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Economic impact of the Cairns casino

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Summary

This report provides some economic background information on the size and recent growth of the Cairns/FNQ regional economy with special reference to the Recreation and Personal Services sector, incorporating tourism. This information provides background for an assessment of the regional economic impact of the Cairns casino, which may be undertaken using the input-output approach.

Economic impact of the Cairns casinos

1. Introduction

The Reef Casino in Cairns opened in Cairns in January 1996. Already it is apparent that the casino has had significant impacts on patterns of economic and social activity in the Cairns city area. It is less clear, however, what the impact has been on the broader regional economy.

The object of this paper is to provide a framework for assessment of economic aspects of the impact of the Casino on the regional economy, defined for this purpose as the Far North Statistical Division, generally referred to as Far North Queensland (FNQ). The framework has been developed with the aim of allowing for integration between analysis of purely economic effects and the broader socioeconomic analysis of the project as a whole.

As yet, data on casino revenues and on the sources of those revenues is not available. For this reason, only an illustrative analysis has been feasible. The approach proposed is to estimate the economic impact per unit of annual gross revenue. For convenience, the unit selected is \$100 million. As a comparison, the gross revenue of Jupiter's Gold Coast casino was just over \$200 million in 1994-95 (Compendium of Statistics, GSO). Parameter values used in the analysis are illustrative only.

The paper is organised as follows. Section 2 contains background information on the Cairns regional economy. Section 3 describes the regional economic impact of casinos. Section 4 reports modelling of the regional economic impact of the casino. Section 5 is a discussion of economic impacts within the Cairns CBD. Section 6 contains concluding

comments.

2. Economic background

This section gives a brief outline of the economic development of Cairns and the Far North Queensland region. The analysis is not intended as a comprehensive description of the regional economy. Attention is focused on those factors relevant to an analysis of casino development.

Population

Between June 1981 and June 1995 the estimated resident population of Cairns increased from 64,040 (or 2.8% of the Qld population) to 107,458 persons (or 3.3% of Qld). This amounts to an increase of 67.8% overall or an average of 3.8% annually. The actual annual population growth figures are shown in the following chart.

The Cairns growth rate has been consistently well above the overall state population growth rate. However there was a slump in the early 1990s associated in part with the 1989 airline pilots dispute which disrupted the region's tourism industry, and in part with the general recession commencing in that year and the subsequent recession in Japan. Growth rates have since recovered and Cairns continues to be one of two main growth areas in the state, the south-east corner being the other. The growth rates reported above reflects the general movement of population to Queensland, and particularly to coastal areas with recreational opportunities, including the Gold Coast and Cairns.

Economic Base

In the same way that Gross Domestic Product (GDP) figures are used to describe the economic performance of a country, Gross Regional Product (GRP) figures can be used to describe the economic performance of a region. The Queensland Government's Statistician's Office has so far only produced GRP figures for Queensland regions for two time periods - 1986/87 and 1990/91 - and the figures are only available for relatively large regions, not for Cairns specifically. However figures are available for the Far North Statistical Division (FNQ). GRP estimates for FNQ are shown below in constant 1989/90 dollars.

Table 1 Gross Regional Product at Market Prices

Constant 1989-90 Prices: FNQ Division

	1986/87			1990/91			Annual Growth Rates	
	GRP	% of Qld Total	GRP Per Capita	GRP	% of Qld Total	GRP Per Capita	GRP	GRP Per Capita
	\$m	%	\$	\$m	%	\$	%	%
FNQ	2594	5.4	15628	3532	6.3	19473	8	5.7
Qld	47705	-	17829	55645	-	18795	3.9	1.3

Source: Estimates of Gross Regional Product Queensland, Government Statistician's

The table shows that FNQ's GRP grew over the period at a very high annual rate of 8.0%. Even when adjusted for population growth, GRP per capita grew at a rate of 5.7% per annum. Growth also occurred in the size of the contribution FNQ makes to the state GRP - 5.4% to 6.3%.

The contribution to regional GRP by the various industry sectors is shown in the following table. It is notable that a number of the major contributors would generally be located outside the Cairns City area. Manufacturing (11.4%) would include large operations like the sugar mills and the Malanda milk factory which are outside of the city. The same would be true for Agriculture (9.2%) and Mining (7.5%). But other major sectors - Trade (13.1%), Public Administration (14.5%), Transport (9.9%) and Recreation (8.0%) - would be concentrated in the Cairns city area.

The industry sector showing the greatest increase in contribution to GRP is that of Recreation, Personal and Other Services - rising from 4.9% of GRP to 8.0%. This is an indication of the growth in the tourism industry over the period. Economic analysis of the Casino must be set against the background of this growth, and of the increasing reliance of the Cairns city economy on tourism and recreational services.

Table 2 Industry Contribution to GRP: FNQ

	1986/87 %	1990/91 %	Difference %
Agriculture	10.8	9.2	-1.7
Mining	9.2	7.5	-1.7
Manufacturing	9.0	11.4	2.4
Electricity, gas and water	4.2	2.0	-2.2
Construction	9.1	7.7	-1.4
Wholesale and retail trade	13.1	13.1	0.0
Transport, storage and communication	9.3	9.9	0.6
Finance, property and business services	4.2	5.8	1.6
Public administration, defence and community services	14.9	14.5	-0.4
Recreation, personal and other services	4.9	8.0	3.1
Ownership of dwellings	8.5	8.8	0.3
General government	2.7	2.2	-0.5
All industries	100.0	100.0	-

Source: Estimates of Gross Regional Product Queensland, Government Statistician's Office

Labour force shift-share analysis

The above GRP figures show the pattern of growth and decline in the various industrial sectors but as mentioned they are not truly representative of Cairns City. They are also not necessarily indicative of the growth areas in employment growth. For example,

mining production is very capital intensive and a significant increase in the mining industry does not always translate through to an increase in employment levels. This suggests another method of examining an area's economic performance over a period of time - Shift-Share analysis which uses the number persons employed per industry. . As explained by Mangan¹, Shift-Share analysis divides the growth in jobs per industry sector into three components, they being:

- the national economic growth component,
- the industrial mix component, and
- the region-specific component reflecting the difference in growth rates between national and state industries and the comparative advantage (disadvantage) of the region.

The table shows that if the region had merely maintained national trends over the period then 72,989 jobs would have been added. But, overall 197,310 jobs were added with more than half of these (107,808 or 54.6%) added due to by region-specific conditions.

Using manufacturing as an example, the expected job increase due to national trends was 11,621. However the change in the mix of industries in the sector resulted in a negative effect of -26,409 jobs, which was more or less balanced out by the region-specific or competitive element of 24,072 additional jobs. The net result for manufacturing was an increase of over 9,283 jobs over the period. It can be seen that the biggest increase in job numbers came from (i) community services (51,367 jobs), (ii) wholesale and retail trade (48,891), (iii) finance, property and business services (37,842) and (iv) recreation, personal and other services (29,281). The growth in the recreation, personal and other services sector over this period is substantial relative to the low base from which growth began.

¹Mangan, D, (1994) The Queensland Labour Market: An Overview, Monograph No. 1/94, Government Statistician's Office, Brisbane.

**Table 3 Shift-Share Analysis of Industrial Employment (persons) - Cairns:
Between 1981 and 1991**

Industry specific	Growth Component			Total Change in Employment
	Share	Mix	Region	
	persons	persons	persons	persons
Agriculture	267	-591.0	-372.0	-695
Mining	40	-50.0	105.0	95
Manufacturing	478	-1087.0	360.0	-248
Electricity, gas and water	77	-241.0	-288.0	-452
Construction	314	-181.0	596.0	729
Wholesale and retail trade	855	587.0	961.0	2,404
Transport and storage	283	-316.0	1172.0	1,139
Communication	98	-149.0	-88.0	-139
Finance, property and business services	305	823.0	858.0	1,986
Public administration and defence	198	8.0	817.0	1,023
Community Services	551	891.0	758.0	2,201
Recreation, personal and other services	295	849.0	2418.0	3,562
Total	3,763	544	7,299	11,605

Source: ABS Census Data

The two categories, "not classified" and "not stated", in the original data have been dispersed proportionally between the other categories.

It should be noted the period covered in the above table is not the same as that in the GRP table, however similar patterns do emerge. Overall, if Cairns had merely kept pace with the national trend over the period only 3,763 additional jobs would have eventuated, whereas 11,605 new jobs actually arose. Most of the job growth (7,299 jobs) occurred for region-specific reasons where the Cairns area provide an favourable environment for growth in a number of industry sectors.

Once again the Recreation, Personal and Other Services, with a the region-specific growth of 2,418 jobs, is the most noteworthy area of growth This is more than eight times the level of increase (295 jobs) if the area had merely kept up with national trends.

Employment by Industry

Although the above table gives some idea of employment by sector it is somewhat out of date, especially when it is known that the area has continued to experiencing strong growth since 1991. However, until information from the 1996 Census becomes available, employment information must be obtained from the ABS survey of the FNQ area. The latest available information is shown in the following table.

**Table 4 Employment by Industry - Far North Queensland
November 1991 and November 1995**

	Feb 91 '000	Feb 96 '000	Difference '000	Annual %Change
Agriculture	8400	8400		0
Mining	2300	2400		1.1
Manufacturing	6000	6700		2.8
Electricity, gas and water	700	900		6.5
Construction	6300	10100		12.5
Wholesale and retail trade	18000	20200		2.9
Transport and storage	5900	6700		3.2
Communication	500	1600		33.7
Finance, property & business services	7000	10900		11.7
Public administration and defence	2100	7700		38.4
Community Services	20100	17300		-3.7
Recreation, personal and other services	10000	14400		9.5
Total	87300	107300		5.3

Source: ABS 6201.3

Many of the changes shown in the above table seem unrealistic - e.g. Public Administration and Defence growing at 38.4% per year - and this highlights the caution that must be exercised when using the results of surveys conducted with small samples. But once again the Recreation, Personal and Other Services sector has shown strong employment growth.

A consistent theme in the economic analysis presented above is the growing importance of the Recreation, Personal and Other Services sector and particularly of the tourism industry in the Cairns economy.

Unemployment Rate

After being consistently above the state average in the late 1980s the FNQ unemployment rate has been almost 2 percentage points below the state average for some time.

Participation Rate

Labour Force Participation rates have been significantly higher in FNQ than in the state overall. This would seem encouraging to the region, that is, with a higher participation rate than the state average it is able to maintain a lower unemployment rate than the state average.

Full-time/Part-time Employment

Although the employment surveys may indicate that FNQ may have a higher proportion of the labour force in employment it may well be that much of this employment may be part-time whereas the employees may in fact be seeking full-time employment. The following chart plots the levels of part-time and full-time employment. Over the period shown in the chart part-time jobs have increased by 85% whereas full-time jobs have increased by only 30%. Between 1994 and 1995 full-time jobs actually decreased while part-time jobs continued to increase.

Construction

The emphasis on tourism in the Cairns area has resulted in the a high and constant level of tourist facilities construction. This is shown to some extent in the following chart which shows the value of non-residential construction in the city area. It shows that investment in construction is quite considerable each year, well over \$50 million on average, with a very high figure in 1995 which would no doubt be due mainly to the Casino approval.

Some Basic Tourism Indicators

The taking off point for Cairns' development as a world-renowned tourist destination came with the development or redevelopment of the Cairns airport in the mid 1980s. The following chart shows the dramatic increase in passenger movements (i.e. passengers both in and out) from that time. The trough in the domestic passenger numbers reflects the Pilots Dispute of 1989 and possibly also the recession that commenced in 1989.

A brief summary of the number of international and domestic tourists visiting the Cairns region is shown below.

Source: Department of Transport and Communications

Table 5 Visitor Arrivals in Cairns - ('000)

	1988	1989	1990	1991	1992	1993	1994
International	320.0	304.0	368.0	393.0	508.0	507.0	587.0
% change		-5.0	21.1	6.8	29.3	-0.2	15.8
Domestic	915.0	979.0	1163.0	931.0	1344.0	1152.0	2474
% change		7.0	18.8	-19.9	44.4	-14.3	-2.3

Source: BTR

Note: Cairns Region is defined as the entire FNQ Statistical Division excluding offshore Barrier Reef Islands

Consumer Price Levels

Surveys have found that retail prices in Cairns are consistently between 5% and 6% higher than in Brisbane. The results of the regional centres retail prices surveys since 1990 are shown below. Basically the data shows that for the major coastal cities the retail

prices increase the further they are from Brisbane, leading to the not illogical argument that transport costs are the main reason for the price differences.

Expenditure Patterns

Given that residents of the Far North have to pay slightly more for their goods and services, how in fact do they spend their money? The ABS conducts at irregular intervals an Average Weekly Household Expenditure Survey and the results for the most recent survey for the FNQ area are shown below. Once again the small sample size (62 households) means that extreme caution must be adopted in using the data. If the sample used is a true representation of the FNQ population then they spend far less on Clothing and Footwear (48% of the Qld average), less on Transport (77%) and Recreation (79%), but more on smoking (122%) and Medical and Health Expenses (122%).

Table 6 Average Weekly Household Expenditure - 1993/94

Broad Commodity or service expenditure Group	FNQ	Qld	FNQ
	86.0	81.0	106%
Current housing costs	13.0	12.0	108%
Fuel and power	92.0	103.0	89%
Food and beverages	19.0	18.0	106%
Tobacco	11.0	9.0	122%
Clothing and footwear	14.0	29.0	48%
Household furnishings and equipment	39.0	37.0	105%
Household services	35.0	32.0	109%
Medical care and health expenses	31.0	26.0	119%
Transport	73.0	95.0	77%
Recreation	59.0	75.0	79%
Personal care	13.0	12.0	108%
Miscellaneous	30.0	47.0	64%
Total expenditure	514.0	576.0	89%
Selected other			
Income tax	115.0	128.0	90%
Mortgage payments principal	13.0	17.0	76%
Other capital housing costs	24.0	14.0	171%
Superannuation and life insurance	15.0	22.0	68%
Number in sample	62.0	1148.0	

Source: ABS unpublished data

Of course with well over a million tourists spending between 5 and 10 days in the FNQ region each year, their consumption patterns are also very important. The following table lists the level of expenditure by an average tourist staying in commercial accommodation and the general areas in which they spent their money.

Table 7 Average Expenditure Per Visitor Night by Visitors Using Commercial Accommodation: Far North Region

	86/87	87/88	88/89	89/90	90/91	91/92	92/93
Accommodation	22.0	28.0	25.0	31.0	34.0	38.0	41.0
Food and beverages	16.0	20.0	20.0	24.0	27.0	29.0	28.0
Shopping	11.0	13.0	11.0	16.0	19.0	23.0	26.0
Local transport and tours	14.0	20.0	22.0	25.0	34.0	36.0	41.0
other	4.0	4.0	6.0	6.0	8.0	5.0	9.0
Total	67.0	85.0	84.0	102.0	122.0	131.0	145.0

Source: QTTC and CAERA

3. Regional economic impact of casinos

To undertake an input–output analysis, it is most useful to distinguish three sources of revenue for casinos:

- (i) residents of the local region
- (ii) diversion of expenditure from the existing tourist market (more precisely, from tourists whose planned stay and total expenditure are unaffected by the casino)
- (iii) new tourists and tourists who extend their stay in order to include a visit to the casino or spend money on casino services in addition to amounts they would have spent otherwise.

The demand drawn from the first two markets may be regarded as a diversion of existing demand, with no net impact on the regional economy. On the other hand, any increase in visitor numbers associated with the casino will imply an expanded demand for accommodation, food and other services.

The classification appropriate for an input-output analysis will not be appropriate for other purposes. For example, in considering the social impacts of casinos it is desirable to differentiate local residents by economic status, age, sex and possibly ethnicity. Similarly in market projections for casinos, a more elaborate classification of the tourist market is appropriate. Because an input-output analysis is concerned primarily with the effect of changes in aggregate demand, the individual characteristics of casino patrons are relatively unimportant, and changes in the pattern of demand for goods and services within the region are the central issue of concern.

Local demand for casino services

The demand for casino services from local residents represents, at least in the first instance, a diversion from other expenditure². Other areas of expenditure may be ranked in terms of the likely degree of substitution with casino gambling. The closest substitution is between casino gambling and other gambling outlets. Existing casinos and venues offering poker machines are the most obvious. The Treasury casino is in competition with the existing Gold Coast casino. However, the distance between the two casinos and the differences in the style of gambling means that the two products are not perfect substitutes.

Casinos offer poker machine gambling, thereby competing directly with machines in hotels and clubs. Cairns Casino has 540 poker machines compared to a regional total of ... machines. Casinos will also compete with other forms of gambling though the degree of substitution will not be as great. There is a closer similarity between casino

² Total current expenditure may increase in the short term, representing a reduction in savings. However, this must ultimately result in a reduction in future consumption.

gambling and poker machine gambling in a pub or club setting than between either of these gambling forms and, say, Lotto or betting on horse races. More generally, casino gambling will be a substitute for other recreational expenditure, such as restaurant meals.

New and existing visitors

Given that visitor numbers are unlikely to be greatly affected by the opening of the casino, the key issues are

(i) whether visitors extend their stay to incorporate visits to the casino

(iii) whether expenditure on casino gambling is additional to total tourist expenditure or is diverted from alternative recreational spending

A detailed analysis of this question will require separate consideration of different subgroups of visitors. For the purposes of the analysis undertaken here, it is assumed that additional expenditure associated with longer stays is approximately equivalent to expenditure diverted from alternative recreational outlets to casino gambling with the result that the net impact on final demand is equal to expenditure on casino services.

4. Modelling

The basic approach employed here is that of input-output analysis (see Appendix). The analysis begins with an estimate of the initial impact of the casino on demand for final goods and services, taking account of demand diversion and the impact of new visitors to the region. Taking account of the diversion effects considered above, this initial impact consists of a net increase in demand for the output of the recreation services sector (which includes casinos) and a partially offsetting net reduction in the demand for the output of all other sectors.

The input-output matrix is then used to determine the change in total output, including intermediate goods and services, that is required to adjust to the change in

demand for final goods and services. The model yields predictions of the change in regional value-added, employment and income. From the viewpoint of the theory of economic welfare these latter effects are more relevant than the change in total output. As discussed in the Appendix, the impacts of changes in the output of a particular sector on a given variable of interest may be expressed as a multiplier. The aggregate effect of a casino development may be derived by summing the effects across all sectors.

Impact calculation (illustrative estimate)

Unfortunately, data on casino revenues and expenditures was not available for the preparation of this Report. An illustrative estimate of the impact of \$100 million of expenditure at the Cairns casino has therefore been prepared. The following assumptions have been in the preparation of illustrative estimates.

(ii) Seventy per cent of demand comes from visitors to the Cairns region

(iii) Of the local demand for casino services, it is assumed that 50 per cent is diverted from expenditure on recreational services and the remainder from general expenditure³.

Assumption (iii) is consistent with available survey evidence. When data on revenue and usage patterns available, assumptions (i) and (ii) and the illustrative quantity of \$100 million will be replaced by parameters derived from the data.

³ Since recreational expenditure makes up about 5 per cent of general expenditure, the final reduction in non-casino recreation expenditure is slightly more than 50 per cent of the local expenditure on casino services

Net increase in visitor demand		\$70 million
Local expenditure diverted from		
recreation expenditure	\$16 million	
other local expenditure	\$12 million	
imports ⁴	\$2 million	
Total		\$30 million
Total revenue		\$100 million

The second-round and subsequent impacts arising from effects on demands for input to production are then traced through. The final impact may be summarised by a multiplier which is applied to the initial impact. Table 8 gives the initial and ultimate impacts on output and employment by sector under alternative estimating procedures. The first, referred to as Type I, takes account of multiplier effects arising from demands for input to production. The second, referred to as Type II, takes account of these factors and of multiplier effects arising from changes in household incomes. These issues are discussed further in the Appendix.

⁴ Here 'imports' denotes spending outside the region. Imports may come either from overseas or from elsewhere in Australia.

Table 8: Impact of \$100 million in casino spending

	Output (\$m)			Value added (\$m)			Employment		
	Initial	Type I	Type II	Initial	Type I	Type II	Initial	Type I	Type II
Agriculture	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
Mining	-0.2	-0.3	-0.4	-0.2	-0.2	-0.2	-2	-3	-4
Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
Electricity, gas and water	-1.5	-2.6	-3.5	-0.5	-1.1	-1.2	-17	-28	-31
Construction	-0.2	-0.3	-0.4	-0.1	-0.2	-0.2	-1	-2	-2
Wholesale and retail trade	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
Transport and communication	-3.0	-4.6	-6.7	-1.7	-2.6	-2.8	-54	-73	-79
Finance and dwellings	-0.8	-1.2	-1.7	-0.5	-0.7	-0.8	-9	-14	-15
Public admin & defence	-3.2	-4.8	-6.0	-2.1	-2.9	-3.0	-18	-35	-39
Community services	0.0	-0.1	-0.1	0.0	0.0	0.0	0	-1	-1
Recreation & personal	81.0	127.7	188.1	46.0	70.0	78.2	1507	2089	2257
Total	72.0	113.8	169.4	40.9	62.4	70.0	1405	1932	2087

The first three columns in Table 8 are concerned with effects on gross output. The first column is a more detailed statement of the breakdown of initial impacts derived above. The second, based on a Type I multiplier analysis takes into account the effect of input purchases. The third, based on a Type II multiplier analysis takes into account the effect of increased household demand. The next three columns deal with value added, that is with output net of imports and primary inputs. From an economic viewpoint, value added is the most important variable, since it is only increases in value added that ultimately constitute increases in income. The final three columns deal with initial, Type

I and Type II employment impacts, expressed in terms of the number of jobs.

The basic results may be explained as follows. The initial impact shows a transfer from all other sectors to the recreation and personal services sector. The reduction in output, value added and employment is greatest in those sectors, such as wholesale and retail trade and community services, that play a major role in final consumption. The impact on construction may be explained in the same way, but it should be noted that this illustrative analysis refers only to the operating phase of the project. During the construction phase, which will be analysed in a subsequent report, the casino project acted as a stimulus to the construction sector.

In the Type I analysis, the negative effects on other sectors of the change in final demand is offset by the input demands of the casino. This generates net gains for those sectors that supply significant quantities of inputs to the casino, notably the financial services sector, but sectors supplying final demand still have reduced output. In the Type II analysis, impacts on the final demand of the household sector are incorporated, leading to an increase in output, value added and employment in most sectors of the economy.

On the whole, the Type I analysis is a more realistic representation of the impact of the casino. As was argued above, employment growth in Queensland is being driven by population growth, not *vice versa*. Even if the casino had not been built, the number of households, and therefore total household demand would have increased. A Type II analysis therefore tends to overstate the total impact of the casino.

5. Other issues to be addressed

Analysis thus far has focused on the development of a baseline analysis and models for the estimation of aggregate economic impact. A number of other issues will be dealt with in subsequent work

CBD impact

General analysis of the impact of casino development has been presented in the previous section. The economic component of the analysis will focus on issues such as effects on land prices and the appropriate treatment of spillover effects on patterns of economic activity within the CBD.

Welfare analysis

Standard economic analysis would suggest that the opening of the casino represents an increase in consumer welfare, since consumers can now consume a service that was not previously (legally) available. To the extent that expenditure is diverted from other gambling services, or from other goods and services, this may be interpreted as an indication that the service provided by the casino is preferred to the items that were consumed previously.

However, the applicability of standard welfare analysis to casino gambling is debatable. There is a widespread view that expenditure on gambling is undesirable, either in itself or because expenditure is diverted from more desirable ends. There are also issues of distribution of resources within households. Casino gambling expenditure is undertaken exclusively by adults and, it appears likely, frequently only by one adult within a household. Substantial levels of gambling expenditure, even if they do not constitute a problem in the perception of the person undertaking the expenditure, may represent a redistribution of resources away from other members of the household, and particularly from children. The view that expenditure on gambling is undesirable is one reason for the acceptance of heavy taxes on gambling.

Microeconomic analysis of employment effects

The input-output modelling described above derives effects on the demand for labour derived from changes in the pattern of final demand for consumption goods. It is also necessary to look at the specific employment relationships within the casino and

their effects on labour demand and supply at the micro-economic level. This part of the analysis will involve a comparison between experience at Cairns, where a specific attempt has been made to provide opportunities for long term unemployed workers, and Brisbane, where no specific program is in place. This analysis will be undertaken primarily in 1997.

Taxation

Gambling is one of the most heavily taxed activities in the Australian economy. There are considerable conceptual difficulties in estimating effective tax rates on gambling and assessing the effects of taxation on economic welfare. These difficulties are complicated by the facts that much taxation takes the implicit form of allocations of monopoly rights and that much revenue is hypothecated to specific projects. The taxation of casinos in Queensland has been undertaken on a case-by-case basis. In addition to a general revenue payment, casinos are required to contribute to a community development fund.

Information on Queensland casino license conditions and tax rates				
	Jupiters Casino Gold Coast	Breakwater Casino Townsville	Treasury Casino Brisbane	Reef Casino Cairns
Opening date	November 1985	May 1986	April 1995	January 1996
Operator	Conrad International Hotels Corp.	Sheraton Pacific Hotels P/L	Conrad International Hotels Corp.	Casinos Austria International (Cairns) P/L
Number of tables	101	32	101	50
Number of machines	1083	274	1224	540
Tax rate (per cent of gross winnings)	20	10	20	10
Community benefit levy (per cent of gross winnings)	1	1	1	1
Casino licence fee (\$ '000 per quarter)	125	125	125	125
Number of hotel rooms	605	192	136	128
Source:				

Casino tax revenues		
Year ending May	Casino tax revenue (\$ million)	Community benefit levy revenue (\$'000)
1986	8.8	438
1987	17.9	959
1988	22.8	1210
1989	27.9	1479
1990	31.6	1672
1991	34.2	1807
1992	36.5	1924
1993	38.4	2023
1994	45.5	2380
1995	49.3	2586
Total at May 1995	315.3.3	16479

6. Concluding comments

The purpose of this draft report has been to estimate the impact of the Cairns casino on the regional economy. The results contain no particular surprises, and serve primarily as a background for exploration of the social and political issues raised by the casinos.

Appendix — Input-output analysis

Analysing the impact of projects such as casinos is complicated because of the complex relationships that make up the economy itself. Most importantly, projects purchase inputs from a wide variety of suppliers who in turn purchase inputs from others and so on. Produced inputs to production are referred to as intermediate outputs. The existence of intermediate outputs has two main implications. First, not all of the output of a new project represents an increase in final output. The contribution to final output is the difference between total output and consumption of intermediate outputs and is referred to as value-added. The second implication is that a new project will have multiplier effects on the output of other sectors.

There are two⁵ main approaches to formal modelling of the impact of developments such as casinos: input-output models and computable general equilibrium (CGE) models. CGE models. The input-output approach is the simpler of the two.

CGE models are built on the basis of input-output tables. They incorporate more flexible and realistic representations of the technology of production, allowing for substitution between factors of production such as labour and capital. They also take account of the aggregate resource constraints affecting the economy as a whole, allowing wages and returns to capital to adjust in order to satisfy these aggregate constraints, collectively referred to as model closure assumptions.

Although CGE models are more theoretically appealing than input-output models, there are a number of practical difficulties, particularly when modelling small regions of a larger economy. First, the effort involved in constructing CGE models is substantial, at

⁵ An even simpler approach is informal 'back of the envelope' modelling. This was adopted in the McMillen, Ryand and Quiggin (1995) baseline study of the Cairns casino, generating results quite close to those of an IO model based on the same assumptions.

least if any effort is made to estimate technological coefficients appropriate to the region in question, rather than simply cutting down a larger CGE to fit the region in question.

Second, because labour and capital flow fairly freely, but not perfectly freely, between regions, the model closure assumptions normally used in CGE models, in which factor supplies are either exogenously fixed or perfectly elastic are not appropriate in regional models. The closure approach used in input-output models, where demand for final consumption is fixed, seems to be a reasonable approximation.

Finally, the output of CGE models is less transparent than that of input-output models. If surprising results emerge it can be very difficult to trace the way in which those results were derived. This means that it is hard to assess whether the results are valid, or are due to inappropriate assumptions.

For these reasons, the input-output approach is adopted here. The basis of input-output analysis is the observation that goods and services are produced using a combination of factor inputs, such as labour and capital, intermediate goods that are themselves produced in the region concerned and intermediate goods imported from other regions. Hence an expansion in the output of one industry will require an expansion in the output of others and so on. This fact can be summarised by an $N \times N$ matrix of input-output coefficients A , where N is the number of industry sectors in the economy and the input-output coefficient A_{ij} is the quantity of the output of the i -th sector required to produce one unit of output in the j -th sector (common practice is to normalise the units of output so that, at current prices, one unit of output is worth \$1 in each sector).

Suppose that final consumption is given by an $N \times 1$ vector Y . The gross output X required to supply this final consumption must include all of the intermediate outputs used in its own production, as well as the final consumption Y . By the definition of the input-output matrix A , the quantity of intermediate outputs is given by the $N \times 1$ vector AX . Hence

$$X = AX + Y$$

or

$$(I - A)X = Y$$

where I is the $N \times N$ identity matrix. Hence

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

The matrix $(I - A)^{-1}$ is often denoted Z and referred to as the matrix. The ij entry of the matrix Z is the increase in the final output of commodity i associated with a unit increase in final consumption of commodity j . Assuming units have been chosen so that units of each commodity have the same value, the sum of the entries in the j -th column is therefore the total increase in final output associated with a unit increase in final consumption of commodity j .

Precisely because intermediate goods are used up in production, the change in aggregate output is of only moderate interest. The relevant economic concept of output in a given sector is that of value added, that is, the difference in value between the output of the industry and the value of the intermediate goods consumed as inputs. The value added per unit of output in a given industry is referred to as the initial value added multiplier. To derive the regional value added associated with a given final demand, it is necessary to multiply each of the rows of the matrix Z by the corresponding initial value added multiplier. In a very similar fashion, it is possible to derive predicted initial and final multiplier effects on employment and income.

It should be noted that high output multipliers for a particular industry generally imply that the industry uses large quantities of intermediate inputs and that the associated initial value added multiplier is therefore small. By construction, the output multiplier must be greater than one, and the initial value added multiplier less than one. Because some inputs are imported from outside the region, the final value added multiplier is also less than one. The average value added multiplier is approximately equal to the share of

regional factor inputs in regional output (for the regions used in this analysis around 0.75).

Type II multipliers

In all of the analysis used to derive the multipliers discussed so far, final consumption has been assumed to be determined exogenously. Multiplier effects have been generated solely through the input demands of enterprises. A Keynesian multiplier analysis focuses on effects transmitted through household income. When demand increases, firms not only purchase intermediate goods, they also hire additional labour and make payments to other factors such as capital. The recipients of this income then purchase additional goods and services. In a Keynesian analysis, attention is focused on the resulting multiplier effects.

In terms of the logic of the input-output model, all that is required to incorporate such multiplier effects is to think of the services of input factors as a particular kind of intermediate good. Households produce this good using the components of household consumption as inputs. Hence, we simply add an extra row (containing the value of factor inputs used in each sector and an extra column, containing the proportion of household income allocated to consuming the output of each sector to the matrix A , producing an augmented matrix A^* . The multipliers derived from the associated matrix Z^* are referred to as Type II multipliers, as distinguished from the Type I multipliers obtained using the matrixes A and Z . As with Type I multipliers, it is possible to derive multiplier effects for output, value added, employment and income. Type II value added multipliers may be greater or less than one. Labor intensive industries will normally have Type II value added multipliers greater than one, while industries that make significant use of imported inputs will have Type II value added multipliers less than one.

Critics of Keynesian macroeconomics argue that the multiplier effects identified in a Type II input-output analysis will be offset by various forms of 'crowding out'. For

example, an increase in the demand for labour in one sector will bid up wages, reducing employment in other sectors. Defenders of the approach suggest that these effects are unimportant in a regional context with relatively free flows of labour and capital between regions. In this paper both Type I and Type II multipliers will be reported, with a primary emphasis on the Type I value added multiplier.