Economic Impact Analysis of Central Queensland University

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Summary

Higher education can make a significant contribution to regional economies through both direct and indirect impacts. In this paper the issues involved in assessing the economic impact of Central Queensland University on different regional areas are discussed. Variations in impacts across campuses are expected according to the different mixes of domestic and international students. Data from two national survey reports concerning student income and living expenses are summarized to provide some estimates of primary expenditure drivers. While previous studies from other Australian universities provide some benchmark data, Central Queensland University has some distinct attributes such as its large funding from international students and its multi-campus organisational structure.

The results of the economic modeling demonstrate the substantial contribution that Central Queensland University makes to the economy in the Rockhampton region. Using the most realisitic scenario, where it is assumed that if the university did not exist there would be no operating expenditure, staff expenditure, international students or 50% of domestic students, the following impacts of the university on the Rockhampton region are predicted from the model:

- Total economic output and expenditure of $334.25M,
- Total employment effects of 3,017 jobs,
- Total employment income of $163.63M.

1. Introduction

In Australia, the higher education sector makes a substantial contribution to the economy by creating value, providing employment, accelerating innovation and enhancing workforce qualification. According to the Australian Bureau of Statistic (ABS) (2007), institutions in the higher education sector generated operating revenue of $13,904 million in 2005, 42% of the revenue made up of Australian Government grants. In 2004, Australian higher education expenditure on research and development (HERD) was $42,283 million. This equates to 0.44% of Gross Domestic Product (GDP) and a total of 56,809 person years of effort devoted to research and development (R&D) (ABS 2006). The Australian work force has benefited from higher education as well, due to the strong positive relationship between qualifications and weekly salary. As shown by the ABS (2005), people with a bachelor degree or higher can earn an average weekly payment over $1000, compared to an average weekly payment below $900 earned by those without tertiary qualifications.

Measuring the economic impact of universities is becoming a focal point of research. As argued by Groves (2005), the motivations for such studies are: to deal with competition and financial pressure; to answer public demands for social accountability and transparency; and to meet government requirements. Since 2000, research on the economic impact of Australian universities has been intensively funded.

As a regional and multi-campus university, Central Queensland University (CQU) plays an important role in the Australian economy, and particularly the relevant regional economies. In this paper, the issues involved in modelling the economic impacts of a university are reviewed, followed by an application of an input-output model to one relevant region, the Rockhampton economy in central Queensland.

The paper is structured in the following way. In section two, the conceptual framework of an economic impact analysis and the components of direct and indirect impacts from a university are reviewed. An overview of other economic impact studies that have been conducted on Australian universities is provided in section three. As student expenditure is such an important contributor to economic impacts, available data on this economic stimulus is reviewed in section four. An overview of the structure of Central Queensland University is provided in section five, and the results of economic modeling in section six. Final conclusions are presented in section seven.

2. Introduction to Impact Analysis

To assess the impact of the education sector on a regional economy, crude estimates of changes in production, investment or employment can be used. However, it is more accurate to measure net changes in economic activity after accounting for 'ripple' effects in the regional economy. Ripple effects vary according to the level of inputs (including labour) purchased from the regional economy, as well the level of outputs supplied into the regional economy (compared to being exported out of the region). Estimates of these direct and indirect effects can be done with more sophisticated economic modeling tools such as Input-Output analysis (Jensen and West, 2002).

An input output (IO) table provides a snap-shot of relationships within an economy at a given point in time. IO modelling provides a mechanistic approach to estimate how economic impacts can 'ripple' through an economy. It is typically done by building a model of a regional economy where the transactions between each industry sectors, the household sectors, and the economy outside of the region are summarised in a matrix. Under this approach, the impact of a change or institution is divided into the primary impact or direct impact, and secondary impacts including indirect impacts and induced impacts.

2.1 Direct Impact

Direct impact comprises the university's operating expenditure and the visitors' (students') expenditure, most importantly, students from outside of the target region.

While operating in the local region, a university will make payments to employees, purchase supplies, invest capital in properties and spend dollars on research. All of these activities will directly benefit the local economy. Langworthy (2001) made a detailed analysis and identified the following items that can be categorised as direct economic impact.

- The value of infrastructure or capital injection in the region. Infrastructure can be generally defined as basic facilities such as buildings, roads, equipment or other networks to enable the working of a functional system like a university. The Research Infrastructure Task Force (RITF) defined 'research infrastructure' as

  > "The facilities (e.g., laboratories, studios, clinics) and services (e.g., libraries, computing services, grants management systems, research safety and subject protection organizations, and secretarial services) needed to produce novel and influential scholarly output (e.g., publications, exhibits, performances)." (RITF 2006, p3)

  According to this definition, the infrastructure of a university may include, not exhaustively, buildings, road works, grounds, telephones, laboratory facilities, computers, intranet, maintenance related to these facilities, communication service, library services, securities and so on.

- The value of salaries paid to staff living locally. Salaries paid outside of the target region cannot be counted..

- The value of other university expenditure in the region. This includes the payments for supplies and other services such as delivery and hospitality expenses.

- The value spent by regional campus staff and students. This item covers the expenditure of both staff and students living in the local region. For university staff, their income is mainly salaries paid by university, the value of which should be regarded as internal resource exchange within the university. Thus, the spending by staff and wages paid by the university should be mutually exclusive, otherwise the economic impact will be double counted. There are two different patterns in students' expenditure - one is spending by students from outside of the region and another is local students' expenditure. In some studies, the local students are excluded from the survey sample because they are deemed to spend on living locally whether the university exists or not. However, if the university is operating in a regional area, these expenditures should be included because the local students would have to move to other regions without the existence of that university. Students' income and expenditure will be discussed in detail later.

- The value of project funding attracted. Universities absorb outside resources such as government funding, student funding and other private funding to support their operation. Although no details are given by the report of Langworthy (2001), it can be inferred that the measurement of project funding may include the total amount attracted and spent by the university on projects and other in-kind project investment by the university. Langworthy (2001, p.8) identified the in-kind project investment as expenditure on 'hosting meetings, providing office, equipment and telecommunications or time spent by staff sitting on project steering committees'.

2.2 Indirect Impact

The expenditure of a university will stimulate other economic activities in its surrounding region. For example, expenditure by university staff on food will increase the income of employees in the food store; and the consumption of delivery services will bring more revenue for suppliers. These increments can be classified as indirect impacts. Similarly, when food store workers and service suppliers spend these increments, it will cause another round of contributions to economic activity and household income. This circulation can be classified as an induced impact of expenditure. Indirect impacts and induced impacts may be summarized as secondary impacts, although they are normally identified separately in input-output modelling.

In economic models of business or industry activities, the initial expenditure impacts are normally limited to the direct expenditure incurred by the firm or industry. A consistent approach in higher education would focus on the direct expenditure by a

university on salaries and other capital and operating expenses in the relevant economy. However, higher education typically induces the location of students at the university site, and the expenditure by those students (other than to the university), can also be classified as contributing to direct impacts into an economy. According to Groves (2005), the impact flow of a university can be summarized in Figure 1.

As illustrated in the diagram, the direct impact of a university and related expenditure by students will stimulate other economic activities through indirect and induced effects. Input-output and general equilibrium models can be used to estimate these impacts, although the quality of the modeling is reliant on both the accuracy with which the initial impacts are measured and the preciseness with which the interrelationships between the industry sectors are defined in the model. Essentially these models provide multipliers to indicate the extent of the indirect and induced effects, and which industry sectors they will fall on.

Figure 1   Direct, Indirect and Induced Impacts
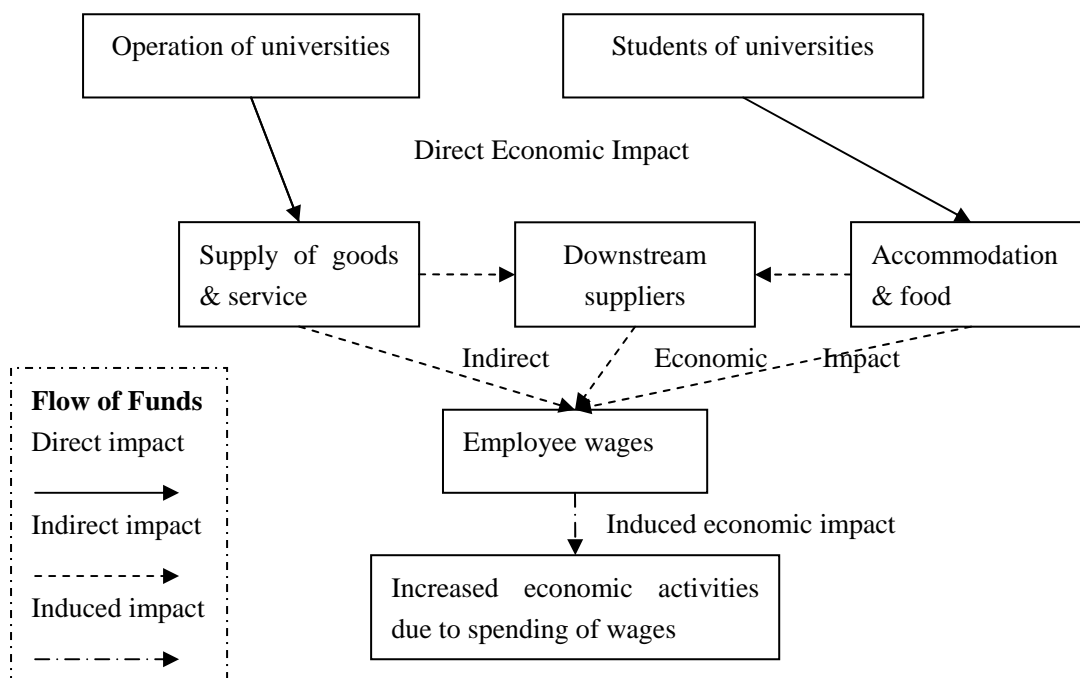
Besides the tangible economic impacts displayed in Figure 1, there may be other less tangible economic impacts of a university in a local or regional economy (Langworthy 2001). Some of these impacts are summarized as follows:

- *Human capital impacts*: According to the ABS (2005), there is a positive relationship between qualifications and average earnings. This principle reflects the direct economic impact of universities on human capital value. Michael (1996, cited in Langworthy 2001) and IRIC (1999 and 2000, cited in Langworthy 2001) measured the value that arose from the enhancement of human capital as expected wage benefits minus student costs and public sector investment costs for providing tuition through universities. More concisely,

the incremental human capital is the difference between the present value of future wage benefits and the costs of providing higher education. Moreover, the increase of skilled labour will allow higher productivity and accelerate the development of the local economy.

- *Social capital impacts:*. Education may generate other social benefits in terms of a more 'civil' society with better networks, greater diversity of interests, and higher standards of behaviour as a consequence of the increases in human capital. These contributions to social capital may generate economic impacts, particularly when it becomes easier to attract skilled and professional labour to communities with higher education services.

- *Other unquantifiable impacts*. Some indirect impacts, such as the impacts of research, are difficult to quantify. Langworthy (2001), in his report on the impacts of the Swinburne University of Technology, acknowledged work related training, industry training, growth and development partnerships and community group use of facilities as unquantifiable impacts .

3. Review of Previous Studies

Since 2000, there has been increasing interest in Australian universities in identifying their economic impact on local and state economies. A desktop audit identified six reports measuring the economic impact of a university or research centre in Australia that had been conducted in the past decade (Table 1). The six universities vary in scale measured by student numbers, from the lowest (666 students) at Southern Cross University Tweed Campus (SCU-Tweed) to the highest (8,200 students) at Charles Sturt University (CSU).   The earliest report was finished in 2001 to measure the impact during 2000. The reports on hand until now are summarised as follows:

Table 1   **Basic Information of Previous Studies**

Report Name	Date of report	Region of Research	Scale of the Institution
The Economic Benefits of CQU Melbourne Campus to Victorian Gross Domestic Product	April 2007	State of Victoria	Students: 2,637
The Economic Impact of Southern Cross University Tweed Gold Coast Campus on the Economy of the Tweed (SCU-Tweed)	October 2006	Tweed Region	Students: 666 Staff: 45
Economic Impact of Charles Sturt University (CSU)	April 2005	Regions surrounding CSU's 4 main campuses	Students: 8,200 Staff: 1,400
The Economic Impact of Swinburne University of Technology on the Shire of Yarra Ranges (SUT-Shire)	July 2001	The Shire of Yarra Ranges	Students: 229 F/T, 921 P/T Staff: 204
The Economic Value of Southern Cross University Campuses to their Regional Economies (SCU)	January 2006	Regions surrounding SCU's three campuses	Students:7,736 Staff: 1,787
Computable General Equilibrium (CGE) Evaluation of a University's Effect on A Regional Economy (UTAS)	November 2006	The State of Tasmania	Students: 7,437 Staff: 1,787
The Economic Impact of Cooperative Research Centres in Australia (CRCs)	2005	Australia	NA

All the reports studied as part of this project divided economic impacts into direct and indirect impacts. Whilst the Charles Sturt University (CSU) report did not specify this classification, it did use an input-output model to measure the flow-on or multiplier effect, and this flow-on effect was integrated into the total impacts presented in the report. Student expenditure was included in all reports as a component of the direct impacts. However, the Swinburne University of Technology (SUT)-Shire report focused on infrastructure and project funding as the direct impact while the CSU report included CSU's expenditure in its direct impact measurement.

Indirect impacts were treated as flow-on or multiplier effect in all the reports, but the multipliers were obtained using different methods. The multiplier in the SUT-Shire was modeled on that used for a report on Curtin University of Technology, which is not available. The CSU report used an Input-Output model and a Marginal Coefficients Model to generate a multiplier matrix for individual campuses. The CQU-Mel report did not include an explanation of the methodology used, and appears to be an add-up of the multiplier applied in another report finished in New Zealand.

Apart from the quantified indirect impacts, the SUT-Shire report identified several unquantifiable impacts on the regional economy such as community group use of facilities, work related learning, growth and the development of partnerships. These qualifications were also identified in the report on the economic impacts of Cooperative Research Centres (CRC Report). Due to the special characteristics of the CRC program, the economic impact could not be reflected in quantified terms only. Thus, the CRCs report categorised the impacts into quantified and verified economic impacts and non-quantifiable or prospective outcomes from the CRC research activities.

3.1 Economic Models Used

Florax (1992, cited in Giesecke Ja & Madden JR, 2006) grouped the economic impact studies of university expenditure by the methodology applied into four classes: economic base models, Caffey and Issacs model, Keynesian multiplier models and input-output models. All the reports reviewed in this study are found to fall within these four categories.

3.1.1 *Counterfactual Scenario Analysis*

The CRCs report evaluated the economic impact using a scenario analysis. It compared the economic outcomes from CRC programs with the scenario without CRC programs, and took the difference as the economic impact. The authors of the CSU report adopted this approach, determining that only 25% of the impact was likely to have been generated by alternative investments with the absence of CSU. All local students of CSU were ignored when measuring the final demand impact of student expenditure. The inference of this treatment is that those local students would still remain in the regional area if the university was not present, in which case they would still be contributing to the local economy. However, Giesecke & Madden (2006) argued this method would not be plausible under certain circumstances, such as where the university of interest is the only university in the target region.

3.1.2 *Input-Output Models*

The ease of use and the level of detail obtained are generally accepted as the attractions of Input-Output models (Western Research Institute, 2005). Input-Output models provide multipliers for evaluating the flow-on effects, and were a feature of most of the reports on hand, where the techniques had been used to evaluate the indirect and induced economic impacts.

Input-Output models were reviewed in detail in the CSU report and the SCU report. The model used in the CSU report was constructed on the basis of a national input-output table. A customised input-output table was produced using the

Generation of Regional Input-Output Tables (GRIT) technique, which makes adjustments to the national table for each region covered by the research. The regional employment rate is the key variable in the GRIT technique used to adjust the national tables to suit the regional economy. The CSU report identified several disadvantages of using the Input-Output method, one of which is the assumption relating to linear coefficients. The researchers addressed this problem by using least squares regression to find a logarithmic relation between household income and demand, and used this to replace the linear coefficients.

The researchers for the SCU report specified three methods to construct a regional input-output model, being the bottom up approach, the top down approach, and the hybrid method. The researchers argued the hybrid method might be the best one to balance the offsetting demands of model accuracy and cost efficiency. The study of the economic contribution of SCU campuses to their surrounding regions was based on the Regional Economic Modelling and Planning tool (REMPLAN), developed by La Trobe University, that is based on an application of the hybrid method. Generally, the hybrid method develops a regional input-output table on the basis of the national table with relevant employment and demographic data for the region, as well as supplementary survey data.

Both the CSU report and the SCU report presented economic impacts in terms of value added, household income and the employment effect. These are typically standard outputs of an input-output model, and interpretation for all these influences was provided in the SCU report.

3.1.3 Multipliers

Multipliers were used to measure the indirect impacts in the CQU-Mel report and the SUT-Shire report. The multiplier effect is a flow-on effect to summarise the impact of expenditure or other activities in the wider economy. From the discussion above, it can be inferred that a multiplier is a derivative of the input-output model. The SCU report showed the process of deriving Type 1 and Type 2 multipliers from a regional input-output table, providing a range of multipliers used in prior similar studies varying from 1.58 to 2.36. The CQU-Mel report was a briefer analysis, where a multiplier of 2.0 was adopted to summarise the economic impacts.

3.2 Results

Table 2 collates the information gathered regarding the economic impact of the universities studied here. To make a clear comparison, two bar charts were generated to show the total impact of each university and the size-adjusted impact, which was the quotient of total impact and total student number. The student numbers of SCU is not shown in the SCU report, and the UTAS report followed a different measurement system. As a consequence, these two reports are not included in the comparison.

Table 2　Final Impact Measurement of Four Universities

Name of University	*CSU*	*SUT*	*CQU-Mel*	*SCU-Tweed*
	$m	$m	$m	$m
Total Impact	$264m	$114.2m	$132m	$12.8m
Direct Impact	$129.27m	$69.7m	$66m	$8.7m
Number of students	8,200	3,212	2,637	666
Total Impact/Student	$32,195	$35,554	$50,057	$19,219
Direct Impact/Student	$15,765	$21,700	$25,028	$13,063
Multiplier	2.04	1.58	2	1.47
Year of Research	2003	2000	2007	2005

The results of the different modeling applications show both similarities and differences. The direct impacts of students on the regional economies range from $13,063 to $25,028 per student, while the total economic impacts range from $19,219 to $50,057 per student. Several reasons can be identified to explain the difference in the impacts of the individual universities.

First, the models underlying the analyses are different, as shown by the summary multipliers. This can be expected where different regions are involved, and the models are developed to reflect regional characteristics. Second, there may have been different treatments of the direct economic stimulus. As noted above, the researchers in the CSU report were conservative in assuming that 25% of the impact would have occurred in the absence of the university and was therefore deducted when evaluating the university's economic contribution. This helps to explain why the direct impacts per student are lower for CSU than in the SUT and CQU-Melbourne reports.

4. Student Expenditure and Employment

The direct economic of universities are relatively easy to identify from the operating and financial data of university operations. However, the corresponding contributions of students to regional economies are more difficult to assess. In part, this is because of the diversity of student enrolments, with varying levels of expenditure expected according to whether students are domestic or international, full-time or part-time, and school leavers or mature age. In this section, some evidence about expenditure patterns for university students in Australia is reported.

The average weekly expenditure for international students by State/Territory and by category of expenditure is shown in Figure 2 and Table 3. It should be noted that AEI's survey results represent not only expenditure by higher education students but by students in other educational sectors such as TAFE and secondary schools.

Figure 2. Average Weekly Expenditure by State for International students
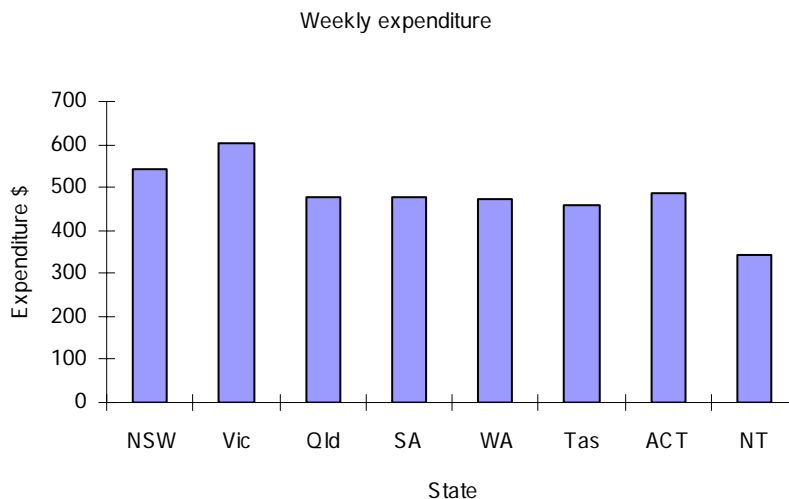
Table 3 Weekly Expenditure of International Students by State/Territory

Category of Expenditure	NSW	Vic	Qld	SA	WA	Tas	ACT	NT
Housing	$127	$124	$121	$131	$92	$112	$123	$148
Utility Costs	9	15	7	10	9	10	14	1
Telephone Costs	33	43	29	29	35	26	22	30
Health Costs	14	15	16	14	16	13	14	15
Food and Groceries	131	149	104	102	113	96	133	69
Alcohol and Cigarettes	13	12	12	10	20	10	4	1
Car Costs	20	27	23	20	51	22	31	
Transport	24	19	12	9	5	7	8	4
Entertainment	36	40	26	29	26	28	28	9
Clothing	16	22	15	18	13	13	7	15
Household Goods	14	20	11	8	11	12	10	1
Travel	10	14	11	12	13	9	13	16
Children's Course Fees								
Course Related Expenses	31	41	33	34	28	29	30	21
Other Expenses	8	9	7	7	6	4	8	3
Other Major Expenses	57	52	52	43	37	66	41	10
Total	543	602	479	476	475	457	486	343

Source: AEI (2004)

It can is apparent that international students in Queensland, South Australia, Western Australia, Tasmania and the Australian Capital Territory show a similar expenditure level around $500. The report by AVCC (2007) provides domestic students' financial information for 2006. These student expenditure details can be found in Table 4.

Table 4   **Annual Domestic Students' Expenditure by Attendance Mode**

		Undergraduates			*Postgraduate*			*ALL*
		FT	PT	all	FT	PT	all	
TOTAL	*mean*	15950	23030	17390	21200	24510	23370	18760
	median	11320	18690	12540	16820	22000	20010	13850
GENERAL EXPENSES								
Rent/ mortgage, food, household supplies, etc.		5160	9540	6020	9120	11800	10870	7130
Medical and health costs		600	1190	720	1070	1130	1100	800
Transport (inc. vehicle and public transport)		3050	2980	3050	2740	2560	2630	2950
Personal costs (inc. entertainment, holidays)		3670	3760	3700	3590	3530	3540	3660
Credit / loan commitments		1080	2460	1370	1500	2180	1970	1500
Childcare		50	430	120	280	430	370	180
Other general expenses		620	1080	720	910	1070	1020	790
Textbooks		520	360	490	320	310	310	450
Stationery, equipment, field trips, copying etc.		230	180	220	360	220	270	230
Computer purchase or hire		520	560	530	660	680	670	560
Computer related costs, e.g. software, internet		230	310	240	330	350	340	270
University costs		40	40	40	70	60	70	50
Union/ Guild/ Sports, Union fees		120	60	110	140	80	100	110
Other study-related costs		60	75	60	110	110	110	80

Source: AVCC (2007)

The results in Table 4 are the annual total amount. From the total expenditure for all students, the weekly expenditure in total is $360.77.   This is quite different from the weekly expenditure found in the survey of international students. However, the survey for the expenditure of domestic students was for study-intensive periods (concerned only with teaching periods during the year). This means the differences between the two estimates can be resolved and these differences will be clearly presented by comparing the weight taken by each expenditure item in both reports. In order to do this, a reclassification of the survey of international students to match the categories in the other report needs to be done. The combined figures are shown in Table 5.

Table 5 **Comparison of Expenditure by Same Breakdown**

Expenditure Category	Annual expense for students in Australia	Weekly expense for international students
Rent/ Mortgage, food, household supplies, etc	$7,130	$287.18
Medical and Health cost	800	14.8
Transport (inc. vehicle and public transport)	2950	42.64
Personal Costs (inc. entertainment, holidays)	3660	45.52
Other general expenses	2470	111.51
Study related expenses	1750	33.87

The pie charts generated from Table 5 more clearly illustrate the comparison.
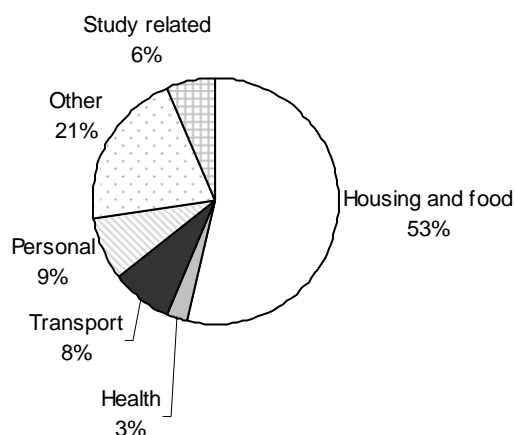
Figure 3: **Average expenditure of domestic students in Australia**

Expenditure of Students in Australia
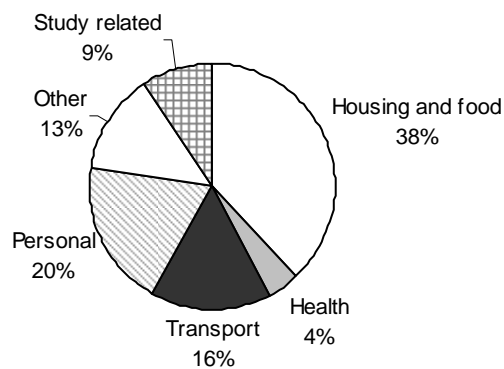
Figure 4:   Average expenditure of domestic students in Australia

Expenditure of International Students

As shown in the pie charts, international students spend a larger proportion on housing, food and other expenses while less on personal costs such as entertainment, recreation and transport. The main difference between the two populations under investigation is whether students are local or from outside of Australia, so it can be concluded that a big difference exists in expenditure patterns between international students and domestic students.

5 An Overview of Central Queensland University

5.1 Basic Information about CQU

The CQU 2006 annual report provides general information and achievements of CQU, which are summarized as follows. As an educational institution, CQU is made up of three faculties, the Faculty of Arts, Humanities and Education, Faculty of Business and Information and the Faculty of Science, Engineering and Health. CQU hosts the Institute for Sustainable Regional Development, four designated research centres and is a partner in four Co-operative Research Centres (CRCs). As a multi-campus university, CQU operates wholly owned campuses located in Rockhampton, Bundaberg, Gladstone and Mackay. As well the University has a 50% controlling interest in Campus Management Services (CMS), which operates campuses in Sydney, Melbourne, Brisbane and Gold Coast. CQU also associates with other domestic and overseas educational institutions to operate campuses and delivery sites in the Sunshine Coast, Fiji, Hong Kong, Singapore, Shanghai and New Zealand.

5.2 The Operation of CQU in 2006

For the year ending 31 December 2006, CQU reported consolidated revenue from continuing operations of $277.81m. For CQU as the parent entity, the consolidated revenue was $292.11m. The major sources of CQU's revenue are government financial assistance and student tuition fees. The Department of Education, Science and Training (DEST) contributed most of the government grants to CQU including $51.73m under the Commonwealth Grants Scheme, $27.56m under the Higher Education Loan Programmes, $2.44m in scholarships and $4.2m in DEST research grants. Overseas students brought the largest proportion of tuition fees to CQU in 2006, amounting to $144.96m, 52.18% of the total revenue and 95.73% of the total course fees and charges. CQU also collected revenue by providing consultancies, selling books and student materials, and other income making activities that only accounted for a minor part of the total revenue.

It may be more appropriate to model economic impacts using expenditure or employment data than income data. This is because the level of university activity in a regional area is better reflected by expenditure or employment data than income data.l At the regional campuses in Queensland, income is largely sourced from government grants, while income from the international campuses has to apportioned between CQU and various subsidiaries. Here, further detail is provided on expenditure and employment details, beginning with the summary operating expenditure accounts for the University in 2006 (Table 6).

In 2006, 1,139.88 Full Time Equivalent (FTE) staff were employed by CQU for a total cost of $121.5M. This suggests that the average cost per employee was $106,600. A detailed CQU staff profile for 2006 is displayed in Table 7.

Table 6　　　　　　　　**2006 CQU Operating Expenditure**

	Items	Expenses $000	Weighting
Expenditure on fixed assets			
	net investment in fixed assets	12,226	5.30%
	net investment in software development	1,650	0.72%
	repairs and maintenances	8,218	3.56%
	payment on operating leases	12,746	5.52%
Subtotal		34,840	15.10%
Expenditure on employees			
	salary expense	109,505	47.47%
	Staff leave	3,598	1.56%
	worker's compensation	721	0.31%
	staff development & training	7,724	3.35%
Subtotal		121,548	52.69%
Expenditure on other items			
	management fees	35,723	15.48%
	minor acquisitions & consumables	12,346	5.35%
	Telecommunications	2,992	1.30%
	inventory purchases	4,251	1.84%
	other expenses	19,000	8.24%
Subtotal		74,312	32.21%
Total operating expenditure		230,700	100.00%

Table 7　　　　　　　　**2006 CQU Staff Statistics**

Status		Total
Academic Staff	Contract	75.42
	Permanent	282.1
Academic Staff total		357.52
General Staff	Contract	206.64
	Permanent	511.26
General Staff total		717.9
Research Staff	Contract	61.46
	Permanent	3
Research Staff total		64.46
Total		1,139.88

5.3 Analysis of Student Information

The CQU 2006 annual report provides detailed information of students enrolled by various classifications. These are shown in Tables 8, 9,10 and 11.

Table 8   **EFTSL[1] by Funding Type**

	EFTSL 2005	*EFTSL 2006*
DEST Funded	6,608.5	6,213.5
Australian Fee Paying	757.8	690
Overseas Fee Paying	11,382.2	11,395
RTS	146.8	150
Total	18895.3	18448.5

Table 9   **EFTSL by Mode of Attendance and Type of Attendance**

		Domestic	*International*	*Total EFTSL*
Internal	*Full-time*	2,317.7	10,364.8	12,682.5
	Part-time	203.8	839.3	1,043.1
	Total	2,521.5	11,204.1	13,725.6
External	*Full-time*	1,219.3	27.1	1,246.4
	Part-time	1,649.2	36.8	1,686
	Total	2,868.5	63.9	2,932.4
Multi Modal	*Full-time*	1,463.7	104.8	1,568.5
	Part-time	215.6	6.5	222.1
	Total	1,679.3	111.3	1,790.6
Total		7,069.3	11,379.3	18,448.6

Table 10   Enrolments by regional campus

		2006	2006 annual average
BDG : Bundaberg	Total load	4,113	1,371
EMD : Emerald	Total load	646	39
GLD : Gladstone	Total load	1,670	557
MKY : Mackay	Total load	4,684	1,561
ROK : Rock	Total load	10,998	3,666
FLEX : Flexible	Total load	26,401	8,800

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[1] Estimated Full-Time Student Load

Table 11   **Student Distribution by Level of Study**

		Total 06	
		N	*%*
Research	*Doctorate by research*	224	0.87%
	Masters by research	74	0.29%
Subtotal		**296**	**1.15%**
Postgraduate	*Doctorate by coursework*	35	0.14%
	Masters by coursework	7952	30.82%
	Grad Dip/Postgrad Dip-new	1198	4.64%
	Grad Dip/Postgrad Dip-ext	52	0.20%
	Graduate Certification	536	2.08%
	Other Postgraduate	415	1.61%
Subtotal		**9655**	**37.42%**
Undergraduate	*Bachelors Honours*	19	0.07%
	Bachelors Graduate Entry	9	0.03%
	Bachelors Pass	14190	55.00%
	Bachelor		
	Advanced Dip	284	1.10%
	Associate Degree	51	0.20%
	Other Undergraduate	69	0.27%
Subtotal		**14548**	**56.39%**
Non Award	*Non Award*	601	2.33%
	Cross Institutional-P/G	98	0.38%
	Cross Institutional-U/G	181	0.70%
Subtotal		**855**	**3.31%**
Enabling	*Enabling*	613	2.38%
Subtotal		**613**	**2.38%**
Total		25799	

Based on the information in Tables 8, 9, 10 and 11, four conclusions can be reached. Firstly, CQU sourced its greatest proportion of tuition fees from overseas students, who took up 61.77% of the total equivalent full time student load (EFTSL) in 2006. Secondly, there is a large difference between domestic and international students in preference with regard to mode of attendance. Most of international students are enrolled on an internal full-time basis (largely a consequence of immigration requirements), while enrolments of domestic students are roughly balanced between internal and external modes. Thirdly, full-time studying was chosen by most students (84%), with this tendency strongly affected by international students. Lastly, although

more students enrolled in postgraduate studies in 2006 than 2005, undergraduate students still dominated the student distribution in 2006 (56.39%).

As a multicultural university, CQU leads Australia with its large cohort of international students, and was the largest international education provider to overseas students in 2006. Some basic statistics of CQU international students are provided in Table 12.

Table 12   International Students Enrolled by Campus

Campus	International 2006
Bundaberg	7
Emerald	0
Gladstone	0
Mackay	8
Rockhampton	317
Noosa Hub	2
Sunshine Coast	0
Distance Education	294
Brisbane	1096
Gold Coast	575
Melbourne	4370
Sydney	6483
Fiji	548
Hong Kong	86
New Zealand Delivery Site	21
Shanghai	148
Singapore	531
Total	14222

6. The Economic Impact of CQU

The economic impact of CQU is difficult to measure because of its unique operating features. A key issue CQU is a multi-campus university with students, staff and operations varying in load and numbers across different campuses. As well, international students play a major role in CQU's funding and student distribution, and the different expenditure and employment patterns for this group need to be considered. Moreover, the impact is likely to vary according to whether students are enrolled directly in the university or through Campus Management Services (the operator of the international campuses).

Here, the impact of CQU on the Rockhampton regional area is provided in more

detail. The Rockhampton campus was the original campus developed at the University in its origins as an Institute for Advanced Education, and still retains most of the core functions of teaching and administration at the campus. As the administrative and teaching hub of the University, it can be expected that most of the economic impacts of the university would flow back to the Rockhampton campus. This will largely occur through employment effects, where income from university activities across the different campuses are reflected in staff employment in Rockhampton.

The Rockhampton regional area comprises the Shires of Fitzroy, Livingstone, Mt Morgan and Rockhampton. These four shires are being amalgamated in March 2008 to form the Rockhampton Regional Council. Rockhampton is the core city within these shires, with the local area having a total population of 101,172 persons in the 2006 Census. The total labour force for the four shires reported from the 2006 Census was 46,373 persons.

In 2006, Central Queensland University had a total full-time equivalent employment of 1,140 persons at its regional Queensland campuses of Rockhampton, Bundaberg, Emerald, Gladstone and Mackay. The estimated level of employment at the Rockhampton campus was 940 full-time equivalents, or 2% of the Rockhampton Regional labour force.

The direct impacts of University expenditure on the Rockhampton regional economy has been estimated as follows:

Table 13.   Direct expenditure impacts of CQU on Rockhampton economy

	Items	*Expenses $000*
Expenditure on fixed assets		
	net investment in fixed assets	7,336
	repairs and maintenances	4,931
Subtotal		12,266
Expenditure on employees		
	salary expense	90,294
	Staff leave	29,670
	Staff development and training	6,369
Subtotal		99,629
Expenditure on other items		
	minor acquisitions & consumables	7,408
	Telecommunications	1,795
	inventory purchases	2,551
	other expenses	11,400
Subtotal		23,153
Total expenditure in region		135,048

A number of expenditure categories have not been included as they are unlikely to relate to expenditure in the Rockhampton area. For example, payments for operating leases and management fees relate to the international operations in other cities. Expenditure on staff was estimated by identifying the staff at the regional campuses (195.2 FTEs), and taking this from the CQU load. A further 5 positions were deducted to take account of placements at the international campuses. University expenditure on worker's compensation was not included, as this was unlikely to be spent in the local area.

The impact of student expenditure on the local economy also needs to be estimated. First, the impact of international students was calculated by taking the number of students at the Rockhampton campus (317) and multiplying this by the average weekly expenditure of $479 reported in AEI (2004). This indicates that $7.895 million is being expended in the Rockhampton region by intenational students.

The inclusion of domestic students is more problematic. If Central Queensland University was not available in Rockhampton, it is likely that many students would locate to other centres in order to gain an education. However, many would not relocate, and would be expected to pursue other career options. Assuming that only 50% of domestic students would remain in Rockhampton suggests that the impacts should be considered for 1,833 students (50% of the annual 2006 estimate of 3,666 students). At an average expenditure of $360.77 per week, this translates to a total expenditure of $34,387,153 for 2006.

The input output model was taken from REMPLAN, and was developed by La Trobe University and Compelling Economics Pty Ltd. Data for the input-output model was largely sourced from the national accounts data and the 2001 and 2006 Census data published by the Australian Bureau of Statistics (ABS).

Two separate models were generated from the data. For the first, it was assumed that there would be no relocation of Rockhampton students if the university did not exist, while in the second it was assumed that 50% of Rockhampton students would relocate to other areas. This identified the initial expenditure changes as $142.94M and $177.33M respectively. The results of the models are provided in Appendix 1 and Appendix 2 respectively, and are summarized in Tables 14 and 15.

Table 14:   Summary impacts of staff and international students

Impact	Direct Effect	Industrial Effect	Consumption Effect	Total Effect	Type 1 Multiplier	Type 2 Multiplier
Output	$142.94	$27.16	$99.33	$269.43	1.19	1.885
Employment	1,652	126	654	2,432	1.076	1.472
Wages & Salaries	$95.59	$7.34	$28.97	$131.90	1.077	1.38
Value-added	$108.31	$12.70	$47.06	$168.07	1.117	1.552

Table 15: Summary impacts of staff, international and 50% domestic students

Impact	Direct Effect	Industrial Effect	Consumpti on Effect	Total Effect	Type 1 Multiplier	Type 2 Multiplier
Output	$177.33	$33.69	$123.23	$334.25	1.19	1.885
Employment	2,050	156	811	3,017	1.076	1.472
Wages & Salaries	$118.59	$9.11	$35.93	$163.63	1.077	1.38
Value-added	$134.36	$15.76	$58.39	$208.51	1.117	1.552

7. Summary and conclusions

The results of the economic modeling demonstrate the substantial contribution that Central Queensland University makes to the economy in the Rockhampton region. Using the most realisitic scenario, where it is assumed that if the university did not exist there would be no operating expenditure, staff expenditure, international students or 50% of domestic students, the following impacts of the university on the Rockhampton region are predicted from the model:

- Total economic output and expenditure of $334.25M,

- Total employment effects of 3,017 jobs,

- Total employment income of $163.63M.

The scale of the economic impacts are similar to what was calculated for Charles Sturt University, with the total multiplier of 1.885 falling within the range identified in other studies. However, the model reveals the scale of the benefits that flow to the Rockhampton region from the operation of the multi-campus university. Whereas Charles Sturt University had a total economic impact per student of $32,195 (see Table 2), the economic impact of CQU on the Rockhampton region is estimated at $89,919 per student at the Rockhampton campus. Clearly, the impact of running operations across distance education and a variety of campuses, particularly the international ones, are generating substantial net benefits to the Rockhampton economy.

These economic impacts are likely to still be an understatement of the contribution of the university to the regional economy. Other key ways in which the university helps to stimulate the local economy include the direct provision of skilled labour and training in the workforce through contributions to human capital, indirect contributions to the social capital of the region, helping to attract skilled labour and other services to the region, and contributions through research activities. As well, the university will make other, additional contributions to the economy of other regions where it has campuses and operations.

Acknowledgements:

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Appendix 1: Economic impacts of staff and international students

Output	Direct Effect ($M)	Industrial Effect ($M)	Consumption Effect ($M)	Total ($M)
Agriculture Forestry Fishing		$116.549	$1,991.536	$2,108.085
Mining		$93.190	$336.770	$429.959
Manufacturing		$5,207.837	$14,850.234	$20,058.072
Electricity, gas & water supply		$2,651.289	$3,991.022	$6,642.311
Construction		$503.328	$1,116.261	$1,619.589
Wholesale trade		$2,668.185	$6,755.869	$9,424.054
Retail trade		$1,401.771	$20,507.139	$21,908.910
Accommodation, cafes & restaurants		$703.724	$8,683.907	$9,387.631
Transport & storage		$1,329.039	$4,513.600	$5,842.639
Communication services		$1,363.985	$2,674.455	$4,038.441
Finance & insurance		$2,236.055	$6,838.182	$9,074.237
Property & business services		$4,944.541	$9,861.306	$14,805.847
Government administration & defence		$760.150	$570.602	$1,330.752
Education	$142,943.000	$2,006.511	$4,315.174	$149,264.685
Health & community services		$115.172	$5,207.976	$5,323.148
Cultural & recreational services		$794.374	$3,282.035	$4,076.410
Personal & other services		$261.933	$3,835.348	$4,097.280

TOTAL	$142,943.000	$27,157.635	$99,331.414	$269,432.049

Multiplier	Type 1	Type 2
	1.190	1.885

Appendix 2: Economic impacts of staff, international students and 50% domestic students

Output	Direct Effect ($M)	Industrial Effect ($M)	Consumption Effect ($M)	Total ($M)
Agriculture Forestry Fishing		$0.145	$2.471	$2.615
Mining		$0.116	$0.418	$0.533
Manufacturing		$6.461	$18.423	$24.883
Electricity, gas & water supply		$3.289	$4.951	$8.240
Construction		$0.624	$1.385	$2.009
Wholesale trade		$3.310	$8.381	$11.691
Retail trade		$1.739	$25.440	$27.179
Accommodation, cafes & restaurants		$0.873	$10.773	$11.646
Transport & storage		$1.649	$5.599	$7.248
Communication services		$1.692	$3.318	$5.010
Finance & insurance		$2.774	$8.483	$11.257
Property & business services		$6.134	$12.234	$18.368
Government administration & defence		$0.943	$0.708	$1.651
Education	$177.330	$2.489	$5.353	$185.172
Health & community services		$0.143	$6.461	$6.604
Cultural & recreational services		$0.985	$4.072	$5.057
Personal & other		$0.325	$4.758	$5.083

services				
TOTAL	$177.330	$33.691	$123.227	$334.248
Multiplier		Type 1		Type 2
		1.190		1.885