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Regional Industry Specialisation or Regional Industry Diversification: Is One Better Than The Other?

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Abstract

This paper explores regional economic growth by examining regional economic industrial diversity levels within the Australian Bureau of Statistics (ABS) identified, statistical districts (SDists) of New South Wales (NSW) using the 2006 ABS Census of Population and Housing data.

The national averages index of industrial diversity measurement found that most NSW SDists were industry specialised economies with Port Macquarie (33.03) being most specialised and Tamworth (4.73) being most diversified.

The Regional Economic Modelling and Planning System (REMPLAN), an input-output model was then utilised to examine a hypothetical exogenous increase in demand on the 'test' SDist of Coffs Harbour, a relatively specialised economy.

Modelling for the economic impact of an increase in demand of $20 million on employment, income, and value added found a potential for 94 more jobs, $2.980 million more wages, and $4.246 million more value added for an industrially specialised region than one which was more industrially diverse.

Introduction

Regional economic growth strategies have become an extremely important means to sustain and grow regional economies (Kruitlla 1955). Indeed, regional economic growth, especially economic development has become a significant economic and political concept (Stern 1991), with policy makers increasingly conscious of the impacts to outside regions (McGovern 1985). Regional economic growth strategies have become essential, not only in terms of regional income, but in improving regional education, employment, and industry statistics.

Within the literature lies, in many cases, the implicit assumption that a diverse regional economy will enjoy a stable employment growth rate, with the diversity acting to shield the regional economy from fluctuations in the market for its products (Jackson 1984 and Malizia and Ke 1993). Some research however has shown that regional industry specialisation in fact generates greater economic impacts to a regional economy than the more conversant, industrial diversification strategy (Diamond & Simon 1990). This paper is a further exploration of that theme. Indeed, the analysis within this paper not only suggests that many regional economies in NSW are specialist economies, but additionally suggests that a regional industrial specialisation strategy creates a greater employment, income and value added impact to regional economies compared to an industrial diversification strategy.

Stephen Mason

Industrial Specialisation versus Industrial Diversification

There is considered to be four methods of obtaining regional growth for policy makers, these include (Picton 1951):

(1) attracting new firms to the region,
(2) expansion of firms already established within the region, by adapting products to serve the needs of varying markets or by adding new products with new markets,
(3) physically shifting of firms already located to the region, and
(4) the establishment of branch factories within the region by firms already located elsewhere.

The industrial specialisation and industrial diversification strategies both were developed from this analysis of regional growth.

An industrial specialisation strategy attempts to expand an economy through promoting specific established industries in which the region has a competitive advantage (Diamond and Simon 1990). An industrial diversification strategy, conversely, attempts to expand an economy through growing its industry base, countering the localisation in specific regions of industries of similar and complementary types (Skyes 1950).

Industrial specialisation was founded upon the classical economists' theory that hypothesised that specialisation and trade are beneficial to a country. These benefits derive as countries specialise in goods and services in which they have a comparative advantage by way of resource endowments and/or superior value added techniques (Izraeli and Murphy 2003.) . Industrial specialisation advocates state that the low costs of production attainable are diminished by industrial diversification strategies. This is achieved by causing the removal of a portion of the specialised industries elsewhere or by leaving them intact and introducing into the regions, differing industries (Skyes 1950). In the latter case, Skyes (1950) suggests that competing demands for the factors of production by the newly introduced industries may curtail their supply and drive up their costs to the specialised industries. Valuable external economies; such as industrial and commercial linkages, transport facilities and other specific service facilities; may be impugned.

Industrial diversification advocates state, that it would be rare for industrial diversification to raise the costs of specialised industries and cause these industries to relocate to inferior locations, for such industries ordinarily do not lead themselves to transfer. Many of the specialised industries are 'chained to the spot' because they are extractive industries with other specialised industries depending on existing factors of production which could not be provided elsewhere (Skyes 1950).

Industrial specialisation advocates also note that industrial specialisation will in itself create diversity, suggesting that the history of industrial growth shows that after a certain point, specialisation itself generates diversity (Diamond and Simon 1990). This is achieved by attracting industries subsidiary to the main industry, and later on these subsidiary industries enter upon production of goods and services.

This paper will provide hypothetical evidence that an industrial specialisation strategy would indeed create a greater employment, income and value added impact to regional economies compared to an industrial diversification strategy.

Measuring the industry diversity of regional economies

The use of indices as summary measures of regional diversity is particularly appealing because of their ability to synthesize vast amounts of information into a single, easily interpreted number (Wagner 2000). These indices calculate industry diversity relative to some benchmark, typically the nation which then allows for the comparison and ranking of regions based on a generated, standardised measure (Siegel, Johnson, and Alwang 1995).

Historically several index methods have been developed to measure the level of industrial diversity of regional economies. These classic indices include the minimum and adjusted minimum requirements method, the Ogive method, the national average approach and the Herfindahl index (Mack, Grubesic and Kessler 2007). Along with these classical measurements of industrial diversity come some more recent measurements including Entropy index, Krugman Similarity index and Markowitz Portfolio theory.
While it is not the purpose of this paper to explore the efficacy of alternate measures of regional industrial diversity, there is considerable debate over the use and outcomes of these differing measurements.

Jackson (1984) evaluated alternative measures of regional diversification revealing a substantial amount of ambiguity among the results. Jackson (1984) concluded that the concept of industrial diversity as a policy framework suffered from definitional ambiguity and was lacking in empirical substantiation. Attaran (1986) came to a similar conclusion. In his study of 10 years of annual data for 50 U.S. states Attaran (1986) concluded that no strict relationship existed between economic diversity and the economic performance of a region.

The large volume of current research addressing measurement of industrial diversity suggests that these tools have maintained their relevancy since their inception some sixty years ago (Mack, Grubesic and Kessler 2007). The search for the best way in which to foster diversity (if this is considered the best way forward for regional growth) remains of great importance for researchers and policy makers (Conroy 1975; Attaran and Zwick 1987; Wagner 2000; Dissart 2003).

A recent Australian study by Trendle and Shorney (2003) used data from the Australian Bureau of Statistics (ABS) Census of Population and Housing Data from 1996 and 2001, small area labour market data from the Department of Education Employment and Workplace Relations (DEEWR) and Australian Tax Office (ATO) data to assess regional economic performance in terms of employment, unemployment and per capita income for Queensland's ABS defined Local Government Areas (LGA's). Using the Entropy index for measuring industrial diversity Trendle and Shorney (2003) concluded that regional industrial diversification has a significant influence on regional economic performance.

The relationship between diversity and regional instability, as measured by employment and the unemployment rate, and the relationship between diversity and regional employment growth confirms the literature in this area. The findings of this study however did not support the literature that regional industrial diversification has a significant influence on regional per capita income, while the relationship between the unemployment rate and industrial diversity suggested that outcomes vary with labour force size.

In particular Trendle and Shorney (2003) found that for regions with a labour force above 10,000 persons the correlation coefficient of the unemployment rate with the Entropy index was found to be negative at -0.53 while it was found to be positive at +0.45 for regions with a labour force below 10,000 personnel.

This current paper uses the regional SDists of NSW to measure industrial diversity and these SDists all have labour force populations above 10,000 as shown in Table No.2

National average index of industrial diversity measurement

The method adopted in this paper to measure the industry diversity of regional economies within NSW is the national average approach. This method was chosen due to the availability of national average industry statistics from the ABS, enabling comparisons of Coffs Harbour statistics with other Statistical Districts within New South Wales. The other approaches are considered to complicating when national average (Australia) data is more readily available from the ABS. Further, Bahl, Firestine and Phares (1971) argue that the national average index may be accepted as a credible measurement of industrial diversity on the grounds that national urban average employment more closely approximates an industry norm or employment outcome.

The national average approach assumes M_i is equal to the national average employment in the i^{th} industry. The approach, similar to the minimum requirements approach only uses the numerator in determining the industry diversity within a region (Bahl, Firestine and Phares 1971). The numerator is shown again to be:

$$\Sigma \frac{(P_i - M_i)^2}{M_i} \qquad i = 1,2, \ldots ,39$$

Whereby:

P_i = the percent of employment in the ith industry class

M_i = national percent of employment in industry *i*.

Bahl, Firestine and Phares (1971) demonstrated using the national average approach in the United States (U.S.) that larger regions tended to be more diversified and that smaller regions were far more specialised. This is in line with the findings of Trendle and Shorney (2003) in their study of industrial diversity in regional Queensland.as discussed above. Steigenga (1955) also utilised national average employment data by calculating the variance as the indicator of diversity, explicitly identifying the national average employment in each industry as the 'norm' from which industry diversity was computed.

Hammond and Thompson (2004) used the national averages approach to examine the effects of industrial diversity and population characteristics on the variability of metropolitan and non metropolitan employment for the contiguous U.S. These authors found that the influence of population characteristics and industrial specialisation varies significantly across metropolitan and non metropolitan regions.

In 2007 Mack, Grubesic and Kessler used the national average index (amongst others) of industrial composition to evaluate the composition of regional economic resources at the county level in the U.S This study sought to revisit the classic index of national averages but from a different perspective. Instead of explicitly examining industrial diversity, this study used the national averages index to evaluate their applicability for benchmarking local and regional economies.

The study explored whether this index might be extended beyond more traditional definitions of diversity to produce a multivariate evaluation of the relative concentrations of (U.S.) county level resources and a ranking of these regions accordingly. Further, this study suggested that this conceptual alteration of the classic index of national averages held great promise for wide applicability in the public and private sectors, because of its more intuitive interpretation and computational simplicity, relative to other diversity measures (Mack, Grubesic and Kessler 2007)

The outcomes of this current study using the national average approach to measuring industrial diversity in regional NSW SDists are identified in the 'Findings' section of this paper.

This paper then focuses on providing empirical evidence for growth strategies for regional economies through comparatively analysing the impacts of an exogenous increase in demand on productive industries (sectors) compared to less established industries (sectors); thus, effectively comparing the effects of increasing demand for specialist industries to the industries which would create diversity.

Static Input-Output Analysis

The REMPLAN (2006) model utilised in this paper to measure the exogenous impacts on the test regional economy applies a static input-output methodology. This methodology will be explained below.

Static input-output analysis essentially traces out the transactions in dollar terms between the industries and sectors of an economy for a given year. The analysis summarises the inter-sectoral flows in the period and presents the data in a matrix form, which provides a concise, descriptive snapshot of the economy at a particular point in time (REMPLAN 2006).

The original static input-output matrix developed by Leontief (1956) outlined the sets of direct capital and labour coefficients displaying the amount of capital and labour employed in each, per unit of output. The computations reflected the internal structure of the economy, with the interdependence between individual industry sectors of the system described by a set of linear equations. The simple linear input-output equation is described by (Leontief, 1965):

$$X_i = AX_i + Y_j$$

Whereby:

X_i = sum of the total output of all sectors,
Y_j = total final demand for the output of sector *j*, and
$A = (a_{ij})$, the matrix of input-output coefficients.

The *REMPLAN* model utilised within this paper is based on this original concept and is described by the following matrix equation (Nichol 2005):

$$X = AX + Y$$

Where:

X is the vector of sectoral gross outputs,
A is the matrix of regional intermediate input or regional purchase coefficients, and
Y is a vector of total final demands by sector.

The coefficients a_{ij} of A are defined as the amount purchased by sector j from sector i per unit of output of sector j. The equation states that gross output of each industry equals immediate demand sales (AX) to other industries for further processing plus final demand sales (Y) of end products to consumers, including households, government, and for export. By rearranging and converting to differences, this equation can be rewritten as:

$$\Delta X = (I - A)^{-1} \Delta Y$$

This equation permits the analyst to calculate the change in industry production levels (ΔX) in response to the change in industry final demands (ΔY). ΔY can incorporate any element of final demand expenditure (Nichol 2006).

The REMPLAN input-output matrix can be divided into four segments. These segments are shown in the following Table 1.

Table 1: The Structure of the Input-Output Transaction Table

	Q1. Intermediate Sector			*Q2. Final Demand Sector*				
Industry Sector	1.	2.	3.	H'holds	Govt	Investment	Exports	Total Output
1. Agriculture.	20	40	0	20	0	0	20	**100**
2. Manufacturing	20	20	10	75	10	10	55	**200**
3. Services.	0	40	10	25	20	5	0	**100**
Payments for:	*Q3. Primary Inputs Sector*			*Q4. Primary Inputs Absorbed by Final Demand*				
H,hold Services	40	45	70	5	0	0	0	**160**
Govt Services	10	15	5	0	0	0	0	**30**
Imports	10	40	5	0	0	0	5	**60**
TOTAL INPUTS	**100**	**200**	**100**	**125**	**30**	**15**	**80**	**650**

Source: *REMPLAN* 2006.

The transaction table is divided into four segments per the example provided in Table 1 above. The table provides a transaction table for three example industries, that is, the agricultural, manufacturing and services industries. In reality there are 19 industries defined within a region which have the ability to be segmented further in order to generate more specific transaction tables (Nichol 2006).

Quadrant 1

The intermediate sector is made up of transactions between firms in the local region. Working down the manufacturing column for example the analysis shows that the sector purchases $40 from agriculture, $20 from its own sector and $40 from the services sector. Working across the rows, the agricultural sector sells $20 to its own sector, $40 to manufacturers and nothing to the service sector (Nichol 2006).

Quadrant 2
The final demand sector, records sales of locally produced goods and services within the region (consumption and investment by households, government and firms) and to people outside the region (exports) (Nichol 2006).

Quadrant 3
This quadrant represents payments to households (wages and salaries), firms (gross operating surplus, although it is not included in the example in table 1), governments (taxes on goods and services) and to producers outside the region (imports) all of which provide primary inputs (labour and capital) (Nichol 2006).

Quadrant 4
The primary inputs for final demand is the smallest sector in terms of activity, as it represents the provision of primary inputs for final demand (Nichol 2006).

The columns and rows or the inputs and outputs, for the industry sectors (agriculture, manufacturing and services) will all balance. The total of the column for the manufacturing of $200 matches the total for the manufacturing sector's row and the same is shown for the remaining two sectors. It is also possible to compare regional exports ($80) and regional imports ($60) to determine a trading surplus of deficit. Outlays by the government sector in the above table by pure coincidence match the revenue collected in the region but this is not generally the case. It also should be noted that taxes on income and profits are omitted from such data (Nichol 2006).

Regional Input-Output Analysis

Regional input-output analysis is relatively similar to national input-output analysis except that the comparison is between regions, rather than nationally (Isard 1960). The major difference between national input-output and regional input-output is not in the interpretation and analysis of the tables but rather in the construction of the transaction tables themselves (Jensen, Mandeville and Karunaratne 1979). The construction of the regional transaction table has been one of the most controversial and debated subjects surrounding regional input-output analysis.

Early contributions to the construction of regional input-output tables were from Miernyk (1967), Isard and Langford (1971) and Polenske (1970). These early works constructed the regional transaction table by mainly personal interview (Miernyk 1967), and surveys (Isard and Langford 1971, Polenske 1970) which entailed utilising the input-output model to simulate impacts on output and employment.

In order to construct a regional input-output transaction table, the procedure required at least two sets of input-output data over time. These two sets of data included national and regional input-output data (Jensen, Mandeville and Karunaratne 1979). While consecutive annual national input-output data is now common, data constraints and financial limitations have made similar occurrences at the regional level less frequent (Forster and Garlick 1986).

The three most common methods in constructing regional input-output transaction tables are the survey, non survey and hybrid approaches. The survey approach to the construction of regional transaction tables relies on direct surveys to obtain data for the measurement of interindustry flows (Jensen 1980). The non-survey approach to constructing regional transaction tables allow the development of regional transaction tables from existing sets of input-output tables at the national level.

The final method is the hybrid approach, which combines the non-survey techniques for estimating regional direct-requirements tables with the insertion of superior data (Lahr 1992). The superior data is obtained from experts, surveys, and other reliable sources (primary and secondary), and can be added into the model at any stage.

The hybrid method mixes the advantages of the survey and the non-survey methods for constructing regional input-output tables while avoiding the limitations (Muhammad, 2000). Accuracy is considered the main advantage of the survey method while speed and low cost are characteristics of non-survey methods for the construction of regional tables. High cost and time requirement are the main limitations of the survey method. In contrast, less accuracy is the central limitation of non-survey methods (Muhammad, 2000).

REMPLAN (2006) utilised in this current research adopts the hybrid approach to the construction of the test regions input-output transaction table. This technique was chosen due to the support it has gained from regional input-output researchers (Jensen, Mandeville and Karunaratne 1979; Lahr 1992; Muhammad 2000; West and Gamage 2001; Pinge 2005,)

Methodology

The national average approach to measuring industrial diversity as previously discussed was utilised in this current study to measure and compare the industrial diversity of regional economies (SDists) within NSW.

The national and NSW SDist regional industry employment data for 2006 was obtained from the ABS Census of Population and Housing catalogue 2068 Industry of Employment and these SDists are listed at Table No.2 source. The test region of Coffs Harbour's data was obtained from REMPLAN and is provided for the year 2006.

The REMPLAN computer generated model used in this study is based on the Generation of Regional Input-output Tables (GRIT) methodology and is a top down approach which uses state input-output tables to produce the test regions input-output tables by utilising a mechanical regionalisation technique; location quotient.

The input-output transaction tables for the Australian economy are collected by the Australian Bureau of Statistics (ABS). The national input-output tables illustrate for a product; its origin or source of supply divided into domestic production and imports, its destination classified into usage by various industries and final demand categories, and the difference between the basic price and the purchaser's price for each product or margin (ABS 2000 (5216.0)). State matrices adjusted for the latest estimates of Gross State Product (GSP) without the application of location quotients are derived from the national matrices (Nichol 2006).

In summation the REMPLAN (2006) model produces variable-interference hybrid tables, with the model relying on a series of mechanical steps to produce regional coefficients from the state tables.

Multiplier impacts from exogenous increases in demand

Regional input-output models developed to trace the impact of demand on a region's income and employment have generally involved some framework of regional accounts which describe transactions between the region, the outside world and activities within the region (Chase, Bourque and Conway 1993). To trace this impact regional input-output models include some type of multiplier ratio that determines the relationship between an initial increase in demand and the ultimate effect on regional income or employment (Hoover and Giarratani 1985). An input-output multiplier is a summary measure of an industry's impact on the economy (Chase, Bourque and Conway (1993).

In any economy, the addition of new (exogenous) output or employment for a particular sector will usually lead to an increase in the gross product for that economy (Jensen, Mandeville and Karunaratne 1979).

The total increase in the gross product of the economy will be greater than the exogenous output due to the effect of economic multipliers. An increase in output or employment will induce additional multiplier effects throughout other sectors. Those sectors will in turn require inputs from other sectors, and multiplier rounds will occur. Through the use of input-output matrices, a series of coefficients can be determined. These coefficients allow the modelling of impacts to the economy. Such impacts can be measured not only in terms of the direct impact (the new output) on the sector which is expanding, but the total impact on all sectors and therefore the total impact on gross product for the region (Jensen, Mandeville and Karunaratne 1979).

Jensen, Mandeville and Karunaratne (1979) described the input-output multiplier formula as:

$$X_1 = X_{1\,1} + X_{1\,2} + \dots + X_{1\,n} + Y_1$$
$$X_2 = X_{2\,1} + X_{2\,2} + \dots + X_{2\,n} + Y_2$$
$$\vdots \qquad \vdots$$
$$X_n = X_{n\,1} + X_{n\,2} + \dots X_{n\,m} + Y_n$$

Whereby:

X_i = total value added of intermediate sector i,
X_{ij} = output of sector i purchased by sector j, and
Yi = total value added for the output of sector i.

By dividing the X_{ij} by X_j, one can derive coefficients, which represent more clearly the purchasing pattern of each sector. These coefficients are termed 'direct' or 'input-output' coefficients, or 'technical coefficients'. Technical coefficients are noted as $a_{ij,}$ and represent the direct or first round requirement of inputs from each sector *i* following an increase in unit output of any sector *j*, therefore, $a_{ij} = X_{ij} / X_j$ (Jensen, Mandeville and Karunaratne 1979).

This mathematical relationship infers infinite multiplier affects however demand leakages correct this inference. Hoover and Giarratani (1985) suggest that a common demand leakage occurs when one of the intermediate activities experiences an increase in sales. The sector then has to allocate part of the extra revenue to purchasing inputs. These inputs are not from the other intermediate activities but from primary supply sectors. Money paid for additional imports leaves the region. Stimulus to regional demand for payroll, taxes, and depreciation drop out of the stream of new money circulated among the processing activities. The stream gets smaller at each round and finally peters out altogether. Jensen, Mandeville and Karunaratne (1979) calculated that the additional units created after the fourth round were simply not significant.

The REMPLAN (2006) model essentially provides input-output analysis at a regional level.by allowing the input of a hypothetical exogenous increase in output or employment. From an industry specialisation and / or industry diversification point of view, these hypothetical increases permit the examination of the economic impacts, from these hypothetical increases. REMPLAN (2006) uses Australian and New Zealand Standard Industry Classifcation (ANSIC) to aggregate industries for input – output analysis.

Findings

Industry diversity

Table 2: **Industry diversity within regional NSW Statistical Districts 2006**

Industry Diversity		
Region	**National average approach** $(P_i - M_i)^2 / M_i$	**Variance** $(P_i - M_i)^2 / (n - 1)$
New South Wales	0.98	0.22
Tamworth	4.73	1.42
Newcastle	4.77	0.96
Dubbo	4.85	1.89
Wollongong	5.00	1.17
Albury – Wodonga	5.92	1.76
Wagga Wagga	10.13	3.21
Bathurst	10.60	2.94
Orange	11.47	2.15
Lismore	11.76	4.90
Coffs Harbour	**12.33**	**4.74**
Nowra-Bomaderry	14.23	4.38
Port Macquarie	33.03	6.38

Source: Census data, ABS, Catalogue 2068.0 (2006) State 1, Statistical Districts; 1027, 1003, 1030, 1006, 1218, 1033, 1036, 1039, 1015, 1008, 1021, 1024,

Table 2 outlines the national average approach and the variance for NSW and 11 NSW regional SDists assuming the national industry employment figures as the norm or average. As a result, the national industry diversity would be shown as 0.00.

The table shows that all the regional districts have a national average value of greater than 4 in relation to the national economy, with Tamworth considered to be the most diversified SDist in NSW at 4.73 and Port Macquarie the most specialised at 33.03.

To arrive at these industry diversity indices each regional economy (SDist) is dissected into 19 industries showing the employment variances to the national average. The national averages formula is used to arrive at the final diversity index for each SDist.

For the district economies with a total national average variance of less than 10, the total variance of the two most significant positive employment industries is less than 2. For district economies with a total national average value of greater than 10, the two most significant industries total variance to the national average is greater than 2. Consequently, each district economy can be shown to have a specialised industry or industries; it is just a question of how large. Tamworth, which is the most diversified SDist economy, has a specialisation in the health care and social assistance industry (variance of 0.59), while the most specialised SDist of Port Macquarie has a specialisation in electricity, gas and water. (variance of 18.48).

Far greater issues can be identified within these statistics, and further examination of the variance of positive and negative employment industries within each district economy can be examined, however, from initial analysis, most district economies have some specialisation in terms of employment.

Industrial specialisation v industrial diversification for the Coffs Harbour SDist

Industrial specialisation

To assess whether industrial specialisation created a greater impact to the regional economy, than industrial diversification, when a hypothesised exogenous impact of $20m in demand was introduced to a region**,** this study adopted the REMPLAN model and utilised this model to analyse the test SDist economy of Coffs Harbour.

The Coffs Harbour SDist regional economy in 2006 had an employment variance to the national average value of 12.33, with a variance value of 4.73. The test economies two greatest employment variances to the national economy was in the retail trade (2.41), and accommodation and food services (3.83) industries

When examining the Coffs Coast regional economy utilising the REMPLAN model, the retail trade and property and business services industries were found to be the most significant industries in terms of value added within the test region

Consequently, th**is** paper examined the employment, income and value added impact on the Coffs Harbour SDist from a potential exogenous increase in demand ($20 million) on the two most significant industries in terms of value added identified, that is, the retail trade ($10 million increase in demand) and property and business services ($10 million increase in demand) industries. This paper assumed that the retail trade and property and business services industries would have the greatest likelihood of becoming specialist industries within the test region due to their current value added impact on the regional economy.

Table 4 demonstrates that a potential exogenous increase in demand ($20 million), distributed equally between two industrial specialisation industries (the retail trade, and property and business services industries) within the test region produced a total impact to the test region of 349 jobs, $13.346 million in wages and salaries, and $22.704 million in value added (regional income).

Industrial diversification

This study utilised the *REMPLAN* (2006) industry multipliers in determining the industrial diversification industries used for the current research. The study assumed that the four industries which have the greatest value added multipliers (not including the two industrial specialisation industries; the retail trade and property and business services industries) would provide the greatest impact to the test regions' economy from a potential exogenous increase in demand.

Table 3: Test regions industry multipliers – Coffs Harbour

Test Regions' Industry Multipliers			
Industry	**Employment multiplier**	**Income multiplier**	**Value added multiplier**
Agriculture, forestry and fishing	2.43	1.79	1.75
Mining	**2.89**	**3.75**	1.81
Manufacturing	2.49	2.73	**2.47**
Electricity, gas and water supply	2.51	**3.28**	1.63
Construction	2.49	2.28	**2.54**
Wholesale trade	2.45	2.58	**2.87**
*Retail trade	2.09	1.78	2.19
Accommodation, cafes and restaurants	2.30	1.82	2.33
Transport and storage	**2.54**	2.97	**2.36**
Communication services	2.22	3.04	1.87
Finance and insurance	1.99	2.70	1.82
*Property and business services	2.48	3.05	2.45
Government administration and defence	1.98	2.63	2.27
Education	1.63	1.80	1.93
Health and community services	1.69	1.73	1.95
Cultural and recreational services	2.30	2.08	2.17
Personal and other services	2.02	1.89	2.19

Source: *REMPLAN*, 2006.
* represents the industries utilised in the industrial specialisation examination.
** The figures in bold represent the industries with the most significant multipliers.

If a diversification strategy was to be utilised for the test region, the previous table suggests that the manufacturing, wholesale trade, transport and storage, and construction industries would provide the most significant value added multiplier impact to the test region.

This study examined the employment, income and value added impact on the test region from a potential exogenous increase in demand ($20 million) on the four industries identified in table 3, that is, the manufacturing ($5 million increase in demand), wholesale trade ($5 million increase in demand), transport and storage ($5 million increase in demand), and construction ($5 million increase in demand) industries. The exogenous $20 million value is used so as the analyses is consistent with that provided in the previous analysis when measuring the industrial specialisation impact to the test region.

Table 4 demonstrates that a potential exogenous increase in demand ($20 million), distributed equally between four industrial diversification industries (manufacturing, wholesale trade, transport and storage, and construction industries) within the test region, produced a total impact to the test region of 255 jobs, $10.366 million in wages and salaries, and $18.458 million in value added (regional income).

Summary

Table 4: Summary of *REMPLAN* results

Industry Specialisation and Diversification Statistics				
Regional Economic Growth Strategy	**Industry**	**Employment (Jobs)**	**Income ($M)**	**Value added ($M)**
Industrial Specialisation Strategy				
	Retail trade	119	3.342	5.280
(exogenous increase of $M 20, divided into 2 industries)	Property and Business services	45	2.574	4.552
	Multiplier effect (Type 1 + Type 2)	186	7.431	12.872
	Total Impact to the test region	**349**	**13.346**	**22.704**
Industrial Diversification Strategy				
	Manufacturing	15	0.653	1.189
(exogenous increase of $M 20, divided into 4 industries)	Wholesale trade	32	1.421	1.91
	Construction	29	0.966	2.363
	Transport and Storage	23	1.135	2.213
	Multiplier effect (Type 1 + Type 2)	157	6.192	10.784
	Total Impact to the test region	**255**	**10.366**	**18.458**
Impact Difference (specialisation – diversification)		**94**	**2.980**	**4.246**

Source: *REMPLAN* 2006

In conclusion, this study found that a potential exogenous increase in demand ($20 million), distributed equally between two industrial specialisation industries, produced a greater impact on employment, income and value added than an exogenous increase in demand ($20 million), distributed equally between four diversification industries, within the test region. The measured difference in these two regional economic growth strategies was 94 jobs, $2.980 million in wages and salaries, and $4.246 million in value added (regional income).

Concluding comments

The empirical evidence provided by this study suggests that when adding an endogenous demand increase to the test region of Coffs Harbour SDist, an industrial specialisation strategy creates a greater employment, income and value added impact to a regional economy, than an industrial diversification strategy. Industry specialisation increases in income and gross regional product, were also shown to be apparent within this studies test region after this endogenous demand increase whereas an industry diversification strategy did not, in this test case, provide greater employment prospects as implied in much of the literature.

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