kalgoorlie. This is shown by the difference in growth rates between the bigger industry sectors and smaller sectors widened. In the 2001-2006 period, there were more industry sectors which did not grow while in the 2006-2011 period, there were fewer sectors below the red static line; employment growth increased.

Figure 4: Employment growth rate, relative to initial size of employment for (a) 2001-2006 and (b) 2006-2011.



a.



b.

Table 2 summarizes the overall structure of local competitiveness, (in relation to the overall performance of the Western Australian economy), for Kalgoorlie-Boulder’s industries over the periods 2001-2006 and 2006-2011.

- There is a pattern of considerable change across the industrial activities between the two periods, with only one industry sector remaining as FAST GROWING, (personal and other services) and one sector moving from RESTRUCTURING to FAST GROWING, (transport, postal and warehousing).
- The majority of the industry sectors identified as UNDERDEVELOPED in the 2001-2006 period, remained UNDERDEVELOPED in the 2006-2011 period.
- Three sectors (construction, administrative and support services and wholesale trade), moved from RESTRUCTURING to UNDERDEVELOPED between the two periods and mining shifted from FAST GROWING to RESTRUCTURING.

Table 2: Local Competitive Advantage: the Ability to Create Jobs Locally

	2001-2006	2006-2011
Fast Growing Industries	Mining Personal and Other Services	Personal and Other Services Transport, Postal and Warehousing
Industries Restructuring	Administrative and Support Services Construction Rental, Hiring and Real Estate Services Transport, Postal and Warehousing Wholesale Trade	Mining Rental, Hiring and Real Estate Services
Underdeveloped Industries	Accommodation and Food Services Arts and Recreational Services Agriculture, Forestry and Fishing Education and Training Electricity, Gas, Water and Waste Services Financial and Insurance Services Information Media and Telecommunications Manufacturing	Accommodation and Food Services Arts and Recreational Services Administrative and Support Services Construction Education and Training Electricity, Gas, Water and Waste Services Financial and Insurance Services Information Media and Telecommunications

	Public Administration and Safety Professional, Scientific and Technical Services Retail Trade	Manufacturing Public Administration and Safety Professional, Scientific and Technical Services Retail Trade Wholesale Trade
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(b) Local Economic Specialization and Interregional-Trade Patterns:

Figure 5 shows the pattern of local specialization for Kalgoorlie-Boulder across the 2001-2011 period. Overall, Kalgoorlie-Boulder lacks diversity in its economic base, only specializing in mining.

Figure 5: The specialisation of each industry by employment, relative to levels of employment in Western Australia. LQ values greater than one demonstrate local specialization in that industry.

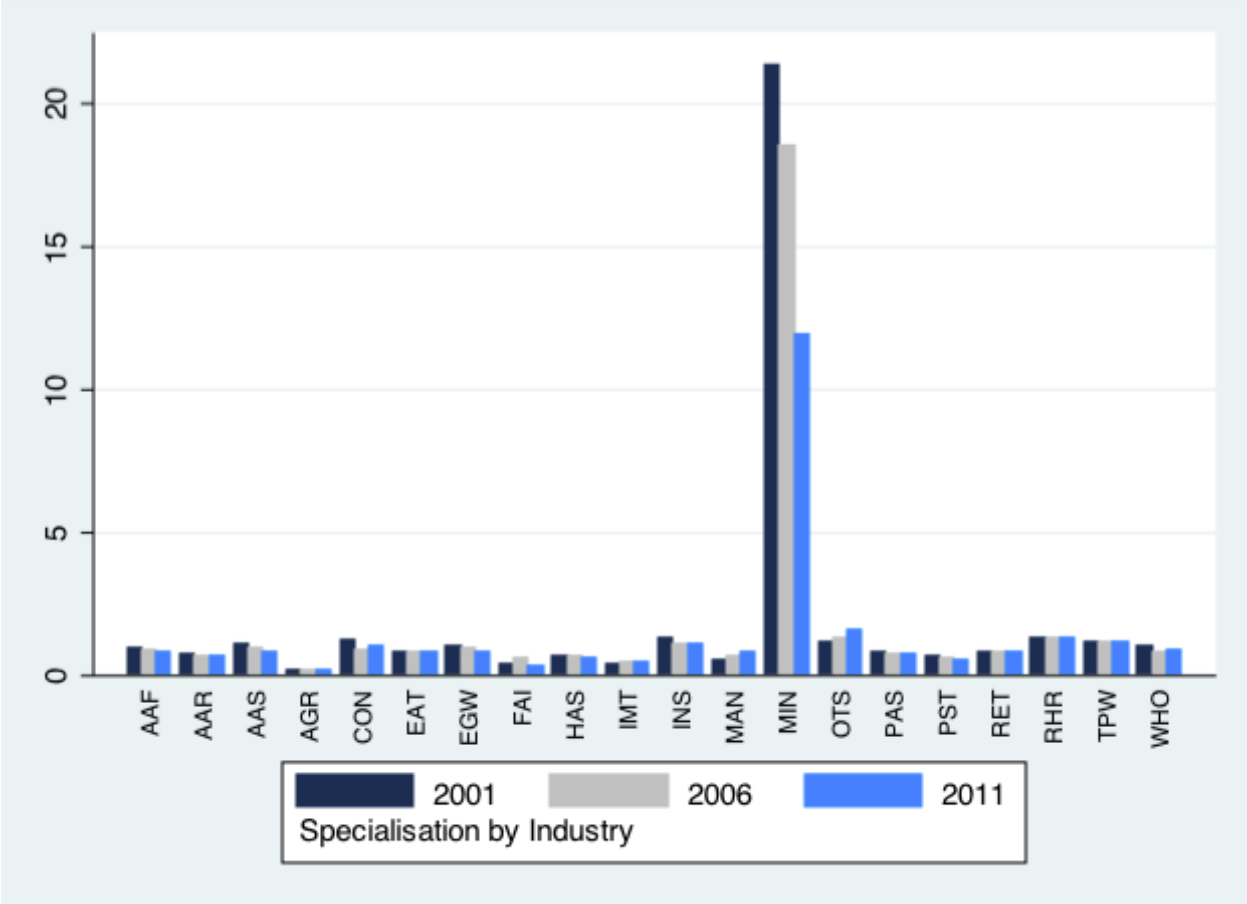
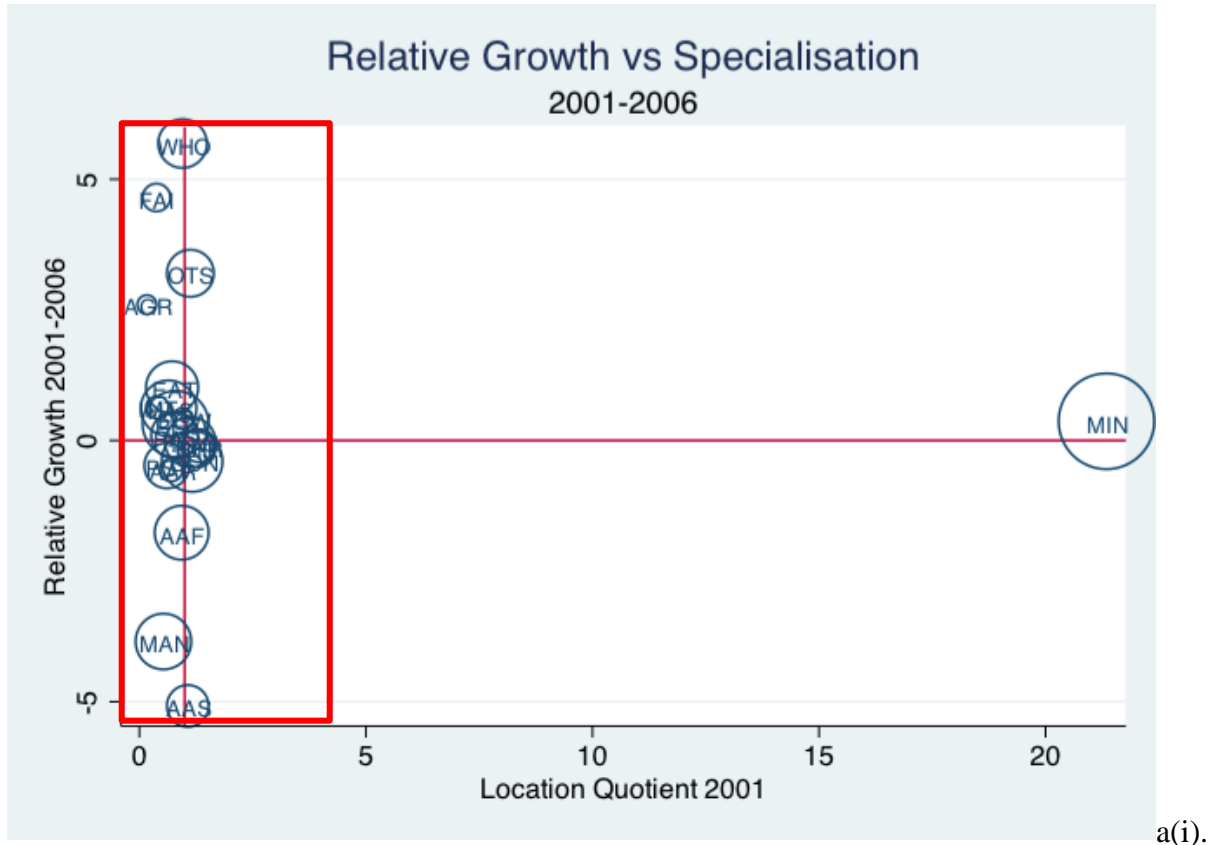
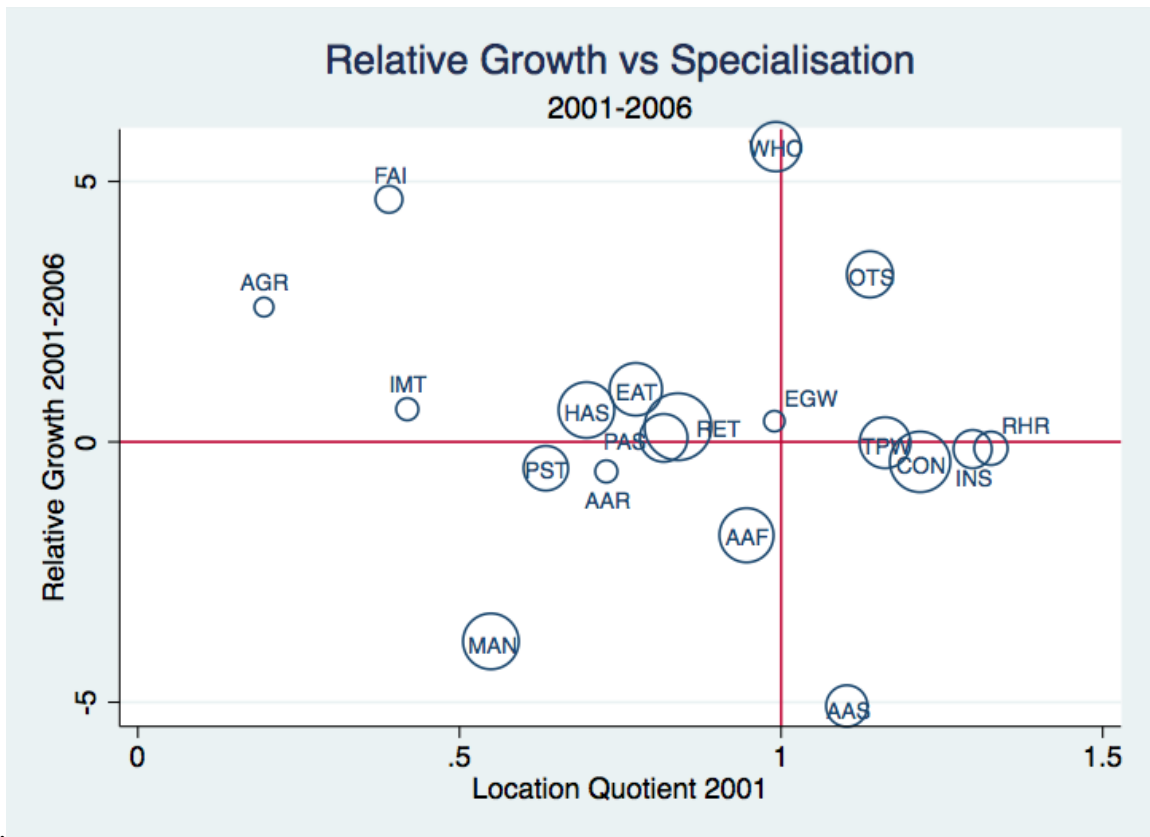


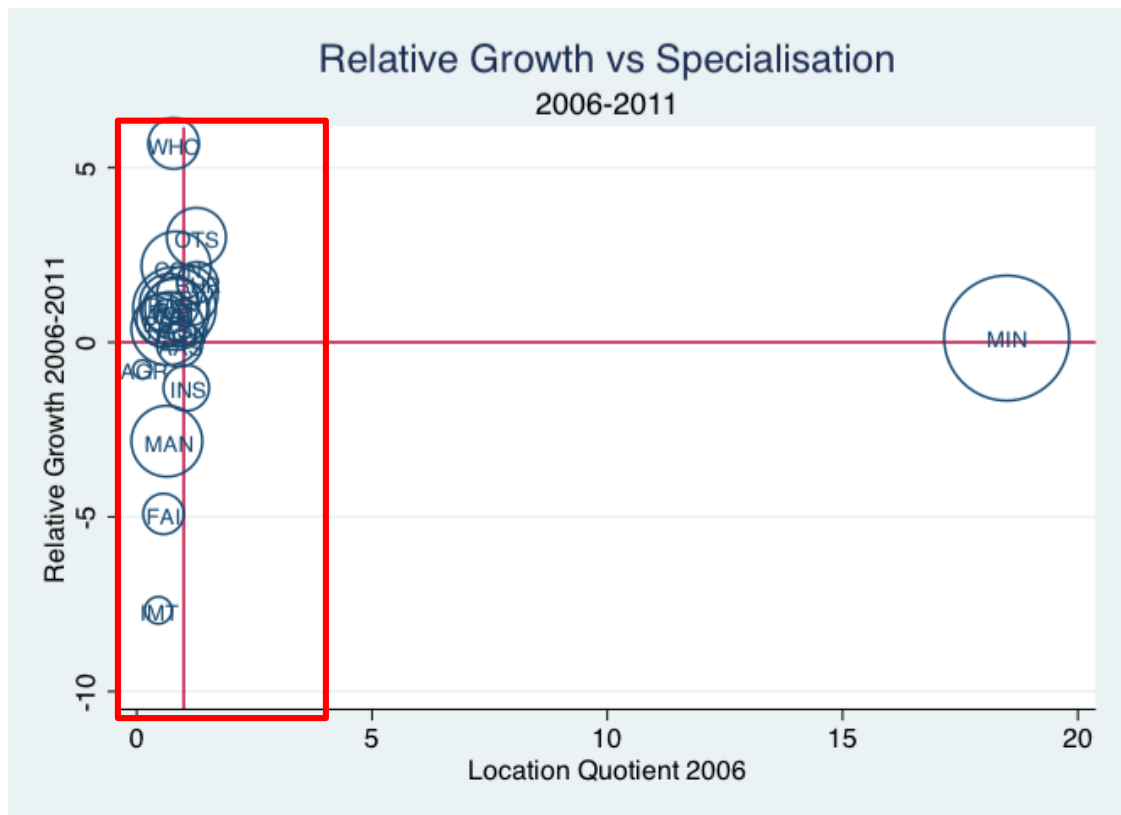
Figure 6 examines the relative growth of industry based on the level of specialisation. The data portrayed in Figure 6a(ii) and Figure 6b(ii) is that of the data shown in Figure 6a(i) and Figure 6b(i) respectively but in greater detail.

Figure 6: The relative growth of the industry based on level of local specialization for (a) 2001-2006 and (b) 2006-2011. The size of the circle demonstrates the proportion of that industry to total employment.

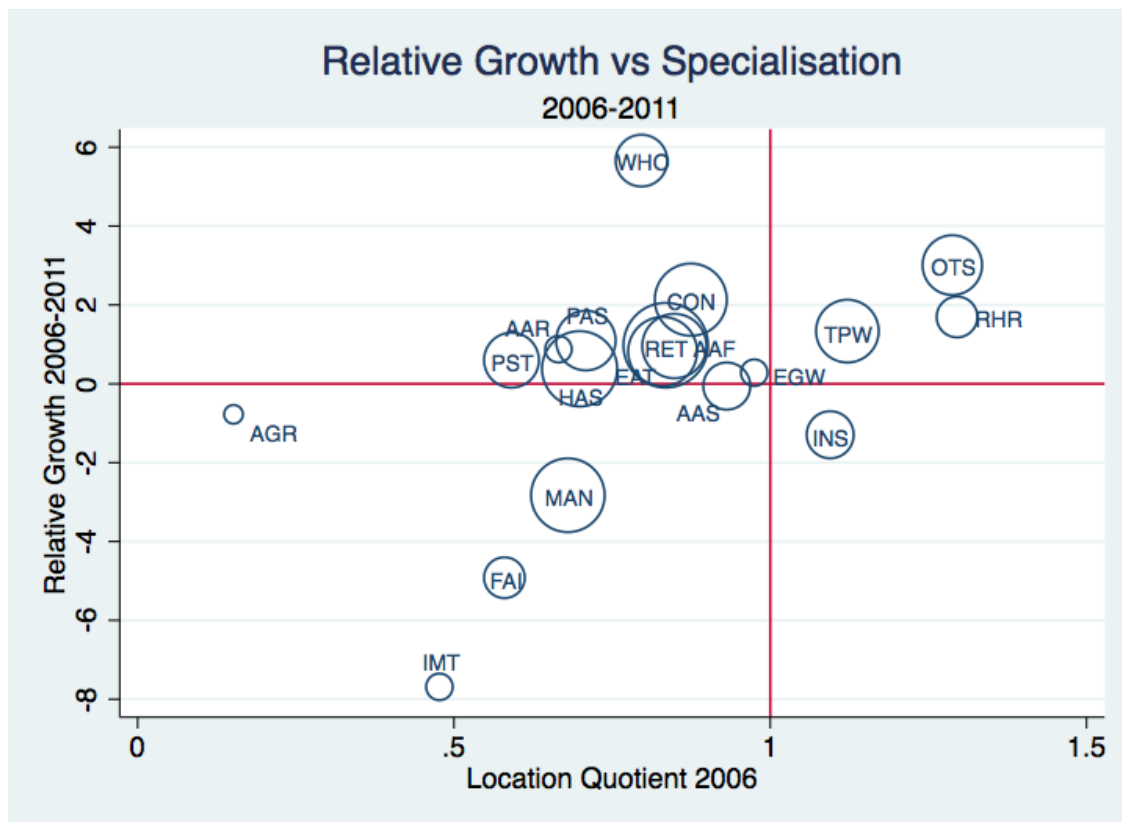




a(ii).



b(i).



b(ii).

(c) Classifying Industrial Activities

Combining the information on an economy’s ability to create jobs locally and the sectoral patterns, it is possible to classify industries in terms of their growth potential and comparative advantage. Figure 6 and Figure 7 classify the economic structure of the Kalgoorlie-Boulder economy into IMPORTANT GROWTH INDUSTRIES, IMPORTANT INDUSTRIES THAT MAY REQUIRE ATTENTION, POTENTIAL EMERGENT INDUSTRIES, INDUSTRIES OF LITTLE PROMISE.

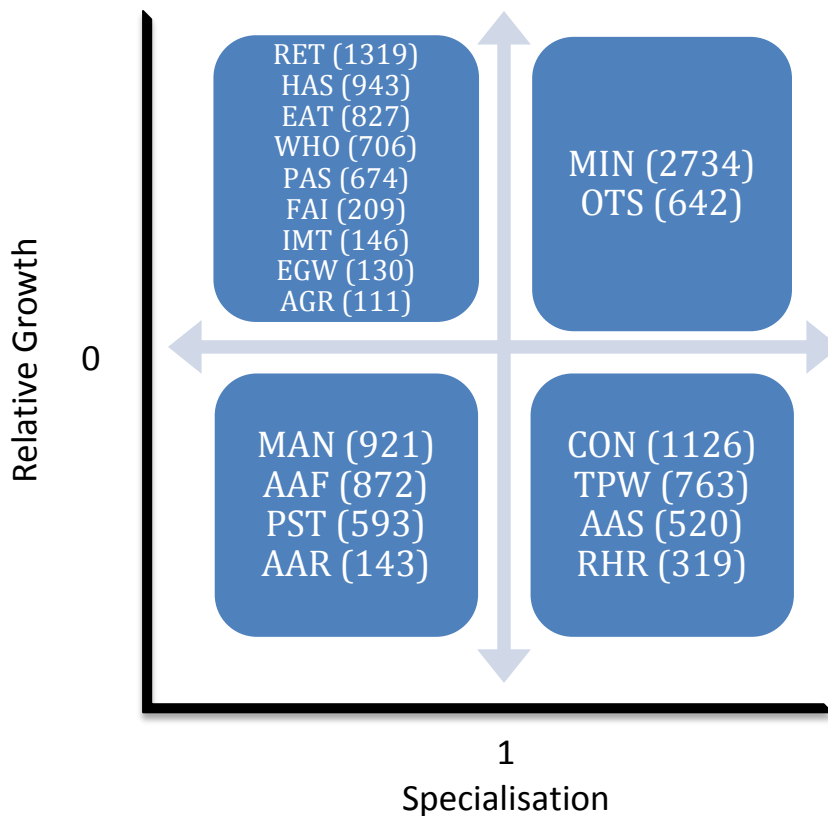
- Kalgoorlie-Boulder has a specialised economy focusing on the mining industry with limited diversity in its other activities. Mining was clearly an IMPORTANT GROWTH INDUSTRY for the overall period. However, the mining industry in Kalgoorlie-Boulder is not growing relative to mining activity overall in Western Australia for the same period.
- In 2006-2011 period, transport, postal and warehousing and rental, hiring and real estate services transitioned to IMPORTANT GROWTH INDUSTRIES.
- In 2001-2006, there were nine industries which were identified as POTENTIAL EMERGENT INDUSTRIES. Of these, financial and insurance services, information, media and telecommunications and agriculture, forestry and fishing shifted to INDUSTRIES OF LITTLE PROMISE in the 2006-2011 period in addition to manufacturing and administrative and support services.

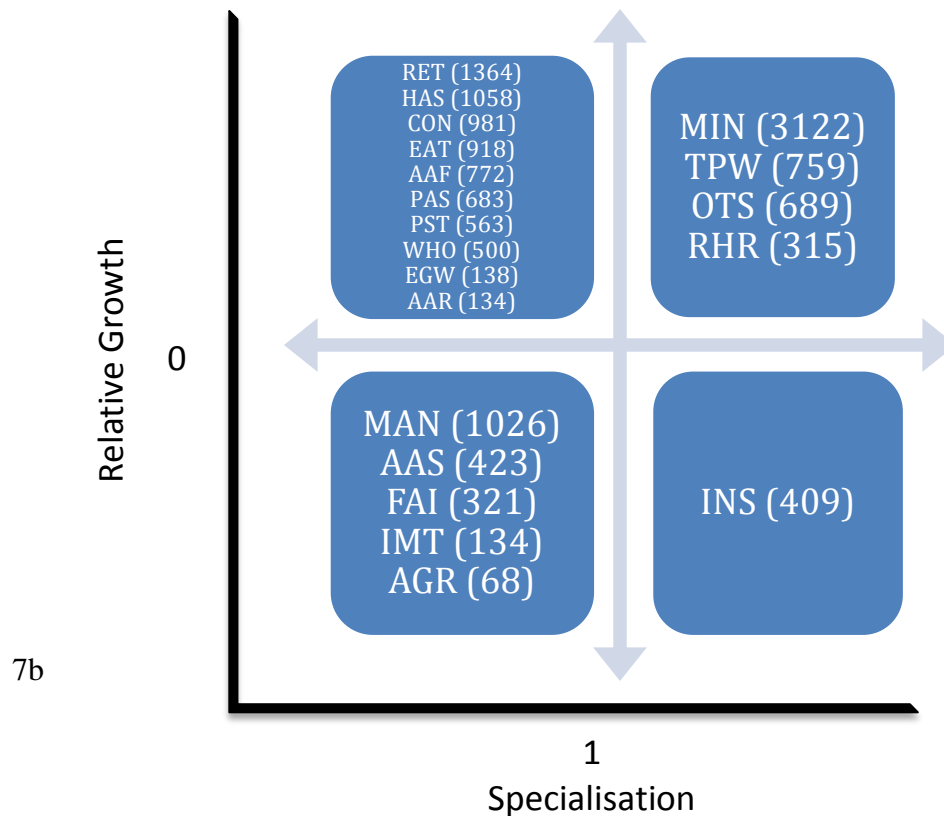
- Accommodation and food services shifted from INDUSTRIES OF LITTLE PROMISE in 2001-2006 to POTENTIAL EMERGENT INDUSTRIES in 2006-2011.

In Figure 7, the data shown in Figures 6a(ii) and 6b(ii) are classified in relation to their status as POTENTIALLY EMERGING INDUSTRIES, IMPORTANT GROWTH INDUSTRIES, INDUSTRIES OF LITTLE PROMISE and IMPORTANT INDUSTRIES THAT MAY REQUIRE ATTENTION.

Figure 7: Classification of industries based on their specialisation and relative growth for (a) 2001-2006 and (b) 2006-2011. Within each category, industries are ranked based on their level of employment (shown in brackets).

7a





7. Implications for Local Economic Policy

Competitive and comparative advantage are technically two separate, independent concepts which measure economic performance. However, when viewed together they have the potential to measure:

- multiple factors in the economy of a particular place;
- the relationship of a particular locality with other localities nearby ('neighbours');
- the interdependence between industries; and
- the performance of that economy with other local economies.

The degree of economic integration is also an important factor and this underpins the robustness of the Western Australian state economy. Consequently, in regional Western Australia, the links each regional capital has with its 'neighbours' can be important depending upon the relative location or proximity of a regional capital and/or the remoteness of the 'neighbours'. The strength of the direct and indirect impacts of a regional economy on its neighbours and also the direction and flows of the impacts are important to understand and this is best described as 'connectivity'. The links and connectivity also indicate accessibility. Factors which influence accessibility are numerous, including: transport networks, social capital, commodities, labour force, infrastructure and services.

Understanding the links, flows, connectivity and accessibility provide the necessary information to explain how competitive and comparative advantage and industry specialisation of a local

economy will impact on neighbouring economies and the strategic positioning of regional capitals in the Western Australian economy overall.

The dynamics and drivers of local competitiveness and comparative advantage shape a regional economy's responsiveness to externalities and help explain the underlying forces triggering 'catch-up', 'falling behind' and 'forging ahead'. They also assist in forecasting economic impacts including:

- the direct and indirect effect of investing in regional capitals,
- the influence of local investment beyond the regional capitals, and
- the potential for diffusion of external shocks across the economic system.

In the case of Kalgoorlie-Boulder, there are indications there is a low level of dependence between Kalgoorlie-Boulder and its neighbours; investment in Kalgoorlie-Boulder has a limited flow-on effect on its neighbours. Future research, through the Western Australian Regional Model (WARM) will explore the degree of connectivity and economic integration between Kalgoorlie-Boulder and its neighbours and Kalgoorlie-Boulder and the Western Australian economy overall.

8. APPENDIX A: ANZSIC INDUSTRIAL CLASSIFICATION

ANZSIC Classification	Mnemonic
Agriculture, forestry & fishing	AGR
Mining	MIN
Manufacturing	MAN
Electricity, gas, water & waste services	EGW
Construction	CON
Wholesale trade	WHO
Retail trade	RET
Accommodation & food services	AAF
Transport, postal & warehousing	TPW
Information media & telecommunications	IMT
Financial & insurance services	FAI
Rental, hiring & real estate services	RHR
Professional, scientific & technical services	PST
Administrative & support services	AAS
Public administration & safety	PAS
Education & training	EAT
Health care & social assistance	HAS
Arts & recreation services	AAR
Other services	OTS
Inadequately described/Not stated	INS

7. APPENDIX A: ANZSIC INDUSTRIAL CLASSIFICATION

8. TECHNICAL APPENDIX:

(1) *Relative Growth Rates:*

Let $E_{ir,t}$ define the number of persons employed in industry i in region r at time t . It follows that the local growth rate g_{ir} can be defined as:

$$g_r = \frac{E_{ir,t+1}}{E_{ir,t}} - 1$$

Similarly, the average growth rate across the benchmark economy, in this instance Western Australia, g_{iWA} , can be defined as:

$$g_{iWA} = \frac{E_{iWA,t+1}}{E_{iWA,t}} - 1$$

It follows that the relative local economic performance, A_{ir} , in terms of job creation is defined as:

$$A_{ir} = g_{ir} - g_{iWA}$$

If $A_{ir} > 0$ then industry i in region r is performing better than the same industry in the benchmark economy. Conversely, if $A_{ir} < 0$ then industry i in region r is performing worst than in the benchmark economy.

(2) *Local Specialization and the Economic Base:*

Conventionally, basic sector employment is assumed to include Agriculture, Mining, Tourism, State/Federal Government and manufacturing (partially) whereas non-basic economic activities include retailing, commercial banking, local government, local public schools, services.

However, this rule-of-thumb can be augmented with a more objective measure of local specialization, the location quotient. An employment location quotient (LQ_{ir}) is used to define the relative specialization of an industry i in a region r relative to the employment in the same industry in a benchmark economy:

$$LQ_{ir} = \frac{E_{ir}/E_r}{E_{iWA}/E_{WA}}$$

Where, E_{iWA} is the level of employment in industry i , in the benchmark economy and E_{WA} is the total employment in the benchmark economy, in this instance Western Australia.

Where local economic data on trade flows does not exist regional trade patterns need to be imputed from measures of local economic structure. Specifically, it is assumed that the patterns of trade can be imputed from the patterns of industrial specialization. In general,

- (a) the greater is the LQ_{ir} above unity, the larger will be there regions net sectoral exports
- (b) the greater is the LQ_{ir} below unity, the larger will be the regions net sectoral imports
- (c) for an LQ_{ir} of unity, the region is neither a net exporter nor a net importer.

From which it is possible to calculate the level of base sector employment in a local economy:

$$E_{ir}^B = (1 - 1/LQ_{ir})E_{ir} = \left(\frac{E_{ir}}{E_{iWA}} - \frac{E_r}{E_{WA}} \right) E_{iWA} \quad \forall LQ_{ir} > 1$$

The first term on the right hand side of this equation can be considered as a proxy for the local economy's share of the total production, or quantity supplied, of the products of industry i for the base economy WA. Similarly, the second term can be considered a proxy for the region's share of the 'base' economy's consumption, or quantity demanded. If the difference is positive (ie a $LQ_{ir} > 1$) then the local economy produces a greater share of the 'base' economy's production than it consumes and the excess is assumed to be exported. As a corollary, this equation can be used to calculate net export employment, that is the local economic base by aggregating across all industries, $E_r^B = \sum_{i=1}^n E_{ir}^B$.