THE ECONOMIC IMPACTS AND BENEFITS OF TOURISM IN AUSTRALIA

A GENERAL EQUILIBRIUM APPROACH

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SUSTAINABLE
TOURISM
CRC

TECHNICAL REPORTS
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Summary

The STCRC Modelling Project in Perspective

This project reports on the STCRC research project on Computable General Equilibrium (CGE) modelling in tourism. Several points are worth noting:

- The report seeks to do several things, including describing the role of CGE analysis in tourism, outlining the work that has been done in Australia and overseas in examining tourism issues using CGE approaches, describing the model being developed by the project research team, and illustrating how the model can be used to examine actual tourism issues.
- While standard CGE models are being used to examine tourism questions, the current project is one of only two worldwide devoted to developing models with detailed tourism sectors (the other project is based at Nottingham University in the UK). These detailed models are capable of exploring tourism issues in much greater depth than hitherto possible.
- There is increasing recognition of the inadequacy of the models which have been extensively used to evaluate tourism's economic impacts. CGE models are designed to avoid these inadequacies and thus they provide a far superior approach to economic evaluation.
- The STCRC project is breaking new ground in several directions, for example in the application of CGE models to evaluation of special events, and in the measurement of the benefits from tourism flows.
- The model developed by the project team can be adapted for use with other evaluation frameworks, such as cost benefit analysis.
- The model is capable of being extended into new areas, for example, through linking up with environmental impact models, to evaluate the environmental impacts of tourism, such as on greenhouse gas emissions.
- The model developed by the research team is readily adapted to examine a wide range of tourism policy questions - models such as this provide, for the first time, a means of rigorously evaluating the economic dimensions of tourism policies.

A New Approach to Estimating Economic Impacts of Tourism

Techniques such as multiplier analysis using an Input-Output (I-O) model are still very commonly used to make estimates of the economic impact of changes in tourism expenditure. It is argued that this approach to economic evaluation, typically undertaken in the tourism context, is both incomplete and misleading and that economic evaluation in tourism thus fails to achieve best practice.

The mechanisms that determine the impact of changes of tourism expenditure on output and employment in real world economies are highlighted. Key mechanisms that determine the size of tourism's economic contribution to a destination will be identified. In addition to 'leakages' that have occupied much attention from tourism economists, factor supply constraints, exchange rate appreciation and the government's fiscal policy stance each play a role in affecting the magnitude of the economic impacts of tourism shocks.

I-O analysis continues to be used worldwide in order to estimate the economic impacts of changes in tourism expenditure on regions and national economies. It is argued that the restrictive assumptions underlying I-O modelling make it an unsuitable instrument for estimating the economic impacts of tourism growth (or decline) of interest to policy makers. Given advances in computable general equilibrium modelling over the past two decades, researchers and policy makers now have workable, flexible and inexpensive models which represent the whole economy, in which resource constraints and feedback effects are explicitly recognised. For measuring changes in both overall economic activity, and in particular aspects of activity, such as employment, tax receipts, imports, exports, and outputs of specific industries, I-O analysis has been superseded by computable general equilibrium modelling.

The nature and scope of CGE modelling is discussed, as well as the types of assumptions upon which it is based, its advantages over I-O analysis, and some qualifications to its use. Some applications of CGE modelling to tourism growth, in Australia and internationally, illustrate the power and flexibility of CGE models to estimate the economic impacts of tourism in contrast to the results typically generated by I-O models.

The STCRC Modelling Project

This study reports on the work done so far by the STCRC Economic Modelling Project. As will be noted, while a comparatively new technique, CGE models have been used a number of times to explore the economic impacts of tourism, both in Australia, and to a lesser extent, overseas. The present project builds on this work in a number of ways.

The model which the team has developed is based on the multi regional MMRF model, of the Monash Centre of Policy Studies. This model incorporates CGE models for each state of Australia. For present purposes, attention is focussed on New South Wales, and the other states are aggregated into the Rest of Australia (RoA). Results are also given for Australia as a whole.

The original model has been updated in several important ways. In particular, the data base has been updated to 2000/01. Its structure, and treatment of the tourism sector, has been made consistent with that of the national Tourism Satellite Account. The tax structure has also been updated, and the model incorporates the Goods and Services Tax, which is of particular significance for the tourism sector.

A key feature of the model has been the explicit incorporation of tourism sectors. Typically, CGE models do not incorporate a tourism sector. Since the focus of the present project is on tourism, specific tourism sectors were incorporated - these include international visitors, interstate and intrastate visitors, and international outbound tourism. Allowance has been made for different tourist types (business, holiday etc). This enables much greater detail and accuracy in analysing tourism's economic impacts.

The model as developed is capable of being used to analyse a wide range of tourism issues. In particular, it has been employed in the assessment of the economic impact of special events (Chapter 6). Up to now, CGE models have only rarely been used for this purpose.

The model has also been adapted to provide a measure of the net economic benefits from changes in economic activity. Changes in economic activity, such as in GDP, are not a good measure of the net gain to the economy. They are measures of additional output, and very often, there is a cost to obtaining this output. Additional resources must be used to produce this output, and these resources have a cost, which must be deducted from the value of the increased output. The model yields measures of benefits from changes in economic activity stimulated by tourism, which can be directly used for policy purposes.

CGE Modelling of Tourism Growth in Australia

Results of CGE modelling to simulate the economic impacts of an increase in international, interstate and intrastate tourism to the Australian state of New South Wales, and on the RoA, are discussed. The model used has been designated the M2RNSW model. This is a modified version of the M2R model, a multi-regional computable general equilibrium tourism model the basic structure of which is an adaptation of the standard MONASH Multi-regional Forecasting (MMRF) model. The model has been adapted to take account of the new tax system in Australia, especially the introduction of the GST.

Types of simulations undertaken are:

- The effects of a ten per cent increase in the world demand for Australian tourism;
- The effects of a ten percent increase in international tourism to New South Wales (with no change in travel to the RoA);
- The effects of a ten percent increase in interstate tourism to New South Wales where the increase replaces: (a) domestic travel in the RoA and overseas; and (b) expenditure on other goods and services in the RoA;
- The effects of an increase in intrastate tourism in New South Wales, where the increase replaces: (a) travel by NSW residents to other States and overseas; or (b) spending on other (non tourism) goods and services from all sources.

Both the intrastate and interstate tourism markets are potentially important generators of income and jobs for New South Wales. The impacts from the intrastate markets depend upon the extent to which growth in intrastate tourism replaces tourism in the RoA. Increases in interstate tourism, however, are associated with relatively large economic impacts on the receiving state, regardless of whether the substitution relates to other tourism or to (non-tourism) goods and services.

Depending on what is given up by intrastate tourists to finance their trip, intrastate tourism may have greater impacts per dollar expended than the more emphasised 'glamour' markets of international and interstate tourism. Further research is needed to determine the extent to which expenditure on both interstate and intrastate tourism represents substitution from intrastate tourism in RoA or from other goods and services foregone.

In terms of the impacts per visitor, New South Wales GSP and employment gain most from intrastate visitation, provided the expenditure is sourced from RoA tourism expenditure foregone (that is from NSW tourists choosing to travel within NSW rather than to the RoA). Next comes increased interstate tourism from the RoA to NSW. This implies that promotional spending in domestic tourism markets may have greater cost effectiveness than international marketing expenditure in both the short and long runs, at least from the perspective of the state undertaking the promotion (though this need not be true for the nation as a whole)

The results also have implications for government support of programs designed to promote greater domestic tourism such as the "See Australia" program. The simulations indicate that increased tourism to New South Wales from interstate can generate substantial economic impacts for that state but can adversely affect GSP and employment in other states and territories. The economic impacts of such programs on a given state will depend

upon its industrial structure, and the proportion of a state's population that visit within, and outside that state. The extent of gains will also depend upon what domestic tourists give up to finance their trips. These issues have been neglected in the research literature to date.

From an Australia wide perspective, expenditure by international tourists creates more GDP and employment, supporting the allocation of scarce resources into the marketing of Australia internationally. However, the modelling suggests that positive economic impacts occur at the national level from changes in domestic tourism as well. For example, in both of the short-run intrastate scenarios, and in one of the two short-run interstate scenarios, where the increased tourist expenditure replaces expenditure on goods and services in the RoA, there were positive GDP and employment effects for Australia as a whole. In the long-run the modelling for of the intrastate and interstate scenarios showed positive impacts on GDP for Australia as a whole (for the long run scenarios total employment at the national level is determined by macroeconomic and labour market structure and does not change). These outcomes were not dependent on any switching of Australian outbound tourism by Australians into domestic tourism, which could provide further positive economic impacts. These will be examined in a future study.

The greatest gains nationally are associated with international tourism in both the short and long runs. However, the greatest gains to the New South Wales state economy, per dollar of additional tourism expenditure, are associated with domestic tourism (except in the case of intrastate tourism which replaces expenditure by NSW residents on other goods and services). From the perspective of Tourism New South Wales, it may well be more cost effective to allocate resources to generate additional domestic tourism rather than to cooperative marketing of Australia as a destination.

Underpinning the above results are the changes in output and employment of industries as a result of changes in the amount and patterns of tourism expenditure. Industries in the State that experience the most positive growth in sectoral output and employment in both the short and long run, and irrespective of the origin of increased tourism expenditure, include Air Transport and Hotels. The simulations reveal that some industries decline as a result of the increased tourism, both in New South Wales and the RoA. The industries that experience a decline in output and employment tend to be export-oriented industries in the primary sector (eg. Mineral Products, Oil), or import competing manufactured products (eg. Chemicals, Motor vehicles, TCF and Wood products).

Economic Impacts of Events using CGE Models

The CGE model, and the I-O model embedded within it, is used to evaluate the economic impacts of events. A major use of I-O analysis in the tourism field has involved estimation of the economic impacts of events. To determine the extent to which I-O and CGE models produce different estimates of an event's economic impacts, the authors undertook simulations of two representative events using the two approaches. These events are a large event, with the expenditure characteristics of the Formula 1 Grand Prix, and another smaller event, such as might be held in a rural city. The results show that the two techniques give very different results; in particular, the impacts estimated using the CGE approach are much smaller than when estimated using the I-O model embedded within the CGE model. The CGE approach is also able to provide estimates of impacts on a wide range of economic variables which the I-O model is incapable of.

For New South Wales, the assumed host State, the Input-output model yields much larger multiplier values, and thus correspondingly larger projections of impacts on output, GSP, and employment than the CGE model for both the large and the small event. The two models differ in their results regarding the magnitude of the impacts on Australia as a whole and RoA of changes in output, Gross State Product, and employment associated with the both the large and the small event.

The I-O model also projects greater impacts on real output and GDP in Australia than in New South Wales while, in contrast, the CGE model projects smaller changes in Australia than in the State. Differences here are due to reduced output, GSP and employment in RoA associated with the event, which are projected outcomes of the CGE but not the I-O model.

The comparison also reveals that two major (related) types of information are gained by using CGE rather than I-O analysis. One type relates to the impact of event related expenditure on output, GSP and employment in the RoA - the I-O model can only handle the impacts within the state holding the event, and it ignores the (primarily negative) impacts elsewhere. The second relates to the positive and negative impacts on output, value added and employment in other industries, in the host state, and in other states.

Objections to Use of CGE

Some possible objections to the use of CGE analysis of economic impacts are considered. The objections which are based on practical rather than conceptual considerations, are argued to carry little weight. I-O analysis makes fewer assumptions than does CGE analysis, but the assumptions it does make about production processes are

highly stylised, and open to the same types of criticism. The real objection to I-O analysis is that it avoids making assumptions about how the rest of the economy works by ignoring it. It is preferable to have a complete representation of the economy, even if this involves making some further assumptions. A strength of CGE analysis is that many of its assumptions can be varied and the sensitivity to them tested. It is conceded that there is a case for using a local I-O model to estimate the local effects of an event or project, providing information of relevance to local decision makers. However, the results of such studies are only of partial guidance to higher-level decision-makers, such as state or national governments, who will be interested in impacts on the overall economies within their jurisdiction. For this, CGE models will be required.

Extensions of the Research Program

The study explores some extensions of the research program to encompass issues such as the development of Tourism Satellite Accounts, and the scope for incorporating dynamic considerations into CGE modelling so that the development path of the economy and deviations from that path can be investigated.

The study also addresses the issue of the measurement of the benefits of tourism growth. Unfortunately, tourism researchers continue to confuse the 'impacts' and the 'benefits' of tourism growth, ignoring the fact that tourism growth has an economic cost, since it requires the use of scarce resources. To measure the net benefits of a tourism change, we need to identify in what ways the revenues gained from additional tourism are not equal to the opportunity costs of the inputs used in supplying it. Benefits are measured by taking the change in real state/national income (which excludes income payable overseas) and subtracting the cost of additional factors employed. With measures of net benefits we are able to get to the bottom line of policies and projects that involve costs to government or affected parties and benefits from greater economic activity.

The way in which CGE models can be used to evaluate the benefits from tourism is illustrated by means of an application to New South Wales.

Additional Research

There is a very extensive range of issues that can be explored using the CGE technique. The agenda for future research in this area will be to extend the analysis to different tourism destinations, to include detailed analyses of the different expenditure patterns of different tourists and to model the different government policy settings that help determine tourism's economic impacts.

Specific research projects might include:

- estimations of the economic impacts of different types of tourists;
- comparison of results under alternative assumptions about the economic environment;
- incorporating environmental costs of tourism into net benefit estimates;
- measuring regional impacts of tourism growth;
- estimates of the economic impacts of tourism in developing countries;
- economic impacts of outbound tourism;
- economic impacts of specific sectors- eg cruising, backpackers;
- modelling the economic impacts of aviation policy changes;
- exploring the impacts of changes in taxation of tourism;
- evaluating tourism promotion;
- exploring the infrastructure requirements of tourism growth;
- estimating the implications of tourism growth on resources; eg water or energy;
- the impact on the economy of changes in tourism competitiveness.

These are only some of the many issues that can be examined in future using CGE modelling. The challenge now facing tourism researchers and planners world-wide is to demonstrate an awareness of these issues in their estimates of the economic contribution of tourism to both developed and developing destinations.

Chapter 1

Introduction

The importance of tourism to economies is now well recognised. As a result, when tourism changes or policy shifts are being considered, there is an interest in determining what impact on the economy they might have. However, the approach to economic evaluation typically undertaken in the tourism context, is both incomplete and misleading. Techniques such as multiplier analysis within an Input-Output model are still very commonly used to make estimates of the economic impact of changes in tourism expenditure. These techniques are recognised to have serious limitations, and as a result, alternative techniques have been developed to address the problems. Computable General Equilibrium (CGE) models are now extensively used, especially in Australia, the UK, the US and Canada, to estimate impacts of a wide variety of changes and policies, across most sectors of the economy. CGE techniques have been used in the tourism context, but so far, not extensively. Economic evaluation in tourism thus fails to achieve best practice.

The authors have used CGE modelling to simulate the economic impacts of an increase in international, interstate and intrastate tourism to the Australian state of New South Wales, and on the RoA. The model used has been designated the M2RNSW model. This is a modified version of the M2R model, a multi-regional computable general equilibrium tourism model the basic structure of which is an adaptation of the standard MONASH Multi-regional Forecasting (MMRF) model. The model has been adapted to take account of the new tax system in Australia, especially the introduction of the GST. Since the earlier model was developed, the Australian Tourism Satellite Account (TSA) has been published and the updated model has been made consistent with the TSA. One of the first applications of the model has been to estimate the economic impacts of two representative events, and to compare the results with those obtained by using Input Output techniques- the results are quite different.

The report is structured as follows:

- Chapter One provides a basic introduction to the report.
- Chapter Two highlights the mechanisms which determine the impact of growth of tourism on output and employment in real world economies. Key mechanisms that determine the size of tourism's economic contribution to a destination are identified. In addition to 'leakages' that have occupied much attention from tourism economists, factor supply constraints, exchange rate appreciation and the government's fiscal policy stance each play a role in affecting the magnitude of the economic impacts of inbound tourism.
- Chapter Three discusses the traditional approach to economic impact estimation. Until recently, I-O analysis has been used worldwide in order to estimate the economic impacts of changes in tourism expenditure on regions and national economies. It is argued that the restrictive assumptions underlying Input-Output modelling make it an unsuitable instrument for estimating the economic impacts of tourism growth of interest to policy makers. Given advances in computable general equilibrium modelling over the past two decades, researchers and policy makers now have workable and flexible models which represent the whole economy, in which resource constraints and feedback effects are explicitly recognised. For measuring changes in both overall economic activity, and in particular aspects of activity, such as employment, tax receipts, imports, exports, and outputs of specific industries, I-O analysis has been superseded by computable general equilibrium modelling.
- Chapter Four begins with a brief outline of the nature and scope of CGE modelling, the types of assumptions upon which it based, its advantages over I-O analysis, and some qualifications to its use. It then discusses applications of CGE modelling to tourism growth in Australia and internationally, exploring the power and flexibility of CGE models to estimate the economic impacts of tourism in contrast to the results typically generated by I-O models. While CGE analysis is being used extensively to estimate economic impacts of changes in a great variety of different industry and policy contexts world wide, tourism researchers have been slow to appreciate its advantages over traditional assessment techniques.
- Chapter Five highlights some recent results from the STCRC economic modelling project for changes in tourism in New South Wales and the RoA. Types of simulations undertaken are (i) The effects of a ten per cent increase in the world demand for Australian tourism; (ii) The effects of a ten percent increase in international tourism to New South Wales (with no change in travel to RoA); (iii) The effects of a ten percent increase in interstate tourism to New South Wales where the increase replaces: (a) domestic travel in RoA and overseas; and (b) expenditure on other goods and services in RoA; (iv) The effects of an increase in intrastate tourism in New South Wales, where the increase replaces: (a)

travel by NSW residents to other states and overseas; or (b) spending on other (non-tourism) goods and services from all sources. The economic simulations are based on four key assumptions about the federal government fiscal policy stance, two key assumptions about the wage setting environment, and four key assumptions about the aggregate level of employment. Short run and long run simulations are compared and some implications for policy are discussed.

- In Chapter Six, the CGE model, and the I-O model embedded within it, is used to evaluate the economic impacts of events. A major use of I-O analysis in the tourism field has involved estimation of the economic impacts of events. To determine the extent to which IO and CGE models produce different estimates of an event's economic impacts, the authors undertook simulations of two representative events, both large and small, using the two approaches. The results show that the two techniques give very different results; in particular, the impacts estimated using the CGE approach are much smaller than when estimated using the I-O model embedded within the CGE model. The CGE approach is also able to provide estimates of impacts on a wide range of economic variables, which the I-O model is incapable of estimating.
- Chapter Seven discusses some objections to the use of CGE analysis of economic impacts of tourism. The objections, which are based on practical rather than conceptual considerations, are discussed and generally discarded.
- Chapter Eight explores some extensions of the above research program to encompass issues such as the development of Tourism Satellite Accounts, and the scope for incorporating dynamic considerations into CGE modelling so that the development path of the economy and deviations from that path can be investigated. This section also addresses the issue of the measurement of the benefits of tourism growth. Unfortunately, a good proportion of tourism researchers continue to confuse the 'impacts' and the 'benefits' of tourism growth, ignoring the fact that tourism growth has an economic cost, since it requires the use of scarce resources. To measure the net benefits of a tourism change, we need to identify in what ways the revenues gained from additional tourism are not equal to the opportunity costs of the inputs used in supplying it. The way in which CGE models can be used to evaluate the benefits from tourism is illustrated by means of an application to New South Wales. Benefits are measured by taking the change in real state/national income (which excludes income payable overseas) and subtracting the cost of additional factors employed. With measures of net benefits we are able to get to the bottom line of policies and projects which involve costs to government or affected parties and benefits from greater economic activity. Measures of impacts of tourism developments on GDP or other measures of activity leave the key question unanswered, and provide only limited guidance for policy making. Through use of the models now available, it is feasible to make estimates of the magnitude of benefits that flow from a range of different tourism developments, and this makes rigorous evaluation of them possible.
- Chapter Nine outlines a wide range of tourism issues which can be explored using the CGE approach, and some conclusions are drawn in Chapter Ten.

The challenge now facing tourism researchers and planners world-wide is to demonstrate an awareness of these issues in their estimates of the economic contribution of tourism to both developed and developing destinations. As a result of these considerations we conclude that, in a CGE model which incorporates a realistic set of economy-wide constraints, the effects of inbound tourism growth cannot be anticipated *a priori*. The agenda for future research in this area should be to extend the analysis to different tourism destinations, and to include detailed analyses of the appropriate behavioural characteristics of the economic agents that are included in model specification and of the government policy settings that determine the context for their behaviour.

Chapter 2

The Economic Impacts of Tourism Growth

Tourist expenditure represents an injection of ' new money ' into a destination (Frechtling 1987, Fletcher 1994a, Archer & Cooper 1995). The expenditure injection is regarded as having three types of impacts - direct, indirect and induced.

The direct impacts are reflected in the increased sales revenues of firms catering to tourist needs for different goods and services. Some of these firms are within, and others are outside, what may be regarded as 'the tourist industry'. These firms and organisations, in turn, purchase goods and services from various suppliers within and outside of the destination region.

Indirect effects result from 'flow-ons' when direct suppliers purchase inputs from other firms in the region which, in turn, purchase inputs from other firms and so on. Almost every industry in the economy is affected to some extent by the indirect effects of the initial tourist expenditure.

Induced effects arise when the recipients of the direct and indirect expenditure - owners of firms and their employees - spend their increased incomes. This, in turn, sets off a process of successive rounds of purchases by intermediate firms, plus further consumption, adding to Gross Domestic Product and employment (Archer 1977a, Jackson 1986, Holloway 1989, Fletcher 1994a)

Given the indirect and induced effects of tourist expenditure, the ultimate increase in income within the destination may exceed the initial expenditure increase. Tourism economists have thus tended to focus upon the so called 'multiplier effects' of tourism expenditure.

Factors Limiting Size of Economic Impacts

Industry Linkages and Leakages

Tourism economists, have devoted a good deal of attention to the effects of 'leakages' of tourism expenditure, resulting from taxes, savings and imports, on the values of tourism multipliers (Bull 1995, Tribe 1999). Perhaps most attention has been devoted to the issue of leakages from tourist expenditure on goods and services which have an import content, an issue of particular concern to developing countries (Sinclair 1998). The extent to which production and employment in the destination is affected by visitor expenditure does depend importantly on the strengths of the business linkages between tourism and other sectors, and the stronger the links between businesses within a destination, the lower the level of 'leakages' from imports (Mathieson & Wall 1982, Archer & Fletcher 1996, Tribe 1999). The greater the extent to which tourism development generates increased production in the primary, secondary and tertiary sectors of the economy, the greater is the tourism multiplier and consequent impact of injected expenditure on Gross Regional Product and employment.

While the size of the 'multiplier effect' will be reduced by 'leakages' of expenditure into imports, taxes and savings, other key mechanisms which determine the size of the economic impacts resulting from increased tourism demand have tended to be neglected. These include: factor supply constraints, exchange rate appreciation and current government economic policy. As we shall argue, recognition of the relevance of these factors to economic impact assessment has implications for the appropriate economic estimation technique to be employed.

Factor Supply Constraints

The tourist industry expands output to meet additional demand by employing additional labour, land, capital plant and equipment. Some of these may be in limited supply eg particular labour skills or workers for particular shifts or locations. In the absence of offsetting productivity improvements price increases are necessary to attract resources into tourism, increasing industry costs, and making a destination less price competitive. The size of the cost increases depends on the supply of different factors, whether these factors account for a significant proportion of the tourist industry total production costs, and how quickly extra supplies can be made available. A destination's ability to increase the supply of goods and services required by tourists in response to an increase in inbound tourism, without offsetting increases in the costs of production, depends to a large extent on the characteristics of the industries which service tourist demands, such as retail services, hospitality; and transportation (Wanhill 1988, Sinclair 1998). When an economy is at or near to full employment, the increased tourism demand imposes cost pressures as the price of scarce resources are bid up. If other industries employ the same resources they also face cost pressures resulting from the increased tourism demand. This may particularly affect trade-exposed sectors that face world prices for their products and hence are unable to pass on cost

increases without losing market share. Any loss of market share by domestic producers means that the net gain to overall Gross Domestic Product and employment from further tourism will be lower. Also, location requirements can lead to rising land prices as the tourist industry attempts to attract land away from other uses.

We can make some observations about *factor inputs* into the main sectors of the tourism industry.

Labour

An expanding tourism industry will place additional pressure on the demand for various types of labour- skilled, semi-skilled and unskilled. The constraints are perhaps most evident, however, in the case of labour which has some skills component.

There is a limit to which the tourism industry can immediately meet its higher demand for skilled and semi-skilled occupations by attracting trained workers from other industries or from immigration. The retail and hospitality sectors are labour intensive with wages comprising the largest single cost item. In Australia around 20% of the hospitality labour force is classified as skilled (eg. chefs, senior management), with 40% semi skilled (Industry Commission). It is not important that levels of skill be precisely defined. It suffices to recognise that different sectors of the tourism industry have different labour requirements and that constraints on the available supply can impede development of any sub-sector. Because skills take time to acquire the wages for some occupations would normally be bid up in the short term as tourism faces an excess demand for labour. Thus firms and organisations competing for a fixed supply of inputs will compete against each other putting upward pressure on wages.

The extent to which wage pressures on particular skills is translated into actual wage increases relative to other occupations depends on the wage setting environment. In many economies, the labour market is characterised by institutional rigidities that constrain wages awarded to government employees such as those employed in the aviation sector. This limits its ability to attract additional skilled labour in the short term from other industries, and in the long term through training. If relative wages are able to adjust in response to skills shortages this would induce people to acquire skills, to immigrate to a country or region, stay in the industry or re-enter the industry.

The expanding tourism industry will, in any case, put upward pressure on other costs and prices, feeding eventually into the Consumer Price Index (CPI) as a result of pressure for general wage increases to maintain real wages. Thus if increased real wages spill over to other industries, they will impose a cost burden on the profit margins of those industries. Unless these industries are willing to suffer reduced profitability, they will raise prices. This increases input prices generally, further reducing industry cost competitiveness. This will lead to a further contraction of output in non-tourist industries and Gross Domestic Product (GDP) growth will be smaller.

Over time, particular skills shortages in tourism may become less pronounced depending on the pace of skills acquisition relative to industry growth and relative to prospects of factor substitution to economise on skills in short supply. In the longer run labour of all types may be relatively scarce because of demographic constraints. The tourism industry will then face greater competition from other growing industries for the labour that is available.

Land

Land is required for capital infrastructure such as roads and airports. Land for tourism development is often required near the urban and coastal fringe where it competes with retail and residential development (Dwyer & Edwards 2001). Land prices increase according to their scarcity value. In particular, land near attractive environmental resources, eg. beaches, nature reserves, becomes more in demand by the hospitality sector as tourism develops, increasing land values. Additionally, tourists demand the services of natural resource areas such as national parks. These resources are often managed by government agencies and funded by taxpayers.

Increased land values due to tourism development will impact on the costs of other industries (Dwyer & Forsyth 1993). These costs could include unpriced losses to the quality of life as well as higher prices for residential or conservation purposes. If an increase in tourism demand leads to a greater share of desirable sites being absorbed by the tourism industry at less than market prices, as a result of designation of certain areas as ‘designated’ tourist zones, this will reduce the supply available to other uses such as fishing and forestry and will increase cost pressures in those industries as they must use their existing resources more intensively.

If land used for tourism development is not priced correctly the cost pressures imposed on alternative users will not be reflected in prices to tourists. Hence tourism will effectively be subsidised relative to other activities. Conversely, if land is allocated to other activities at less than market prices cost pressures will be imposed on the tourist industry some of which may be passed on to tourists as increased congestion or crowding of particular sites.

Capital

Expenditure on capital in response to increased tourism expenditure is undertaken by both private and public sector stakeholders. Lack of suitable infrastructure and tourism industry facilities can pose a constraint to tourism flows both to and from a country. In other cases, lack of entrepreneurship on the part of domestic investors to involve themselves with the tourism industry, coupled with a reluctance by domestic financial institutions to make funds available for tourism developments, has led to foreign direct investment to fill this gap (Dwyer & Forsyth 1994a).

Expansion in tourism will lead to greater use of existing capital plant and equipment such as buildings, aircraft and coaches. If wages rise relative to the costs of employing capital then capital /labour ratios tend to rise. Some new investment (eg. fast food outlets) can expand capital stocks relatively easily. But sometimes the long lead times required for new investment (eg. aircraft, cruise shipping terminals) will mean that existing capital needs to be used more intensively in the short run, pushing up operating costs and thence prices to tourists. Thus, increased tourism demand may lead to more intensive use of airport infrastructure (runways and air traffic control facilities). Until then, passengers may face costs associated with congestion and flight delays.

Lack of suitable infrastructure to support tourism development is one of the greatest constraints to growth in this sector in developing countries (Inskeep 1991, Gunn 1994). New resort developments located in coastal regions can lead to increased use of local roads, requiring greater expenditure on road maintenance and repair. Tourism expansion generates additional demand for water, sewerage, sanitation facilities, telecommunications and the provision of energy. Some of these additional infrastructure costs may be paid for by the tourism industry, and, by extension, tourists. Typically, higher operating costs or costs of new investment will be funded through higher taxes, which in turn reduce the positive economic impacts of tourism growth over the longer term. Thus, in the absence of full cost recovery on infrastructure, both short run operating costs and the long run costs of capital expansion will be met, at least in part, by the wider community.

In the medium to longer term, additional investment in the tourism industry will result in an expansion of the physical capital stock. However, finance for this investment must come from somewhere. In a closed economy, with no links to international capital markets, funding for tourism investment will add to the demand for savings, bidding interest rates up, and leading to crowding out of investment in other sectors. In an open economy (such as most economies today, including Australia) the increased demand for funds will be met from inflows of capital from abroad. This enables an increase in production as measured by GDP. However, it will also lead to an increase in income payable abroad, to the lenders of the finance. The income accruing to residents in the country will not increase.

Exchange Rate Appreciation

By reducing reliance on commodity exports, expansion of a country's tourism industry can improve its terms of trade and it may also reduce the volatility of the terms of trade (Adams & Parmenter 1991). However, the nature of the exchange rate regime is a crucial determinant of the economic impacts of foreign inbound tourism. Additional tourism leads to an increased demand for the nation's currency, and thus upward pressure on its price. Changes in real exchange rates are an important determinant of destination price competitiveness (Dwyer, Forsyth & Rao 2000a, 2000b, 2001).

Under a flexible (nominal) exchange rate, characterising most of the world's industrial economies including Australia, the net impact on aggregate demand may be quite small or even zero. Tourism expands at the expense of industries producing other tradeable goods or services. This reduces the multiplier effect on income and employment, although there may be a small positive impact on employment if tourism is more labour intensive than the industries it replaces. The actual trade balance is determined by the real exchange rate, with domestic prices moving to reallocate resources. An expansion of international tourism will strengthen the real exchange rate leading to a reduction in other exports and/or an increase in demand for imports at the expense of the demand for domestic import competing commodities. Most obviously affected will be the traditional export sectors - agriculture, mining and manufacturing - which suffer reduced competitiveness on world markets due to real exchange rate appreciation. Moreover, if the increased tourism demand leads to an increase in investment this will increase foreign borrowing and possibly, foreign direct investment for a period, and push the real exchange rate even higher. This will further reduce traditional exports and increase imports.

Fiscal Policy

The government fiscal policy stance can help to play a part in determining the size of the economic impacts from tourism growth. In most countries tourism development is inescapably linked to the public sector. For example, expansion of air and land transport implies increased demand for airport facilities, road and rail transport facilities, utilities, and other infrastructure, much of which is provided by government or semi-government authorities and financed wholly or partly through tax revenue. Linkages between private firms and public sector

enterprises can have important implications for patterns of growth. Further, the level and composition of taxes, the relative size of the public sector, and the relative efficiency of resource use all have a substantial impact on the size and distribution of the economic impacts.

A government may use the additional tax revenues generated by additional tourism profits and employment to reduce income and corporate tax rates. If the cause of any existing unemployment is rigid real wages that are higher than the market clearing wage then the impact on unemployment of reduced tax rates could be large. This is because reduced taxes imply increased private consumption, investment spending, and exports depending on the type of tax involved.

If a government invests in additional infrastructure spending to support tourism expansion, for example through construction of new tourism related infrastructure such as roads, wharves, and airport landing facilities, there will be a positive effect on spending but it must be financed. However, if fiscal policy is directed towards maintaining a fixed Public Sector Borrowing requirement (PSBR) then taxes would have to rise to offset growth in government expenditure. This moderates the growth in private consumption leading to downward pressure on the output of consumption-oriented industries. Under the circumstances, any expansion of tourism generates more additional investment than can be financed by the addition to domestic saving which is generated. Hence the trade balance is driven towards deficit. This is associated with a strengthening of the real exchange rate, which crowds out activity in the traditional export sectors and reduces the positive effects on employment growth.

The above discussion highlights the fact that, unless there is significant excess capacity in tourism related industries, the primary effect of an economy-wide expansion in inbound tourism is to alter the industrial structure of the economy rather than to generate a large increase in aggregate economic activity. Its effect will thus show up mainly as a change in the *composition* of the economy rather than as a net addition to activity.

Chapter 3

Estimating the Economic Impacts of Tourism Growth

Input-Output Analysis

The technique most often used to quantify economic impacts of tourism demand change is Input-Output (I-O) analysis (Fletcher 1994b, Frechtling & Horvath 1998). I-O models estimate the increase in economic activity associated with a change, such as an event, by calculating the increase in output directly, and adding the extra output in related industries, such as supplier industries. Input-Output analysis has been used to estimate the income and employment effects of tourism in several countries, for example, Antigua (Pollard 1976), Bahamas and Bermuda (Archer 1977b, Archer 1995), Hong Kong (Lin & Sung 1983), Korea (Song & Ahn 1983), Australia, Mauritius (Archer 1985), Puerto Rico (Ruiz 1985), Singapore (Khan, Seng & Cheong 1989; Heng & Low 1990), Ireland (Baum 1991, Henry & Deane 1997), India (Pavaskar 1987), the Seychelles (Archer & Fletcher 1996). I-O models have also been employed to estimate the economic contribution of tourism to regions within countries (Witt 1987, West 1993, Adams & Parmenter 1993, West & Gamage 2001). In many of these studies, the high income, value added and employment multipliers associated with Input-Output models imply that tourism often emerges as a 'catalyst' for national and sub-regional economic growth, particularly in developing countries. Rarely are the exaggerated multipliers from adoption of the I-O technique acknowledged.

Limitations of Input-Output Analysis

There are some well known limitations to I-O analysis and, by implication, the tourism multipliers that the technique generates. Indeed, the assumptions underlying construction of I-O models are so unrealistic that they affect the validity of the results obtained by the technique (Briassoulis 1991; Dwyer & Forsyth 1998, Johnson 1999, Blake, Durbarry, Sinclair & Sugiyarto 2000).

The I-O model contains no price mechanism and so it cannot capture the effects of changing factor costs within its framework. The constant technical coefficients used in I-O analysis also assume away changes in input mix due to price induced substitution between factors.

The method assumes that there are no constraints limiting the capacity of industry or government to expand production to meet the additional demands of tourists.

The restrictive assumptions imply that interactive effects between economic sectors are ignored. In its focus on the industry which is being directly affected, and on its *direct* relationships with other parts of the economy. The method assumes that there are no constraints limiting the capacity of industry to expand production to meet the additional demands of tourists. It assumes that resources, such as labour, land and capital, flow freely to the tourism and related industries. These resources are effectively assumed to be not used elsewhere; they do not come from other industries, and do not result in reductions in output elsewhere. I-O analysis does not allow for effects through the trade sector, for example, through foreign tourism demand pushing up exchange rates and discouraging other exports, and resulting in increased imports. It does not allow for the impacts of different constraints on the Public Sector Borrowing Requirement which affects levels of taxation and government spending and, hence, economic impacts of the increased tourism expenditure. It does not allow for the workings of the labour market and the possibility of real wage increases in tourism employment. As a consequence, I-O estimates of impacts, on economic activity generally or on specific variables such as employment, are usually overestimates, very often by large margins. Indeed, such estimates can even get the direction of the change wrong.

Effectively, the only circumstances under which the measured change in activity (GDP or employment) would equal the actual net change in activity would be when *all* the resources, including labour, natural resources and capital goods, would have been unemployed and available in the absence of the tourism expenditure. Even granted that there is some unemployment of labour in most economies, this is highly unlikely.

Some researchers have attempted to overcome limitations of the technique by incorporating the effects of changes in the consumption patterns that occur as income rises (Sadler, Archer & Owen 1973), and others have introduced capacity constraints into the basic model (Wanhill 1988, Fletcher & Archer 1991, West & Gamage 2001); but such refinements fail to fully capture the feedback effects that typically work in opposite directions to the initial change in tourism expenditure.

Chapter 4

Need for a General Equilibrium Perspective to Economic Impact Estimation

The General Equilibrium Perspective

General equilibrium effects are not always that easy to observe directly, or to appreciate the significance of. However, it is possible to see them at work when there are big changes to the economy. Excellent examples are the mineral boom in Australia in the 1970s and the North Sea oil boom in Britain in the 1980s (see Forsyth 1986). It was initially thought that the Australian mineral boom would be positive for Australia's manufacturing industry; after all, it would be the recipient of orders for equipment from the booming mining sector. I-O analysis would suggest that it would be a winner from the boom. The reality was otherwise. The mineral boom led to a sharp rise in the value of the Australian dollar; this put real pressure on import competing industries, and especially the manufacturing sector. The net effect was a contraction of manufacturing. It was also expected that the mining boom would lead to a significant shift of the current account into surplus. The reality was that the exchange rate appreciation brought the current account more or less back to where it was. Very much the same processes were at work in Britain during the oil boom; the exchange rate appreciated sharply, devastating the manufacturing sector. When changes are large, the workings of the general equilibrium effects are evident; for smaller changes, they are still present, though naturally less obvious.

For any tourism destination, economy – wide effects must be taken into account in determining tourism's economic contribution to Gross Domestic Product and employment. Making resources available for an activity means that alternative economic activities have fewer resources, and thus their production will fall. When consumers spend on new activities, such as a special event, they divert their spending away from other goods and services, leading to less production in the industries, which produce those goods and services. In the competition for scarce resources, increased costs reduce the competitiveness of other sectors in the economy, particularly export-oriented and import-competing industries, diminishing output and employment levels. Where resources are drawn away from traditional export-oriented industries, these industries will experience increased production costs. Where cost pressures reduce the competitiveness of a nation's tourist industry, relative to other destinations, this may result in increased outbound tourism, implying a loss of production and employment opportunities from domestic tourism. Such effects can be magnified when the increased demand for the home currency pushes up its price, discouraging other exports and import competing industries.

Although an increase in tourism demand may, in part, be met by a net increase in domestic output, it will also tend to 'crowd out' other sectors of domestic economic activity, reducing output and employment in other sectors. While I-O analysis generates high employment multipliers, the reality is that employment effects depend on how the labour markets in the economy work. An increase in demand for labour may lead to wage increases as well as more people being employed. Furthermore, labour is not a single, undifferentiated, resource; demand for certain skills may increase, and skilled labour may be diverted from other industries, even though unemployment exists. To calculate how a change in tourism affects output or activity in the economy overall, a model which incorporates these feedback effects, and which takes account of how critical markets in the economy like the labour market are structured, is essential. Since the difference between 'gross' and 'net' effects will normally be quite substantial, partial approaches, such as I-O models, are insufficient (Dwyer & Forsyth 1998; Dwyer, Forsyth, Madden & Spurr 2000).

In reality, economies are general equilibrium systems, or systems which are integrated wholes, in which an overall balance must be preserved, and in which indirect and feedback mechanisms are important, along with direct mechanisms. Any measures of the extent to which a change, such as a boom in tourism, will impact on economic activity must take this into account and allow for the negative as well as the positive impacts. Thus when there is a change in tourism (or any other economic change) the primary result of this is one of change in the *pattern* of economic activity. There may be, but there need not be, a net *increase* in economic activity. (Dwyer, Forsyth, Madden & Spurr 2000).

Once a CGE perspective is adopted, I-O models come to be seen as essentially an interim measure. When first developed, the general equilibrium effects of changes were recognised, but it was not possible to handle them in empirical models. Now that computable general equilibrium models are available, we have at our disposal workable and flexible models that represent the whole economy and in which resource constraints and feedback effects are explicitly recognised.

Computable General Equilibrium Modelling

Over the past two decades there has been rapid development of computable general equilibrium models. These

models incorporate an I-O framework, but they also model markets for goods and services and factor markets, recognise resource limitations, model consumer spending, allow for government spending and taxing, and allow for external constraints. Computable General Equilibrium models allow for the inclusion of constraints absent from I-O calculations.

A typical CGE model gives us impacts on a range of variables which may be of interest to policymakers. It will give a measure of the overall change in economic output, through the effect on GDP (or Gross State Product in the case of a state economy). It will also provide output results for individual industries. The impact on key variables, such as employment, imports and exports will also be part of the model's output. If the government sector is incorporated explicitly in the model being used, the effects on government revenue, spending and surplus can be determined.

A typical CGE model has a high degree of empirical content in the form of detailed commodity flows, labour market data and national accounts data. A CGE model represents the economy as a system of flows of goods and services between sectors. The goods and services include both produced commodities and primary factor services (labour, land, capital). The sectors include the household sector, several industry sectors, government and the foreign sector. Flows between sectors are represented in an I-O table or social accounting matrix where each row of the I-O table corresponds to a commodity grouping, each column to a sector, and each element of the table shows the money value of usage of the relevant commodity by the relevant sector (McDougall 1995).

Commodity flows in a simple CGE model include: flows of commodities from industries to households, governments, export markets and investment; flows of commodities from industries to other industries for use in current production (*intermediate usage*); imports of commodities from abroad to meet domestic demand, and flows of primary factor services from households to industries. This means that the detailed theoretical structure and overall accounting framework are calibrated to actual conditions in a particular year. Responses within the model to changes in economic conditions are guided by parameters, the values of which are estimated from actual data in the economy.

A CGE model is characterised by four types of variables (McDougall 1995).

Behavioural Assumptions

The behavioural assumptions of a CGE model link the sectors and specify how each sector responds to external shocks including shocks normally affecting the sector directly and shocks transmitted through inter-sectoral linkages. CGE models rely on the constrained optimisation approach of standard microeconomic theory (eg. consumer theory, production theory). CGE models include more general specifications of the behaviour of consumers, producers and investors than those allowed in I-O models. In particular, they make specific assumptions about the availability of factors of production - to what extent their supply can be increased, and to what extent there is an excess supply of some factors (as with unemployment of labour). Substitution possibilities are incorporated reflecting the sensitivity of the behaviour of agents in the model to changes in relative prices as well as quantity variables.

Microeconomic theory provides the general structure for the behavioural assumptions used in the CGE model. These are incorporated into the model using empirical information in the form of behavioural parameters (eg. income elasticities and price elasticities of demand). Not every sector need be modelled in terms of optimising behaviour. The government and foreign sectors especially are often given a less systematic treatment. The parameter setting may be done on the basis of econometrics, literature search, expert opinion or judgement.

Equilibrium Conditions

For a relationship to qualify as an equilibrium condition it is necessary that deviations from it should not persist through time. If this criterion is satisfied, then, given time to adjust to an external shock, we can expect to find the economy close to equilibrium. Whether a particular equilibrium condition is appropriate in a particular application depends on the time frame of analysis. Equilibrium conditions may be either sectoral or economy wide. Economy wide equilibrium conditions and other economy wide constraints create indirect linkages between sectors. The character of a CGE model depends to a great extent on these indirect linkages.

Exogenous Variables

The range of applications of a CGE model also depends on the external shocks that it can respond to (exogenous variables). These may include tax and subsidy rates, government outlays, export demand, technological change, changes in visitor expenditure etc.

Exogenous variables typically include:

- policy variables (eg. Public Sector Borrowing Requirement)
- variables governing conditions in the rest of the world (eg. world interest rates)
- variables associated with labour and capital markets (eg. aggregate employment, rate of technological

change, economy wide rate of return on capital)
- variables relating to size and composition of visitor expenditures
- details about particular industries (eg. current levels of output, employment, industry mix).

Economic Environment

Outside of the model a detailed scenario (or economic environment) is compiled about likely developments through the forecast period in variables which are exogenous for the forecasting simulations. The economic environment consists of assumptions made about economic aggregates or which apply across the economy as a whole (eg. real wage levels, labour and non-labour tax rates, the trade balance, government borrowing levels and so on) and assumptions at the firm or consumer level (eg. about supply response of firms, substitution among inputs, demand for particular exports, the competitiveness of imports and so on). CGE models can make explicit assumptions about government policy settings. Governments can spend, but if they do they must raise taxes (or debt) and this means that other actors in the economy, consumers and firms, must spend less; this in turn has economic effects. CGE models can incorporate a more realistic set of economy wide constraints on the supply side of the economy. They also recognise that the economy is linked to the rest of the world via a foreign exchange market; when the demand for exports increases, the exchange rate rises, discouraging other exports and encouraging imports.

CGE modelling techniques and software systems are now routinely available. CGE models can either be quite basic, incorporating a few sectors and the links between them, or very detailed. Models may be used for static, comparative static, dynamic or comparative dynamic analysis and can be formulated at a number of spatial levels including single-country models with only top-down regional disaggregation such as ORANI or MONASH (eg. Adams & Parmenter 1991); stand-alone models of regional economies (eg. Meagher & Parmenter 1990); multi-regional bottom-up models such as MONASH-MRF (Peter 1994) and Federal (Madden 1996), and multi-country models (eg. Hertel 1997). There is fertile ground here for the application of such models to tourism growth including that involving multi-destination markets.

Acceptance of CGE Analysis in Other Sectors

Within most economies worldwide, tourism is lagging in the sense that it is one of the few sectors in which there is still considerable reliance on superseded techniques of economic evaluation. In Australia, CGE Analysis is extensively used in simulating the effects of shocks on different industries. Its first major use was in analysing tariff protection; in particular to model the effects throughout the economy of reducing tariffs. Since then it has been used for analysing the economy wide effects of microeconomic reform. There are many examples of practical CGE applications. The debate over tax reform which took place in Australia in 1999/2000 provides one good example of the uses to which CGE models are being put. Models were used by various interested parties to examine the effects of the Goods and Services Tax; the "battle of the models'" was an effective way of narrowing down the range of assumptions adopted. Significantly, Input-Output based models were dismissed early on in the debate as inadequate. CGE models have also been used to examine the effects of quite specific projects, such as the City Link private toll road project in Melbourne (Allen Consulting Group).

These days, the main authorities responsible for providing economic advice to governments in Australia, such as the Productivity Commission, would expect any claims of effects on economic activity of some change, made by opponents or proponents, to be made on the basis of analysis employing a CGE approach. This is also true of agencies with control over the purse strings, such as Finance departments. State treasuries are now familiar with CGE analysis, and often expect evaluations of changes to economic activity to be assessed on this basis. Some have been developing their own in-house capabilities in analysis, while others have been relying on research centres and consultants. Considerable consulting expertise now exists, and some consulting organisations and research centres, including the Centre for International Economics, and the Monash Centre of Economic Policy Studies have been pioneers of the application of CGE analysis, including to tourism (CIE 1988, Adams & Parmenter 1991). In particular, the Monash Centre of Policy Studies, is an international leader in the development of CGE models Internationally, CGE models are being used by researchers and private and public sector agencies to explore a variety of issues affecting different economies. CGE analysis is being employed to explore the economic impacts of policy initiatives and frameworks and broader changes as diverse as hazardous waste management, trade liberalisation, tariff protection, environment-economy interactions, structural adjustment, agricultural stabilisation programs, technological change, labour market deregulation, financial market deregulation, taxation changes, macroeconomic reform, economic transition, international capital linkages, public infrastructure, and industry sector studies (Dixon & Parmenter, 1996; Yao & Liu 2000; Harrison, Jensen, Pedersen & Rutherford 2000). With a few exceptions, tourism researchers seem to be relatively unaware of this extensive and evolving CGE modelling literature with its potential to inform impact analysis and policy making in their own field.

CGE Modelling in Tourism

CGE analysis has broad applicability in tourism as a tool for impact and benefit analysis. Whenever the objective is to determine how a change in the tourism sector, or a change affecting it, will impact on overall economic activity or output, and on particular aspects of the economy, such as employment or imports, CGE analysis can be used. Some types of issues which can be explored using CGE analysis are as follows:

- What impact will a change in domestic or international tourism, have on economic activity in a country or region? What impact will an increase in outbound tourism have on activity in the home country?
- What impact on economic activity within a state will intrastate tourism have?
- What impact on state or national activity will a special event, such as a Formula One Grand Prix or a music festival in a small town, have?
- How will a tourism specific tax, such as a bed tax, affect economic activity?
- How will a general tax change, such as the introduction of a Goods and Services Tax (GST) or Value Added Tax (VAT), impact on the tourism sector and on output generally?
- How will changes in international aviation regulation impact on tourism activity and activity in the economy as a whole?
- How will tourism crises, such as that of September 2001, impact on the economy?

This is not an exhaustive list; rather it is a sample of the types of issues which can be handled using this type of analysis. Granted that models are available, the main problem is how to incorporate the changes being considered in the context of the model. Most models do not have a "tourism" sector as such, but they do have the industries which constitute the tourism sector (accommodation, transport etc). It is then a matter of specifying what the tourism sector consists of, and then setting out how the change being considered will impact on the components of this sector.

The Australian Experience of CGE Modelling in Tourism

Over the past decade or so there has developed a considerable body of work applying CGE analysis to tourism questions in Australia. Indeed there is much more CGE analysis in tourism in Australia than in any other country. This is in part a reflection that Australia has been a world leader in developing this type of analysis. The IMPACT project, begun in the 1970s, led to the development of the ORANI and MONASH models are at the frontier of this branch of analysis (Dixon, Parmenter, Sutton & Vincent 1982; Dixon & Parmenter 1996). Thus, in 1988/89, when the IAC investigated Travel and Tourism, it was natural that it sought to measure the impact of tourism on the economy using a CGE model (IAC, 1989a, 1989b). At least one submission to this inquiry, from Qantas, which was prepared by the Centre for International Economics, also used a CGE approach to analyse the issues it was concerned about (CIE, 1988).

In the early 1990s the Bureau of Tourism Research commissioned CGE analysis of the economic impact of tourism, using the ORANI model (Adams & Parmenter 1992). Since then, there has been considerable work done using a CGE framework. Skene explored the impacts of tourism on employment using CGE approaches (Skene 1993a, 1993b). The successor body to the IAC, the Industry Commission, also explored the impacts of tourism on the economy using the ORANI model (Industry Commission, 1996a, Appendix B). The effects on individual states have been explored using state-wide CGE models (Madden & Thapa 2000). Much of the analysis that has been carried out to date has examined the effects of changes in tourism flows (for example, the effects of an increase in inbound tourism). Recently, the effects of the post-September 2001 tourism crisis on the economy were modelled by Econtech, a private modelling consultant, for the Tourism Industry Working Group (TIWG 2001). The Queensland Government Treasury has developed a CGE modelling capability to examine the contribution of tourism expenditures to the Queensland economy (Woollett, Townsend & Watts 2001). The approach can be used to examine many other types of change. So far, the CGE approach has not been used very often to examine the economic impact of events; important exceptions to this have been the evaluation of the impacts of the Formula 1 Grand Prix by the Industry Commission (1996b) and the evaluation of the Sydney Olympic Games on the NSW economy (CREA and NSW Treasury and CREA 1997).

Earlier work on tourism's contribution to the Australian economy can be categorised in terms of the different underlying assumptions made with respect to (i) the workings of the labour market, and (ii) government policy settings.

Assumptions about the labour market have included: no skills shortages in tourism or related industries (IAC 1989, CIE 1989, Adams & Parmenter 1991); labour shortages resolved by increased real wages to occupations in short supply (IAC 1989); real wage increases paid only to some occupations in short supply (IAC 1989); money wages fixed in all occupations (Skene 1993a,b); real wages fixed for all occupations (Skene 1993a,b). The simulations indicate that the effects of an increase in inbound tourism expenditure on a host destination will depend importantly on the wage setting environment characterising its labour markets. When there are no skills shortages, an elastic supply curve of labour implies minimal upward pressure on wages allowing greater

expansionary impacts on income and employment. Given that destinations often face skills shortages in tourism related occupations, the expansionary impact of increased tourism demand will be reduced. Increases in wage rates in some occupations and increased prices in traditional exports and import competing industries, coupled with exchange rate appreciation, can reduce economic activity in other sectors, resulting in lower overall economic gains from the increase in tourism demand.

Assumptions about government policy have included: no excess capacity in factor markets, PSBR constraint (Adams & Parmenter 1991); excess capacity, PSBR constraint (Adams & Parmenter 1991); excess capacity, domestic absorption constraint (Adams & Parmenter 1991); PSBR fixed with real government expenditure fixed (Skene 1993a,b); PSBR endogenous with tax rates fixed (Skene 1993a,b). The studies show that if wage increases are constrained, and extra labour used would otherwise have been unemployed, the types of 'crowding out' effects as noted above are less substantial. Thus Skene (1993b) employed the assumption of fixed real wages under two policy settings: where government borrowing is fixed and where it is endogenous. With real government borrowing fixed, any projected changes in government revenue and expenditure have direct implications for tax rates on labour and non-labour incomes. Average tax rates are projected to fall, stimulating economic activity and generating employment. With real government borrowing taken to be endogenous, and government spending fixed, the expansionary impact on employment and GDP is much smaller.

These studies also indicated that tourism growth affects the industrial structure of host economies. Thus, expansion results in the service industries catering directly to tourists (eg. air transport, hotels, restaurants, entertainment/leisure, retail trade) and also in those industries indirectly supplying tourism related activities (aircraft maintenance and construction, suppliers of investment goods to the tourism industry). Industries which decline in the face of additional tourism growth are those that have a large proportion of exports in their sales and/or face considerable import competition. Non-tourism exports which experience a decline include agriculture, mining, food and metals processing, as do import competing industries such as transport equipment, chemicals, textiles, clothing, footwear (Adams & Parmenter 1993, 1995). These industrial effects explain why a given percentage expansion of tourism in each state will have different effects on the growth prospects for those states. This is mainly due to variations across the States in the composition of their industrial activity. The results depend on different commodity compositions of tourism expenditure across States, differences in the industrial composition of Gross State Product (GSP) and local multiplier effects (Adams & Parmenter 1993).

These results could not be produced by conventional I-O models that omit crowding out mechanisms. They highlight the potential of CGE modelling to produce results that are unlikely to be anticipated without the aid of the model.

Experience in Other Countries

CGE models have been used to study the economic contribution of tourism to the USA (Blake, Durbarry, Sinclair & Sugiyato 2000), the economic impacts of tourism in Spain (Blake 2000), in Indonesia (Sugiyarto, Blake & Sinclair 2002) and in Hawaii (Zhou, Yanagida, Chakravorty & Leung 1997). More recently, Blake, Sinclair and Sugiyarto (2002) apply CGE analysis to estimate the effects of Foot and Mouth disease on tourism expenditure and its economic impact in the UK.

In doing this work, a number of problems have had to be resolved. One of these is how to incorporate tourism into a model, which has no specific “tourism” industry. In much the same way that synthetic tourism satellite accounts are developed, a tourism sector, buying from other industries, is set up within the model. The developments over the past decade have yielded models which have resolved the main difficulties, and which can be applied with confidence to tourism questions.

Chapter 5

The STCRC Economic Modelling Project

Modelling Tourism to New South Wales: An Initial Study

Initial work under the project involved the adaptation of a multi-regional computable general equilibrium model, M2R, which was itself an adaptation of the standard MONASH Multi-regional Forecasting (MMRF) model to measure and analyse the economic contribution of tourism to the NSW state economy. The CGE model was created by incorporating 12 "dummy" tourism industries in each region into an existing model that captures in detail the behaviour of producers in 50 standard industries and a representative consumer household in each of the two regions (NSW and the RoA), and of exporters, importers and investors and two tiers of government (Madden & Thapa 2000).

The main result on the overall economic contribution of tourism to NSW was that the estimated total of $14 billion of direct tourism expenditures in 1998 from overseas, interstate and intrastate, contributes about 7% of NSW gross state product (equivalent to about $13 billion). The contribution to NSW real household consumption was an increase of 6.6% ($7.7 billion) and the contribution to NSW employment a 7.4% increase or about 250,000 jobs. The study found that the boost to the NSW economy from tourism came mainly from inter-state tourism into NSW. The contribution of inter-state tourism into NSW was about 1.5 times more than the contribution of overseas tourism, even though the direct expenditures of overseas tourists in NSW was estimated to be 17% higher than the direct expenditure of inter-state tourists to NSW. It was also found that an increase in *intrastate* tourism would provide a significant short-run boost to NSW activity and employment, whatever the level of substitution between tourism products by destination. The degree to which the positive economic impact is sustained in the long-term, however, depends critically on the degree of substitution of intrastate tourism for interstate travel by NSW residents.

The simulations indicated that the boost to the NSW economy from NSW-destination tourism came at the expense of the other states and territories in Australia. Real state gross output (GSP) in RoA was 4.1% lower and real household consumption 3.2% lower due to the expenditure made by all three categories of tourists in NSW. The largest negative inter-regional effect was due, as expected, to the expenditure made by inter-state tourists who travel to NSW. The tourism expenditure they incurred in their visits to NSW destinations lowered real GSP in the RoA by 4.1%, and decreased real household consumption by 3.2%. This was the result of expenditure being diverted away from their region to NSW. Moreover, the effect of the volume of overseas tourism into NSW was not benign on other regions. Real state GSP, real household consumption and even employment were all lowered in the RoA mainly because resources were pulled into NSW from the other regions.

The study also showed that while many NSW industries have higher employment as a result of tourism to NSW, some mining and metal products industries are squeezed by the real exchange rate effects of overseas tourism. The industries with the largest positive employment effects are those which experience substantial direct purchases by travellers, particularly Hotels and Air Transport.

Modelling Tourism to New South Wales: Recent Results

In 2002, the M2R model was extensively revised and redesignated as the M2RNSW model. (For discussion of the model and its assumptions see Appendix A.) The model was adapted to take account of the new tax system in Australia, especially the introduction of the GST. The way in which the tourism sector is handled in the model is also being refined to allow for explicit treatment of categories such as Australian outbound tourism. Since the earlier model was developed, the Australian Tourism Satellite Account (TSA) has been published and the updated model has been made consistent with the TSA.

The Context

In 2000, approximately 4,946,000 tourists visited Australia, pumping foreign exchange equivalent to A$15.4 billion into the economy. Tourism to Australia has been increasing at 9.6 per cent per annum over the past decade and is forecast to increase by 6.6 per cent annually until at least 2010. Export earnings generated by tourism are projected to grow by an average 6.8 per cent to $29.6 billion in 2010 in 2000-01 dollar terms (Tourism Forecasting Council, October 2001).

The State of New South Wales (NSW) is visited by around two thirds of all inbound tourists. In the year 1999/2000 2,517,000 numbers of inbound tourists visited New South Wales for at least one night and spent A$4.5 billion in the State. Domestic tourism to New South Wales in 1999/2000 was comprised of 18,330,000 intrastate visitors, and 7,463,000 interstate visitors. In total, domestic visitors to the State spent $14.7 billion.

The state capital, Sydney, which hosted the Olympic Games 2000, is Australia's largest city and major tourism gateway.

The base year for the simulations undertaken in this study was 1998. The base employment for New South Wales for that year is 2,862, 942 jobs, one-third of total employment in Australia of 8,596,209 jobs. Base Gross State Product was $1,403,160,000 million.

Types of Simulations

The following simulations were undertaken:

- The effects of a ten per cent increase in the world demand for Australian tourism.
- The effects of a ten percent increase in international tourism to New South Wales - with no change in travel to the RoA.
- The effects of a ten percent increase in interstate tourism to New South Wales where the increase replaces:
  - (i) domestic travel in the RoA and travel overseas; and
  - (ii) expenditure on other goods and services in RoA.
- The effects of an increase in intrastate tourism in New South Wales, where the increase replaces:
  - (i) travel by NSW residents to other States; and travel overseas;
  - (ii) spending on other (non tourism) goods and services from all sources.

Table 1 provides a summary of the maximum impacts of the set of simulations for each type of tourism increase. The table shows key impacts for New South Wales, for the RoA and for (total) Australia (NSW plus RoA). Only the short run results appear here. These short run simulations assume that industry capital stocks are fixed and that there are no changes in industry investment.

Table 1. Summary of maximum impacts on New South Wales and RoA of simulations of ten percent increase in tourism, short run, 2000-01

Source of Increased Tourism Expenditure		Increased Tourism Expenditure	Impact on Real Gross State Product		Impact on Employment	
		A$ million	A$ million	per cent	jobs	per cent
Intrastate tourism in NSW substituted for NSW tourism to RoA	NSW RoA Australia	1,032 -1,032 0	734 -615 119	0.308 0.142 0.018	11,238 -10,891 347	0.369 -0.179 0.017
Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S	NSW RoA Australia	540 0 540	382 -210 172	0.160 -0.049 0.026	6,111 -3,772 2,338	0.201 -0.062 0.032
Interstate tourism to NSW with full substitution from intra-tourism in RoA	NSW RoA Australia	540 -540 0	322 -383 -60	0.135 -0.089 -0.009	4,992 -6,672 -1680	0.164 -0.110 -0.012
International tourism to NSW	NSW RoA Australia	636 0 636	364 -121 244	0.153 -0.028 0.107	6,012 -2,736 3,276	0.197 -0.045 0.042
Intrastate tourism in NSW substituted for other goods and services	NSW RoA Australia	1032 0 1032	354 168 522	0.148 0.039 0.078	4,998 3,696 8,694	0.164 0.061 0.098
International tourism to Australia	NSW RoA Australia	636 1,074 1,710	249 471 718	0.104 0.109 0.107	3,666 8,013 11,679	0.120 0.132 0.128

In the short run simulations undertaken, the most expansionary government policy stance is that where the (Federal and State) government budget deficits are fixed and income and payroll tax rates can vary. These results appear in Table 1. The fall in average tax rates in these simulations results in the largest increases in real household disposable income and real household consumption, leading to the largest increase in employment and the largest change in real GDP.

Interestingly, the greatest gains in State GSP and employment are associated with an increase in intrastate tourism by New South Wales residents, where the additional expenditure replaces that which would otherwise

have been spent on interstate tourism by New South Wales residents to RoA. In the simulations undertaken, Real GSP in the State increased by 0.308 per cent while employment increased by 0.369 per cent. The next highest impact markets are, in order, interstate tourism (with full substitution from RoA expenditure on other goods and services), international tourism to New South Wales, and intrastate tourism by State residents, where the additional substitution replaces that which would have been spent on other goods and services, and finally interstate tourism to New South Wales (with full substitution from tourism in RoA). International tourism to Australia is associated with the smallest effects on the State, with impact on GSP and employment of 0.104 per cent and 0.120 per cent respectively.

Since the base volume of tourist expenditure is different for each origin market the assumed ten per cent increase in tourist expenditure implies different increases in tourist expenditure in New South Wales. The initial expenditure changes, which range between $540 million for the interstate tourism market, $636 million for the international tourism scenarios, and $1,032 million for the intrastate scenarios, are shown in Column Two of Table 1. To provide a more meaningful comparison of the differential impacts of expenditure injections from the different origin markets we can estimate the economic impacts on the State of a one million dollar change in tourist expenditure. The estimates are set out in Table 2, which provides a summary of the maximum impacts of the set of simulations for each type of tourism increase for the short run.

Table 2. Economic impacts of $1 million increase in tourist expenditure by origin market, short run, 2000-01

Source of Change in Tourist Expenditure		Increase in GSP /GDP per $1 million Increase in Tourism Expenditure	Increase in Employment per $1 million Increase in Tourism Expenditure
		$ Million	Jobs
Intrastate tourism in NSW substituted for NSW tourism to RoA	NSW Australia	0.711 0.115	10.89 0.34
Interstate tourism to NSW substituted for other G&S	NSW Australia	0.707 0.319	11.32 4.33
Interstate tourism to NSW substituted for tourism in RoA	NSW Australia	0.597 -0.111	9.24 -3.11
International tourism to NSW	NSW Australia	0.572 0.383	9.45 5.15
International tourism to Australia	NSW Australia	0.393 1.289	5.76 18.36
Intrastate tourism in NSW substituted for other G&S	NSW Australia	0.343 0.506	4.84 8.42

Table 2 reveals that a one million dollar increase in tourism expenditure in New South Wales from intrastate tourism, substituted for RoA interstate tourism, or a similar increase in interstate tourism to NSW, substituted for RoA expenditure on non-tourism goods and services, have the greatest impact on GSP and employment in the State at A$711,000 in GSP and 10.89 jobs and A$707,000 in GSP and 11.32 jobs respectively. The next highest impact market interstate tourism substituted for intra-tourism in RoA (A$597,000 and 9.24 jobs). The next largest gains in GSP and employment come from international tourism to New South Wales (A$573,000 and 9.45 jobs). Interestingly, the second smallest job creating tourism market for the State (but not for the nation) is international tourism to Australia. At A$393,000 GSP and 2.14 jobs created per one million dollars expenditure this is below the impact of intrastate tourism with full substitution from other goods and services at A$343,000 and 4.84 jobs).

Overview of Results and Issues for Further Research

The simulation results indicate that the economic impacts of an increase in tourism to New South Wales depend upon key macroeconomic variables including the wage setting environment, the aggregate level of employment, and the government fiscal policy stance. The results also differ according as to whether a short-run or long-run perspective is taken.

In the short-run, the simulations indicate that the most favourable context for economic impacts are a fixed income real wage, fixed national employment and a fixed government budget deficit (allowing for variation in the income and payroll tax rates). In the long-run, with flexible real wages assumed, the most favourable context

for economic impacts are: fixed national employment, assumed fixed state unemployment rates, a variable state labour supply and population accommodated by interstate migration. Further research is required to determine which assumptions about macroeconomic variables best accord with reality.

The results are set out in detail in Appendix B. They may be summarised as follows:

- Both the intrastate and interstate tourism markets are potentially important generators of income and jobs for New South Wales. The impacts from the intrastate markets depend upon extent to which growth in intrastate tourism replaces tourism in RoA. Increases in interstate tourism, however, are associated with relatively large economic impacts on the State regardless of whether the substitution relates to other tourism or to (non-tourism) goods and services.
- Depending on what is given up by intrastate tourists to finance their trip, intrastate tourism may have greater impacts per dollar expended than the more emphasised 'glamour' markets of international and interstate tourism. Further research is needed to determine the extent to which expenditure on both interstate and intrastate tourism represents substitution from intrastate tourism in RoA or from other goods and services foregone.
- In terms of the impacts per visitor, New South Wales GSP and employment gain most from intrastate visitation, provided the expenditure is sourced from RoA tourism expenditure foregone (that is from NSW tourists choosing to travel within NSW rather than to the RoA). Next is the increased interstate tourism from the RoA to NSW. This implies that promotional spending in domestic tourism markets may have greater cost effectiveness than international marketing expenditure. Of course, decisions to allocate resources between different types of tourism promotional programs require, among other things, knowledge of the relevant elasticities of promotion. Further research is required on this.
- The results also have implications for government support of programs designed to promote greater domestic tourism such as the "See Australia" program. The simulations indicate that increased tourism to New South Wales from interstate can generate substantial economic impacts for that state but can adversely affect GSP and employment in other states and territories. The economic impacts of such programs on a given state will depend upon its industrial structure, and the proportion of a state's population that visit within, and outside that state. The extent of gains will also depend upon what domestic tourists give up to finance their trips. These issues have been neglected in the research literature to date.
- From an Australia wide perspective, expenditure by international tourists creates more GDP and employment, supporting the allocation of scarce resources into the marketing of Australia internationally. However, the modelling suggests that positive economic impacts from changes in domestic tourism occur at the national level as well. For example, in both of the short-run intrastate scenarios, and in one of the two short-run interstate scenarios (where the increased tourist expenditure replaces expenditure on goods and services in the RoA) there were positive GDP and employment effects for Australia as a whole. In the long-run the modelling all of the intrastate and interstate scenarios had positive impacts on GDP for Australia as a whole (total employment at the national level is determined by macroeconomic and labour market structure in the long-run scenarios and does not change). These outcomes were not dependent on any switching of Australian outbound tourism by Australians into domestic tourism. This could provide further positive economic impacts, which will be examined in a future study.
- In the short run, the greatest gains to the New South Wales economy, per dollar of additional tourism expenditure, are associated with domestic tourism (except in the case of intrastate tourism which replaces expenditure by NSW residents on other goods and services). From the perspective of Tourism New South Wales, it may well be more cost effective to allocate resources to generate additional domestic tourism rather than to cooperative marketing of Australia as a destination.
- The greatest gains nationally, however, are associated with international tourism.
- Underpinning the above results are the changes in output and employment of industries as a result of changes in the amount and patterns of tourism expenditure. Industries in the State that experience the most positive growth in sectoral output and employment in both the short and long run, and irrespective of the origin of increased tourism expenditure, include Air Transport and Hotels. The simulations reveal that some industries decline as a result of the increased tourism, both in New South Wales and the RoA. The industries that experience a decline in output and employment tend to be export-oriented industries in the primary sector (eg. Mineral Ores, Brown Coal, and Oil), or import competing services such as Water transport and manufactured products (eg. Chemicals, Motor vehicles, Metal products, TCF and Wood products).
- The simulations reinforce the findings of Adams and Parmenter (1999) that some States that simply maintain their market share of a growing tourism market may experience a fall in their Gross State Product and overall employment, depending on the composition of their industry. Once this result is

more fully appreciated by state tourism authorities it is likely to produce additional pressures on cooperative marketing arrangements (Dwyer 2003).

- The findings are of a preliminary nature and further research is needed before full confidence can be placed on them. At the same time, further analysis of the validity of the assumptions is called for. Further discussion is needed to determine which of the different assumptions underlying the simulations are most robust in reflecting the context in which an economy actually works. We need to ensure that these assumptions reflect as accurately as possible the realities of the macroeconomic environment.
- The simulations undertaken illustrate that when one wants to quantify the impact of growth in visitor expenditure on a host economy, one must first define the key features of the economy on which the impact is to take place. Only some of the results of different simulations have been shown here. Overall, the results show that impact of higher visitor spending can be highly sensitive to the assumptions one makes about the economy. Assumptions about macroeconomic settings appear to have much greater impact on the net results than do the precise size or composition of changes in visitor spending. In other words, the results illustrate that the extent of real medium to long-term gains depend on how the initial gains are used.

Chapter 6

Economic Evaluation of Events Using CGE Models

Evaluation of Events

The value of the CGE approach in analysing tourism issues can be demonstrated through applying it to evaluating special events. One of the first applications of the model developed under the STCRC project has been to consider two realistic, though hypothetical events. These are based on real life events that took place in Victoria. The economic impacts on NSW of events with the same expenditure patterns were estimated using both the CGE and Input Output approaches. The CGE model estimates much smaller economic impacts than the Input Output model.

Economic evaluation of events has invariably been carried out using I-O models. Estimates are made of the increase in expenditure that an event brings to a region, and these are used to calculate the impacts on economic activity (output, jobs etc). Normally, the impact on output is estimated as being well above the initial expenditure injection; typically it will be about twice the injection. These event evaluations are often commissioned by promoters wishing to gain government support for an event, and sometimes governments undertake studies when they are determining whether to support an event. The high positive impacts on output and jobs are always a selling point for the event.

The problems with using I-O models in the events context are very much the same as encountered in other contexts. Because the negative impacts of the event are ignored, the estimated impact on output is grossly excessive. While CGE models are now being used increasingly in the assessment of tourism's economic impacts, they have not yet been used extensively to evaluate events. There are some important examples of their use- for example the analysis of the Formula 1 Grand Prix by the Industry Commission (1996b) and the study of the Sydney Olympics done by the NSW Treasury and the Centre for Research in Regional Economics (NSW Treasury and CREA 1997). It is a matter of time before the technique is used much more extensively.

CGE model will give a smaller, but much more accurate, assessment of the impact of an event on output than an I-O model will. However, its advantages go beyond this. Because it is a much more comprehensive model of the economy, a CGE model will provide a lot more information on a range of different impacts, such as on tax revenues. Many CGE models can be used without adaptation to study events. However, some modifications can be made which make it easier to simulate events and can improve the accuracy with which the model captures the special characteristics of an event. The modifications made to the model by the team will be described briefly.

CGE analysis can, in principle, be applied to all types of events, small and large, local and economy wide. The level of disaggregation of the model used determines the extent to which local effects can be estimated. If the lowest level of disaggregation is a state, it will be feasible to estimate the effects on the state of an event that takes place in a rural city, though not the local effects on that city. The size of the event makes no difference to the appropriate technique for analysis- small events draw resources away from other parts of the economy, just as large events do, and so CGE analysis is the correct technique for evaluation. It is always necessary to consider both positive and negative effects of an event on the economy, including the small events.

Additional Perspectives from the CGE Approach

One advantage of the CGE approach is that it uses a much more comprehensive model of the economy, and thus it is capable of estimating a much wider range of impacts and aspects of the event. The traditional approach to event evaluation is simply incapable of providing estimates of these impacts.

The Choice of Jurisdiction

The CGE model used in the project has been developed thus far for application to the state of NSW, the RoA, and Australia as a whole. Other models exist which explicitly model each of the state economies, though they do not include detailed tourism sectors. It is feasible to estimate impacts on a state of an event taking place within its borders, the impact on other states, and the impact on the Australian economy as a whole. CGE models do not normally exist for local areas or rural cities. Thus it will not be feasible to use the CGE approach to estimate the local impacts. When the area is distant from the centre of economic activity in the state - for example a rural city some distance from the main city - then the local effects can be estimated using I-O analysis. I-O analysis will give a tolerably accurate estimate of the change in economic activity in a region. This estimate must be used with caution since much of the additional activity is created by labour and services which temporarily move to the event location - the impact on the local economy will be smaller than the estimated overall addition to

economic activity in the region. This would not be an option for estimating the local effects of an event taking place within the main centre of economic activity (say, within Sydney, Melbourne or the Gold Coast) – however. I It is not clear what local effects would mean in this context, since a suburb in which an event takes place is inextricably linked to the city's economy. There is no "local economy" in any real sense.

For most policy purposes, the state level is a low enough level of disaggregation. Except for very small events, events are usually approved by sought by and subsidised by state governments. These governments are interested in the state wide impacts of the events. They may sometimes be also interested in the local impacts of events that take place in rural economies, given their interest in rural development- however, if they are, they will also be interested in the impacts elsewhere in the state and on the state as a whole. The impact on economic activity in the state will be typically much smaller than the local impact on a rural area because resources and activity will be drawn from the rest of the state into the area hosting the event, thereby reducing output and jobs elsewhere. CGE models can estimate the state wide impacts which I-O analysis is unable to estimate accurately. A national government might also be interested in the impact of events (especially the larger ones) on the national economy. The impact on the national economy will normally be significantly smaller than the impact in the host state, again because resources are drawn away from other states to the host state, thus reducing economic activity in other states. Because of the negative impacts on other states, the national government may be much less enthusiastic about events (which, to a significant extent, may reallocate economic activity between states rather than add to economic activity) than state governments might be.

Regional and National Impacts

As noted above, a multi regional CGE model, such as developed under this project, is capable of examining the impacts of an event on the home state, other states and the nation. The CGE approach can also estimate the impact of intrastate visits to the event- these are ignored by I-O models. Intrastate patronage of an event can have an impact on economic activity in that state because it results in a change of spending patterns within the state. The overall impact on activity is not likely to be large, but it is sensible to check whether this is so. The impact on specific variables, such as tax revenues, however, could be significant if different goods and services in the state are taxed differently.

Multi State Events

Some events, such as the Rugby World Cup, take place in more than one state. They encourage flows of visitors both into, and out of, a state. Because a multi regional CGE model incorporates several states, it is a simple matter to examine the impacts on a specific state, or on each of the states (host and non-host states) in the federation of the event. Since I-O models are effectively based on one jurisdiction (eg local area or state), and do not model what happens beyond that jurisdiction, they are not suitable for analysis of this type of event.

Tax Revenue Implications

CGE models incorporate governments' taxing and spending. Tax receipts depend on several aspects of economic activity- incomes, sales of specific goods, and profits. These will be affected both positively and negatively by an event. Using a CGE model it will be possible to estimate the impact on tax revenues, which an event will have. An I-O model is incapable of estimating the net tax impact of an event because it ignores the negative impacts on economic activity in some parts of the economy. Sometimes, event studies based on I-O analysis do purport to measure the tax implications - which of course are positive. These must be regarded as highly misleading - the net tax implications of an event could well be negative. In any case, the actual net increase in tax revenue will be much lower than as estimated using I-O techniques.

Event Subsidies

Events are often subsidised by governments. When this happens, tax revenues must be found to pay for the subsidies, or other spending must be reduced. How subsidies are financed will have an impact on economic activity within the state. With a CGE model, the implications of the options for funding the subsidies can be explored. I-O models are incapable of examining this aspect of events.

Inter-Industry Effects

When an event occurs, there will be industries that are positively affected by the event, but here will also be other industries that are negatively affected. Because the event draws resources away from other parts of the economy, it will lead to a reduction in some other industries. CGE models estimate how these other industries are affected (Dwyer, Forsyth & Spurr 2003) By contrast, an I-O analysis will only pickup the positive, and not the negative impacts of the event on other industries.

Differential Impacts of Interstate and Overseas Visitors

Not all sources of expenditure into a state have identical impacts. When overseas visitors come to an event, their expenditure has an impact on the exchange rate. The exchange rate is pushed up, and other export industries are negatively affected. This reduces economic activity in the host and other states. By contrast, when interstate visitors come to an event in the host state, there is no effect on the exchange rate- thus their expenditure has a different impact on the host state from that of overseas visitors' expenditure. The effect on the non-host states will also differ, since interstate visitors shift expenditure away from their home state to the host state, thereby reducing activity in their home state. These effects can be estimated using CGE models, however they are ignored in I-O models, which only recognise "injected expenditure" as a whole, and cannot recognise how different sources of expenditure can have different impacts.

Adapting CGE Models to Study Events

Just about any CGE model with an inter-industry sector can be used to study events. However, sometimes it is cumbersome to fit events into the framework, and it is possible to adapt the model to handle events more readily. It is also possible to provide more detail in them to enable more accurate estimates of impacts. These adaptations have been made in this CGE project.

Modelling the Multi State Economy

The impacts of an event on a state depend critically on how integrated that state is with the rest of the economy. Is the state essentially a separate economy, or is it simply a geographical slice of a broader economy? How integrated are labour markets? If an event pushes up the demand for labour, is this supplied by workers coming from interstate, or from within the state? Furthermore, if it is supplied from within the state, does the extra labour required come from other industries, bid away by higher wages, or from unemployment? When demand for goods and services is increased by the presence of the event, they can be supplied from within the state, from interstate, or overseas. If labour markets are highly integrated, an event will tend to have a large impact on economic activity in the state, as production in that state increases, but there will not tend to be a large impact on unemployment in the state, if the jobs go to migrants from interstate. On the other hand, if goods markets are highly integrated, the impacts on economic activity within the state tend to be smaller due to the 'importation' of products from interstate. The results in terms of impacts on economic activity within a state are sensitive to how the integration of the state's economy with the rest of the economy has been modelled. Clearly, it is desirable that this be done as realistically as possible.

Displacement Effects

The CGE approach recognises that when an event pushes up the demand for goods and services, this will push up prices, especially for items that are in short supply, and this will crowd out other activities, thereby lowering the net addition to economic activity. These displacement effects are particularly important in the events situations, given the fact that events tend to have a sharp but temporary boost to demand in a concentrated area. Many services, such as accommodation, cannot readily expand to match demand; prices are pushed up, and other demands are rationed away. It is easier for an economy to handle a 10% increase in accommodation demand if it is spread over the whole year and whole economy than if happens for one week in a specific area. The impact on economic activity is likely to be smaller in the latter case than the former because supplies are constrained. It is possible to adapt the model to test for this:

- By running the model for short periods, such as a week, rather than for a year, and having a much larger proportional shock to the economy coming from the event. This will make a difference if the model being used is not highly linear- it will not make a difference if the model is essentially linear (and a shock which is ten times the size of another shock will have exactly ten times the impact).
- By running the model with outputs of key services, that are expected to be in relatively fixed supply, such as accommodation, fixed to the level in the base case, or base case plus a predetermined margin of excess capacity.

Both these options were tested in the modelling of events.

Introducing an "Events" Industry

The model we have developed incorporates special "tourism" dummy industries. These reflect the expenditure patterns of different types of tourists, such as domestic business visitors and Interstate VFR visitors. The dummy industries buy goods and services from other industries and supply tourism services to visitors. This is a convenient means of modelling the impacts of different types of tourists. A further development of the model, to

enable it to handle events more readily, is to introduce "events" industry dummies. These treat events as new industries, buying goods and services, and labour, from other industries, and selling their services (tickets, sponsorship) to patrons. The expenditure and revenue patterns of an event can then be easily incorporated into the model.

Events Case Studies

Two events were analysed using the CGE model. Both are based on the expenditure patterns for real events, however the event demand shocks are applied to the NSW model (good data for New South Wales events were not available). The first case study, of a large event, modelled the impacts of holding an event with the characteristics and expenditure patterns of the Formula One Grand Prix, as held in Victoria. Visitor spending and event running costs were assumed to be the same as for the Victorian event, though the event was assumed to break even with ticket sales and sponsorship this assumption can be easily relaxed. A smaller, regional, event was modelled on the basis of the Motorcross event held at Benalla in Victoria.

Both case studies only considered the impacts of expenditure from interstate and overseas - i.e. the expenditure injected into the economy. This included expenditure in running the event, pro rated according to the shares of each source in ticket sales and sponsorship. Expenditure from within the state is normally ignored in I-O studies, and since one objective of these case studies was to compare results with those of I-O studies, this practice was adopted here. Since expenditure from intrastate can affect results, it would be more correct to include it, though it is not likely to make a large difference to the results on output and jobs. It would be a simple matter to include it.

The expenditure shock for both events included the expenditure of visitors from interstate and overseas, on both the event and associated services, such as accommodation. Expenditure by visitors on tickets was excluded, but an equivalent amount of expenditure on running the event was included. The expenditure associated with the Grand Prix type event totalled $51.25m, and the Motorcross event totalled $2.24m.

The simulations undertaken assumed the short run – i.e. that the capital stock was fixed. This is realistic granted the short duration of these special events. Labour supply assumptions are critical to results on economic activity. Two extremes were modelled. The first of these assumed that there was a fixed real wage, and an abundant supply of labour (from unemployment). The second assumed that there was a fixed level of employment within each state. This assumption corresponds to a state labour market in which increases in the demand for labour are met by wages being pushed up. As neither of these extremes is realistic, we averaged to results of the two cases to form a plausible scenario.

The comparison reveals that two major (related) types of information are gained by using CGE: (1) the impact of event related expenditure on output, GSP and employment in RoA, and (2) the adverse impacts on output, value added and employment in various industries, in the host State, or interstate, or both.

Results

The results from the simulations are summarised in Tables 3 and 4. Both CGE and I-O models were run, and the results from them can be compared. Only some of the key results are reported here – more extensive results are reported in Dwyer et al. (2003).

Table 3. Economic impacts, large event

Macro Variables **Total Shock $51.25m**	**NSW (IO)**	**RoA (IO)**	**Aus (IO)**	**NSW (CGE)**	**RoA (CGE)**	**Aus (CGE)**
Change in Real Output ($m)	111.957	8.109	120.066	62.638	-17.552	45.086
Change in Real GDP/GSP ($m)	38.904	4.362	43.267	22.135	-8.438	13.697
Change in Employment (No of Jobs)	521.146	70.713	591.859	367.107	-148.416	218.691

Table 4. Economic impacts, small event

Macro Variables **Total Shock $2.24m**	**NSW (IO)**	**RoA (IO)**	**Aus (IO)**	**NSW (CGE)**	**RoA (CGE)**	**Aus (CGE)**
Change in Real Output ($m)	4.309	0.455	4.764	2.4933	-0.815	1.678
Change in real GDP/GNP ($m)	1.633	0.248	1.881	1.044	-0.354	0.690
Change in Employment (No. of jobs)	22.387	3.597	25.984	16.773	-5.670	11.103

Relative Size of Impacts

It is clear from both the tables that the estimated change in output (GSP/GDP) is much smaller for the CGE simulations than for the I-O simulations. This is to be expected. If anything, the CGE results may be on the high side, allowing, as they do, a strong response in terms of additional labour coming into productive activities.

Interstate Impacts

The negative impacts of these events on the RoA economy is evident from the table. Only CGE simulations are able to pick these effects up- while numbers are reported for the I-O simulations, they do not mean very much, since this technique only records the positive impacts outside of the host state (e.g. from additional demands for goods and services of other states from the state hosting the event).

The negative impacts on other states come about because of :

- The switch of expenditure from the RoA into New South Wales as interstate visitors attend the event, and
- The increase in demand for resources, such as labour, bidding resources away from other states, reducing economic activity in them.

Inter-Industry Effects

The more comprehensive results, reported in Dwyer, Forsyth and Spurr (2003), indicate that several industries are negatively impacted upon by the events. Some industries show increases in activity- this is especially true of industries that are directly related to the event, such as road transport and accommodation. Other industries are negatively impacted upon; these include industries which are competitors in export markets for tourism and events- including agricultural and mining industries, and to a lesser extent, some manufacturing. The patterns of impacts are fairly similar for both events, though there are some differences. For example, air transport is negatively affected by the Motorcross event (travel to which would mainly be by road), but positively affected by the Grand Prix event.

It is possible to obtain estimates of inter-industry effects using I-O techniques, however the results have little meaning. All of the impacts are either positive or zero, as expected, granted that all the technique is incapable of capturing any negative effects.

Relative effects of interstate and overseas visitor expenditure

The different impacts of interstate and overseas inbound visitors can be analysed using CGE analysis. We would expect different impacts partly because the expenditure patterns of the two types of visitor are different, and because the impacts on expenditure in the RoA will be different (interstate visitors funding their visits by reducing their expenditure at home). These issues are explored in Table 5, which breaks up the CGE results reported in Table 3 into results for interstate and inbound overseas visitors. Results for the large event only are reported- there would be similar results for the small event.

Table 5. Differential impacts of inbound and interstate expenditure

	Inbound	Interstate	Total
Expenditure Shock ($m)	22.769	28.481	51.25
Impact on NSW			
GSP ($m)	8.242	13.893	22.135
Employment	131.027	236.079	367.107
GSP Multiplier	0.362	0.488	0.432
Employment Multiplier	5.755	8.289	7.163
Impact on Rest of Australia (RoA)			
GSP ($m)	– 2.951	– 5.487	– 8.438
Employment	– 67.279	– 81.137	– 148.416
GSP Multiplier	– 0.130	– 0.193	– 0.165
Employment Multiplier	– 2.955	– 2.849	– 2.896
Impact on Australia			
GDP ($m)	5.291	8.406	13.697
Employment	63.749	154.942	218.691
GDP Multiplier	0.232	0.295	0.267
Employment Multiplier	2.800	5.440	4.267

The impacts on New South Wales do differ, with the multipliers associated with interstate expenditure being greater than those with inbound expenditure. This is probably the consequence of different expenditure patterns. As expected, the impacts on the RoA of interstate expenditure are negative and larger in absolute size than the impacts of inbound expenditure. This is partly because of the switching effect - interstate visitors switch out of expenditure at home to fund their visits. However, significantly, there is a strong negative effect of inbound tourism to New South Wales on the RoA. This is not a result that a typical I-O study would pick up. It comes about as a result of the impact on the exchange rate of additional tourism exports, which would have the effect of discouraging the export of other goods and services from the RoA. Further, as economic activity increases in New South Wales, granted the limited nature of resources, the supply of resources and economic activity in other states will fall.

A Perspective on Event Evaluation

The results described here show that the conventional approach to event evaluation, based on I-O models, gives highly inaccurate results. Many observers are sceptical of the large boosts to economic activity that events are often claimed to have (see ACT Auditor General, 2002). This scepticism is well placed - these results are only obtained by using a fundamentally flawed technique that ignores all the negative impacts on the economy Dwyer, Forsyth & Spurr 2003b). Given the ready availability of CGE models, and the relative ease with which they can be adapted to evaluate events, there is no longer any reason for relying on defective methodologies.

A further advantage of the CGE approach, which has been highlighted here, is that it provides much more information on how an event impacts on the host region, and elsewhere. It also provides estimates of impacts on other industries and on tax revenues. Critically, a multi-region model such as the one used here enables us to evaluate the impact of an event on the host region, on non-host regions and the nation as a whole. Typically, the economic impact of events will be negative on non-host regions, and the national impact will be much smaller than the impacts on the host region. Taking a broad perspective, events can be seen to have been grossly oversold as stimulants for economic activity. A re-assessment of governments' policies towards events is overdue.

The CGE simulations reported here have sought to measure the impacts on economic activity, as measured by such variables as GDP or GSP. As discussed elsewhere in this report, changes in GDP do not equate to measures of additional *net benefits* to the economy. The additional output requires additional resources, such as labour, and because these resources have a cost, the net benefits will be invariably smaller, often much smaller, than the value of the additional output. Further analysis is needed to measure the net benefits resulting from additional output stimulated by an event. Determining these net benefits is an essential step in conducting a rigorous cost benefit analysis of an event, which compares total benefits (including other benefits such as resident consumer benefits from attending the event) to total costs (including any environmental costs from hosting the event). Conducting such a cost benefit analysis should be an essential requirement before a government incurs a real cost by committing funds to encourage an event.

Chapter 7

Objections to CGE Approaches

Cost and Availability

CGE models are sometimes criticised as too time consuming to build and too complicated to use (Mules 1999, Hunn & Mangan 1999). However, CGE modelling techniques and software systems are now routinely available, and the data should be assessed in terms of its importance for the question to be investigated, other than just in terms of the ease of data mobilisation (McDougall 1995). The claim that CGE modelling is too demanding in its input requirements can easily be countered, particularly when it is appreciated that the structure of I-O analysis omits key mechanisms for the subject of study. In fact, I-O models are dominated by CGE models in the sense that a CGE model will incorporate an I-O model as part of its structure. Essentially, all that is required to derive this is for all relative prices to be treated as exogenous variables. The CGE model also provides us with a mechanism for investigating the sensitivity of the results to changes in assumptions about the parameters.

It is sometimes maintained that the cost of undertaking CGE analyses is prohibitive, and simpler techniques such as I-O are more cost effective. This claim is not necessarily true. Assuming that a CGE model and an I-O model are available, the cost of analysing a change with them would be much the same; most of the cost is in preparing the inputs and in interpreting the outputs, not in developing or running the model.

It does cost more to develop a CGE model from the beginning, but in most cases, it is unnecessary to do this. In Australia, for example, several models, national and regional, have been developed, with more under construction. Research Centres (Centre of Policy Studies, Centre for Regional Economic Analysis) have developed models that can be readily used, and most of the main economic consulting firms have their own models or access to a model. There may be problems of availability for small economies, but models do exist even for quite small economies, such as Fiji or Jersey. Building new models may be time consuming, but it is not an especially demanding exercise; PhD students regularly build them. Some agencies in Australia (state treasuries) are spending considerable sums in developing their own CGE models, but this is in order to have substantial in-house expertise with which to examine a very wide range of issues (tax, industry policy, major projects), and not just for tourism.

Granted, however, that the costs of developing CGE models from scratch are greater than those of I-O models, a typical simulation using them will be priced above a simulation using an I-O model. While the incremental costs of a simulation using a CGE model will be about the same as one using an I-O model, research centres or consultants will normally charge a premium to cover the cost of model development or for the intellectual property. However, with the increasing use of CGE models, this premium is falling. For example, a study which might cost $30,000 using an I-O model could cost around $40,000 using CGE, with a model development component of $10,000. Publicly funded research centres do not always have to recoup this premium, and sometimes are able to undertake an impact study using CGE analysis for much the same cost as when using I-O analysis. A study of the post-September 2001 tourism slump on the Australian economy is reported as having cost around $40,000. This was done at short notice by a commercial firm (TIWG 2001)

It is recognised, of course, that estimating the economic impacts of tourism growth in certain contexts may not justify the expense of constructing a new CGE model if no suitable model already exists, eg. in small regional economies or sub-state regions. These are typically very open to commodity and factor flows and face no external account constraint. Relative prices can safely be regarded as being set outside such economies. In these circumstances, the range of mechanisms encompassed by a CGE model, over and above those included in an I-O model, may not be of much practical importance. In such cases I-O analysis can be employed to estimate economic impacts as long as its assumptions and deficiencies are acknowledged and it is recognised that the positive impacts cannot be extrapolated to the wider national or even state level. And, since CGE simulations indicate that intrastate 'transferred' expenditure has important impacts the I-O results will, at best, provide only partial estimates of tourism's impacts The practical advantage of using I-O modelling in certain contexts is, however, a separate issue from its conceptual status.

Are the Results Much Different?

One stream of criticism of the use of CGE modelling is that it is claimed that it yields very similar results to I-O analysis; hence the additional complexity and cost (if the development of a CGE model from scratch is required) of the more rigorous technique are not justified.

This view is quite unfounded. It is quite possible that the results from using the two techniques will be totally different. Refer, for example, to the events comparison study in the previous chapter. The comparison illustrates

how the change in activity, estimated using the I-O approach, can be large and positive, but estimated using the CGE approach be substantially smaller (or even negative). Suggested rules, such as that of adjusting I-O results downwards by some percentage to allow for the offsetting effects that CGE analysis recognises, simply miss the point.

It is true that, *sometimes*, I-O and CGE analyses will come up with changes in activity of a similar order of magnitude. This could happen if the CGE model being used embodied assumptions about resource supplies (eg easy access to unemployed resources), which approximate those on which I-O analysis relies. In short, if essentially implausible assumptions are fed into a CGE analysis, it can give similar outputs to an I-O analysis. With more plausible assumptions, which recognise resource limitations and the ways labour markets work, CGE and I-O approaches will typically give very different results, with the measured change in economic activity being significantly lower under the former. It does matter which approach is more complete and more correct as a representation of the economy.

Indeed, these considerations highlight one of the practical advantages of using CGE models for policy analysis. As with all kinds of models, results are sensitive to the assumptions made. The I-O approach locks one into extreme assumptions about input availability (free availability with no constraints) and feedback effects from other markets (they do not exist). By contrast, it is possible to test a wide range of assumptions within a CGE approach. For example, the labour markets can be modelled differently; at one extreme, unemployed labour can be freely available, and at the other extreme, additional demand for labour leads to no more employment, but only higher wages. Assumptions in between these extremes can also be used (Dwyer & Forsyth 1998) CGE models also typically allow for alternative assumptions about government tax and spending policies, exchange rate mechanisms, and consumer behaviour (Dwyer, Forsyth, Madden & Spurr 2000)

The results of I-O analyses tend to be rather predictable; the final change in activity is some multiple of the initial change in expenditure. By contrast, those of a CGE analysis are far less so; quite often, unexpected results turn up. This suggests that the model is capturing the complexities and interrelationships in the economy that are missed in more simple approaches. In a real economy, the ultimate consequences of some change on variables such as economic activity cannot be easily predicted. In this respect, the CGE approach is a valuable research device, which goes beyond simplistic rules of thumb.

The Underlying Assumptions

Empirical and quantitative work in economics relies on underlying assumptions, even though this may not always be apparent. For example, there is a considerable body of work measuring demand elasticities, or the sensitivity of tourism demand to variables such as price and income. This work relies on assumptions about consumer behaviour. Taken at face value, these assumptions about how people behave may appear “unrealistic”, however they enable the measurement problem to become tractable. As long as the assumptions made are not too unrealistic, they enable measures that are reasonable approximations to be made.

The same is true for quantitative models that are used to make estimates of impacts on economies, such as I-O and CGE models. CGE models are more comprehensive, and incorporate more markets and processes; hence more assumptions must be made. These involve how markets work, how taxes are levied, how production is structured, and how consumers behave. The assumptions will be based on available empirical work, which in turn will embody assumptions, and they will be chosen to give the best practical representation of the economy. To make models tractable, simplifying assumptions must be made. For example, many CGE models assume constant returns to scale, or that a doubling of output will entail a doubling of cost (Skene 1993a,b) For some industries, including tourism industries, this will be a reasonable assumption. For other industries, such as the motor vehicle industry, this may not be the case (though scale economies are probably not as significant as is often assumed). It is becoming easier to model increasing returns, and some models now incorporate them. Nevertheless, this simplification is not likely to introduce too much error into the results.

I-O analysis makes fewer assumptions than does CGE analysis, but the assumptions it does make about production processes are highly stylised, and open to the same types of criticism (Braissoulis 1991) However the real objection to Input-Output analysis is that it avoids making assumptions about how the rest of the economy works by ignoring it. It is preferable to have a complete representation of the economy, even if this involves making some further assumptions. As noted above, one of the strengths of CGE analysis is that many of its assumptions can be varied and the sensitivity to them tested.

CGE in Analysing Local Impacts

It is often stated that CGE analysis is inappropriate to evaluate small, local events, and that I-O analysis is sufficient for this purpose (Mules 1999). As with other claims, this has to be heavily qualified.

If it is the local effects of an event, or project, which are of interest, the state-wide or economy-wide CGE analysis will not be required. In principle, it would be feasible to construct a local CGE model for the local area,

and this could be used to analyse changes to it. However this will probably be costly, and unwarranted. Alternatively, a local I-O analysis could be undertaken. Since, as with CGE models, a suitable ready-made model is not likely to be available, it will be necessary to construct one, taking into account the structure of the local economy, and its links with the broader economy. This is not a trivial task, but it will be a simpler one than constructing a CGE model of the area. The I-O assumption of freely available resources is closer to the truth in the local case, because labour and capital can flow to the area from other areas. It will be necessary to distinguish between local residents and others who come to the region if aspects such as the impact of the event on local unemployment are of interest (often this is not done).

The information that such a study produces will be of interest to local decision-makers. For example, the local council of a town might undertake such a study to determine whether to support a festival in the town or to extend the airport. However, the information produced is not of much relevance to higher-level decision-makers, such as state or national governments, except to the extent that they are concerned about local impacts. Even when they are, they will also be concerned about state-wide impacts.

A state or regional government will be interested in the impact on economic activity in the state as a whole; this cannot be determined from a local I-O analysis. Rather, a state-wide CGE model will be required. Such a model will take account of the effects of the event or project on resources available to be used elsewhere in the state, and it will allow for the fact that visitors to the town will lessen their expenditure elsewhere to fund their visit to the town. For example, a State Government agency will be interested in how different events, such as a music festival or a Grand Prix, will affect economic activity in the State as a whole, as well as in the area where the events occur. Any net increase in economic activity in the state as a whole will tend to be much smaller than the increase in activity in the immediate local area. Local impact studies will not provide public sector decision-makers with enough guidance as to whether they should support local events financially or otherwise, since they will also need to know the overall state-wide impacts. Likewise, national governments will be interested in the impacts of events or projects on activity in the nation, not just the impact in particular states or regions.

The size of the change that is being contemplated is not something that should determine which type of analysis is appropriate. Small changes can be analysed using CGE analysis just as readily and correctly as large changes. Clearly, as always, the cost of the analysis should be commensurate with the benefits from obtaining information about it. Neither CGE nor I-O analyses are costless. A local I-O analysis, which adequately captures the unique features of the locality, may well be more expensive than a run of an existing CGE model. It is not the case that small or medium sized events or shocks should be analysed using I-O analysis.

In summary, there is a case for using a local Input-Output model to estimate the local effects of an event or project, providing information of relevance to local decision makers. The results of such studies are only of partial guidance to higher level decision-makers, such as state or national governments, because these will be interested in impacts on the overall economies within their jurisdiction. For this, CGE models will be required.

Chapter 8

Extensions

Tourism Satellite Accounts

Tourism Satellite Accounts (TSAs) have been introduced in a number of countries (including Australia) in recent years and they are receiving increasing attention as a tool for providing increased information on the contribution of tourism to national economies. A TSA is a means of measuring the size of the tourism sector in an economy, or measuring the "contribution" of tourism to the economy, in a manner which is consistent with the country's National System of Statistical Accounts. The World Tourism Organisation has developed a detailed framework for their introduction (WTO 1999).

While a TSA can be a substantial step forward, the information it provides is essentially static and descriptive. From the point of view of analysing the economic impacts of tourism a TSA provides a useful tool, akin to the statistical data available for any area of industry analysis from a country's national accounting system. It also plays an extremely valuable role in standardising definitions and assembling data in a manner which is comprehensive, internally consistent and balanced. In doing so it provides a consistent and credible basis on which to build further research and analysis.

The TSA's essential contribution is that, for the first time, it identifies aggregate official figures, within the national accounts, for a tourism "industry". Without a TSA, tourism data is disbursed across a wide range of other industries from which they cannot readily be separated. Because the TSA is developed in a manner which is consistent with the national accounting system as a whole, it makes it possible to compare tourism with other sectors of the economy and to examine its components. For example, tourism's share of GDP and employment, the relative importance of identified tourism components to overall tourism activity, and their contribution to other non-tourism industries can all be identified.

CGE models go much further than TSAs – with them it is possible to tell what impact a change - such as a 10% increase in inbound tourism, will have on variables in the economy, including GDP, employment and exports. They can also be used to project the impact of changes in the overall economy on the tourism sector and its component parts and to estimate the economic effects of changes in government policies. TSAs cannot be used for these purposes.

Where a TSA is already in place, it will provide the statistical basis for much of the tourism specific data required in the development of any CGE model which contains an explicit tourism sector. The absence of TSAs until recently in most countries helps to explain why few existing CGE models identify a tourism "industry" or incorporate any detailed breakdown of tourism data. Even where CGE models have sought to identify tourism,, the absence until recently of consistent definitions and data inputs from the national accounts meant that their results have not been readily replicable or comparable from one model to another.

CGE modellers will usually require much more detailed information than TSAs currently provide, for example, about the direction and breakdown of tourism expenditures and where they occur, and about the breakdown of capital investment in infrastructure which serves multiple users of which tourism may be only one. Sometimes this information must be imputed. TSAs which provide provincial or regional level data are, as yet, extremely rare, creating a further gap for CGE models which are directed at analysing economic impacts at anything other than the level of the national economy.

As long as a CGE model has an explicit tourism sector, it will embody a TSA within it. It will thus be possible to generate a simulated TSA, where an official TSA does not exist, as an output of the CGE model. The degree of accuracy and detail in the CGE derived TSA will depend on the source of the information it is developed from, and on the degree of detail incorporated in the model. A TSA generated as an output of a model may not be as accurate or detailed as one which has been specifically constructed by a government statistical agency. The official TSA will often draw on expensive, specifically commissioned, surveys to fill data gaps. However, if the assumptions and definitions adopted to build the tourism specific components of the CGE model are consistent with those of any official TSA structure then the resulting CGE generated TSA should be broadly consistent with what would be produced in a fully constructed TSA.

This issue is of interest at the state or local level where TSA's are rarely available. A CGE model, which is constructed with an explicit tourism sector in a manner consistent with the national TSA, and which draws on national TSA definitions and data, can provide an appropriate and cost effective tool for producing simulated TSA's at the state/provincial level. This type of extension of a CGE model is one which could logically be explored using the NSW CGE model developed for the STCRC CGE project (Dwyer, Forsyth, Spurr & Ho 2003).

Dynamics and Endogenous Growth

Most analysis of the economic impacts of tourism is done using a static framework; in other words, using an approach which models the economy at a point of time, and examines shifts from one point of time to another. When the issue addressed involves what difference a change in tourism makes to variables in the economy, this type of analysis is sufficient. However, when there is an interest in the adjustment process, for example, how long it takes for a shift in tourism flows to influence other variables in the economy, then a dynamic framework is required. Dynamics can be readily incorporated in CGE models, so that the development path of the economy, and changes from that path, can be investigated. Several CGE models are dynamic - for example, the most comprehensive model of the Australian economy, the MONASH model, is a dynamic one (Adams & Parmenter 1992).

A recent development in economics has been that of "endogenous growth" models (Van Sinderen & Roelandt 1998). These models rely on the existence of various external economies, by which one firm or industry can enhance the performance of other sectors in the economy. For example, lower transport costs may enable other industries to take advantage of economies of scale or gains from greater specialisation. It would be possible to build CGE models which take account of these effects. Alternatively, results from conventional models can be adjusted to take these effects into account. Oxford Economic Forecasting has estimated that aviation has a positive effect on the productivity of other sectors; when examining the impact of tourism changes, it adjusts the results of its models to take this effect into account (Oxford Economic Forecasting 1999).

Measuring Benefits or Welfare Gains

Typically, the impact on economic activity is much greater than the net welfare gain to members of the community (Dwyer & Forsyth 1993). This is because additional activity requires additional resources, and these are not costless. For most policy decisions, governments wish to know how much better off residents are as a result of some decision. For example, suppose a government is considering supporting a special event and it will require $1m of taxpayers' money to subsidise it, but if it goes ahead the addition to GDP will be $6m. Is this a worthwhile expenditure? The answer is that it is worthwhile if the net benefits are positive. If an event requiring a subsidy of $1m produces an addition to GDP of $6m and a net benefit of $2m, then it is worthwhile; however if the net benefit gain was only $0.8m (that is, less than $1 million in taxpayer subsidy required), it would be a poor investment, regardless of the impact on GDP.

If additional tourism is to produce net benefits for the destination, there will have to be some divergence between the prices paid and the costs of provision, either directly in the tourism industry or in other industries indirectly affected by it. There are several ways in which this could come about - prices may not equal costs, there may be externalities, there may be unemployment, and there may be terms of trade effects (Dwyer, Forsyth & Spurr 2003).

To measure the net benefits of a tourism change, we need to identify in what ways the revenues gained from additional tourism are not equal to the opportunity costs of the inputs used in supplying it. With tourism services, which are supplied in quite competitive markets, the prices charged for the outputs, and thus the value of the additional output, will tend to be close to the cost of supply, which in turn reflects the cost of the inputs used. To the extent that this is so, the net benefit from additional output will tend to be small, especially relative to the gross change in the value of output.

Once the importance of costs of supply is recognised, it is in principle straightforward to adjust outputs of a CGE model to take them into account (Dwyer, Forsyth, Spurr & Ho 2003). Indeed, some CGE models are explicitly designed to measure changes in welfare- see Dixon et al. (2002). To do so, one subtracts the cost of additional inputs used to produce the increase in activity. Thus the cost of additional labour used (wage by quantity), the cost of additional capital services and cost of additional natural resources must be subtracted from the change in the value of the increased economic activity, as measured by the change in GNP or National Income. Such a measure can be also be derived as an output of the CGE model simulations which were presented in Chapter Five. Thus, the authors have estimated a benefits measure for the economic impacts of tourism to New South Wales from different origin markets.

Application: Measuring the Benefits of Additional Tourism to NSW

The way in which CGE models can be used to evaluate the benefits from tourism can be illustrated by means of the following application to NSW. Benefits are measured by taking the change in real state/national income (which excludes income payable overseas) and subtracting the cost of additional factors employed.

The cases considered correspond to those in Table 1. Employment in Australia is allowed to vary – an interpretation of this might be that unemployment is the result of too high a real wage, which does not change when activity increases. As a result, employment increases.

In Table 6, the calculation of net benefits is shown. An increase of 10% in foreign tourism expenditure to

NSW only is supposed; this would result in an increase in revenues of $636m. Real GDP/GSP increases by less than this, since there is some crowding out of other industries. Some of this gain is due to additional inputs of labour, both in NSW and Australia. This is the main deduction required to obtain the net benefit of an assumed increase in tourist expenditure. Since this is a short run case, capital and land are fixed, and thus there are no additional payments to these. This would not be so for the long run case.

Table 6. Calculation of net benefits, 10% increase in international tourism to NSW ($m)

	New South Wales	Australia
Expenditure Change	636	636
Change in GSP/GDP	364	244
Cost of Additional Labour	268	165
Cost of Additional Capital	0	0
Cost of Additional Land	0	0
Change in Payroll Tax	9	6
Net Benefit Change	96	85

Source: Calculations as described in text

The net benefits arising from a range of different sources of changes to tourism in NSW are presented in Table 7. The benefits to NSW, and to Australia as a whole are shown. The first case, an increase in international tourism to NSW alone, is the same as that shown in Table 6. The second case is one in which intrastate tourism in NSW increases by 10%; it is financed by NSW residents reducing their expenditure on tourism to the RoA. NSW gains, but the RoA loses; there is an overall gain to Australia. Thirdly, the case of a 10% increase in interstate tourism from the RoA, financed by reductions in tourism expenditure in the RoA is shown. Again NSW gains at the expense of the RoA. There is an overall negative benefit for Australia as a whole. It may seem surprising that the second and third cases are so different; this can come about as a result of different expenditure patterns of tourists from NSW and from the RoA, and also from different industrial structures in NSW compared to RoA. Finally, the case of a 10% increase in international tourism to the whole of Australia is shown; both NSW and the RoA gain in this case.

Table 7. Net benefit: Different sources of additional tourism to NSW ($m)

Source		Expenditure Change	GSP/GDP Change	Net Benefit Change
International Tourism NSW Only	NSW	636	364	96
International Tourism NSW Only	Australia	636	244	85
Interstate Tourism to NSW	NSW	540	322	101
Interstate Tourism to NSW	Australia	0	-60	-14
Additional Intrastate Tourism	NSW	1032	734	235
Additional Intrastate Tourism	Australia	0	119	57
International Tourism to Australia	NSW	636	249	84
International Tourism to Australia	Australia	1710	720	231

Source: Calculations as described in text

The outputs of the CGE simulations can be adjusted to allow for considerations not captured by the model. It is not possible here to make estimates of externality costs and effects of underpriced infrastructure, but the size of the employment benefits may be approximated. The opportunity cost of labour in Australia (and elsewhere) is an unknown quantity; extra jobs are valuable to reduce unemployment, though those who gain the jobs incur costs as a result of this employment. The net gain to them is less than the wage they enjoy, though it is not zero. To illustrate how employment benefits could be incorporated, suppose that hitherto unemployed workers would be willing to work for two thirds of the market wage rate, but not below this. The difference this makes to the measure of net benefits is shown in Table 8. It is significant, indicating that measures of benefits are very sensitive to the view taken of how the labour market works.

Table 8. Calculation of net benefits: Alternative cost of labour ($m)

Source		Change in GSP/GDP	Benefit Change-Full Labour Cost	Benefit Change-2/3 Labour Cost
International Tourism NSW Only	NSW	364	96	185
International Tourism NSW Only	Australia	244	85	140
Interstate Tourism to NSW	NSW	322	101	178
Interstate Tourism to NSW	Australia	-60	-14	-29
Additional Intrastate Tourism	NSW	734	235	408
Additional Intrastate Tourism	Australia	119	57	80
International Tourism to Australia	NSW	249	84	84
International Tourism to Australia	Australia	720	231	398

Source: Calculations as described in text

Some observations are in order. As expected, the net benefits are significantly smaller than the changes in real economic activity. There is a net cost to states other than NSW in some simulations, as these states experience falls in economic activity as well. Given the scope for inaccuracy, it may be taken that other states neither gain nor lose much from an international tourism boom in NSW, though they do lose if tourism increases in NSW are at the expense of tourism in the RoA.

Other adjustments should ideally be made, although there are data limitations. Thus, it may be necessary to make some allowance for subsidised or unpriced services that are used by tourists, or by other industries which expand or contract as a result of the change. Whether this is necessary depends on how these services are incorporated into the CGE model. For example, is the level of road provision exogenous to the model, in the sense that the government is assumed to provide a certain amount of capacity regardless of road use? If so, some adjustment for greater use of roads as a result of tourism should be made. If the road services are already incorporated as inputs into other industries (for example, if an expansion in tourism results in greater provision of roads and the cost of this is deducted from the gain in State or National Income), no further adjustment is needed. Currently, in the model we are using, as with most other CGE models, there is no link between tourism demand and road use and road costs, though the model is being revised to incorporate such a link. It is necessary to also allow for externalities of tourism and all other industries if an accurate measure of net benefits is to be obtained.

There is no guarantee that the net benefit from additional tourism expenditure will be positive; it is perfectly possible that increased economic activity will lead to lower welfare for the community. This could come about if the cost of supplying inputs to enable the increase in activity were greater than the value of the increased production. A situation in which this could occur would be where foreign tourists purchased the output of a highly subsidised product; the revenue from the additional output could be below the cost of the inputs used. It is more likely, however, that the reverse will be the case, and that the net benefits from additional activity will be positive. This will tend to be the case when the output is taxed (as many tourism services are) and costs of inputs are below the value of output. If the value of the extra output is exactly equal to the cost of inputs used in supplying it, there will be no net benefit from the additional activity, positive or negative.

The approach adopted by the authors to net benefit estimation is that of adjusting the estimates of impacts on activity using the project's CGE model. The use of a CGE model is appropriate for this purpose since CGE models are recognised as the most rigorous means of estimating quantitative impacts in economies. It is particularly appropriate in the tourism context, because the benefits which tourism produces are the total of small gains and losses spread throughout the economy, and an economy-wide approach to evaluation is needed. The approach suggested is operationalised using a CGE model of the New South Wales and Australian economies. The outputs of this approach provide us with a means of applying cost benefit analysis to tourism policies; this yields a rigorous means of evaluating tourism policies that involve costs as well as benefits.

Chapter 9

Issues for Further Research

In this report, we have outlined how CGE models can be used to estimate the economic impacts and benefits of tourism generally. One experiment we conducted was of a change in tourism demand- this could come about because of natural growth, promotion, or a fall in the exchange rate. The model could equally well be used to track the impacts of a negative shock to demand, as occurred in September 2001. We also showed the relevance of the CGE approach to evaluating the economic impacts of special events. This is just the tip of the iceberg- there is a vast range of issues which can be explored using this technique. The agenda for future research in this area should be to extend the analysis to different tourism destinations, and to include detailed analyses of the appropriate behavioural characteristics of the economic agents that are included in model specification and of the government policy settings that determine the context for their behaviour. The outcome should be a model which can be used to analyse the economic impacts of a wide range of tourism market developments and scenarios and government policy options. We flag some specific topics here.

Economic Impacts of Different Types of Tourists

The studies which have been discussed in this report have each focussed on aggregate expenditure by all short-term visitors to various destinations. In Australia, data for inbound tourism is available in disaggregated form, both by country of origin and by purpose of visit. It would be relatively straightforward to produce disaggregated results showing the contributions by various visitor groups (eg. holiday, business, VFR travellers) to total expenditure and hence to the economic impact of changes in expenditure. Another, and perhaps more useful way to disaggregate the results would be to look at expenditure by groups of visitors according to length of stay, types of accommodation used and so on irrespective of country of origin. For example, as Skene (1993b) notes, it could be the case that the economic impact of younger, long stay, fully independent, budget travellers, is quite different from the impact of older, short stay visitors on high standard organised tours. Other special interest markets that could be explored might include cruising and conventions and meetings tourism.

Alternative Assumptions about the Economic Environment

There is a variety of assumptions about the economic environment which could be examined. For example, experience has shown that directing tax cuts to corporate taxes only is likely to be even more expansionary than adopting uniform labour and non labour tax cuts (Skene 1993b). CGE modelling allows us to specify the particular types of adjustments to the tax system made by government(s), whether or not constrained by a PSBR. Given differences in taxation regimes world-wide, there is scope for modelling international differences in tourism's economic impacts based on assumptions regarding local taxation structures.

Also, investment in the simulations reported above is only keeping pace with demand driven changes in economic activity. There is no examination of the effects of, say, a tourism-related investment boom, with associated 'crowding out' of other activity (Dwyer & Forsyth 1994). Analysis with a CGE model is one way to assess the economy-wide effects of more tourism-oriented investment, including the merits of domestic versus foreign investment. There is still much confusion about the impacts of foreign direct investment in tourism on a host economy (Dwyer & Forsyth 1996). Since construction is a 'local industry', dollar for dollar it may have greater expansionary impact on regional locations than tourist expenditure.

The economy-wide framework can also provide a treatment of various distortions that operate in the economy to influence the provision of tourism services and other goods and services. It may be that the economic contribution from foreign tourism can be enhanced more effectively by removing existing impediments to its development - impediments that are serving no useful economic purpose - than by devoting additional scarce resources to promoting a country as a tourist destination. Some, such as domestic taxes, tariffs on imports and wage-cost loadings, operate to raise prices of tourist services and hence discourage their consumption. Others, such as restrictions on shopping hours or air service agreements, discourage consumption of tourism services directly. Use of CGE modelling can help determine how important such factors are in influencing the economic contribution of tourism (Centre for International Economics 1989).

Incorporating Environmental Costs of Tourism

Further, there may be social, environmental and other costs not picked up in a CGE model that are perhaps, not being outweighed by the benefits of tourism. Conventional CGE modelling does not incorporate the costs of environmental degradation or loss of scenic attractions that are valued by consumers for their contribution to

quality of life, but which do not enter into industry costs of production. Nor does I-O analysis. But, in indicating changes in the mix of industries associated with tourism growth, CGE modelling does provide a superior basis for undertaking cost benefit analysis than does I-O modelling. CGE modelling, with its fuller supply side specification can provide the basis for an environmental impact assessment and a more balanced assessment of the costs and benefits of tourism.

Measuring Regional Impacts

With respect to the impacts of increased inbound tourism on regions using CGE models, the relative merits of different CGE approaches needs further study. Madden and Thapa (2000) claim that, as well as modelling differences in industrial patterns and local multiplier effects which are picked up by other methods, their approach takes into account differences in sales and cost patterns of individual industries in different regions thereby providing a better modelling of the regional effects of international tourism. They also claim that their method is capable of providing more information about interregional differences in the effects on prices and investment. These issues need further exploration.

Economic Impacts of Tourism in Developing Countries

While the examples used for illustrative purposes in this paper have primarily been Australian, the results hold generally for all tourism destinations. It seems fair to say that discussions of the economic impacts of tourism undertaken in studies world-wide have not, in general, reflected any detailed awareness of many of the issues addressed in this paper. Certainly the use of CGE modelling of tourism's impacts is sparse outside of Australia. The challenge for tourism researchers and planners is to extend use of the technique to the study of tourism growth in both developing and developed countries and to regions within them.

The results would seem to have particular relevance for tourism expansion in developing areas (Sugiyato, Blake & Sinclair 2002). The discussion reveals that achievement of standard economic objectives from tourism growth - increased household incomes, employment, foreign exchange earnings, increased government taxation base for financing development, and so on - may not be as straightforward as the literature has tended to imply. While the policy emphasis has thus far been on reducing leakages of tourist expenditure and the forging of stronger links between tourism and other sectors (Dwyer 2000), the overall industry mix in tourism destinations, and its implications for tourism's economic contribution to development, requires much more attention than it has hitherto been accorded by researchers. The results also reveal the essential interdependence between sectors in the development process. No longer can it simply be assumed, without attention to the mix of industries in a given destination, that tourism growth is a 'catalyst for', or even necessarily compatible with, growth in other economic sectors. No longer can emphasis be placed on the growth of this one particular sector while neglecting the impacts that its growth will have on other sectors.

Economic Impacts of Outbound Tourism

The way in which the tourism sector is being handled in the model is being refined, allowing for explicit treatment of categories such as Australian outbound tourism (a substitute for domestic tourism). The outbound tourism sector seems to have been much neglected by researchers and its economic effects largely un-examined.

Analysing the Taxation of Tourism

The model as constructed incorporates a detailed tax structure. It is feasible to make this structure more detailed however, if, for example, a new tax on some aspect of tourism were levied. This makes the model highly suitable for investigating tourism taxation issues. Using the model, it is possible to assess how heavily tourism is taxed in New South Wales and in Australia generally, and to compare this level of taxes with those of other sectors. This is possible for both tourism as an export industry and as a supplier to the domestic market. The model may be used to assess the economic impacts of changes in taxation, both general taxation as it affects the tourism industry, and in specific tourism taxes. The results from such studies can be used to examine how packages of taxation and support designed for the industry will impact on the industry itself, and on the economy more widely.

Assessing the Economic Impacts of Specific Sectors

It is well recognised that different tourists have different impacts. Indeed, there has been a long standing interest in the "yield" of different tourists (Dwyer & Forsyth 1997). CGE models provides a means of analysing this issue. Different tourists have different impacts on the economy because their expenditure levels and patterns differ. Impacts on specific variables, such as government revenue, can differ because tourists spend different proportions of their budget on the highly taxed commodities such as fuel (domestic tourists spend more on fuel

than do international visitors). It has already been seen (in Chapter 5) that the impacts on GDP of different sources of tourists (interstate, inbound) can differ significantly. The impacts of different tourists, such as cruise tourists, backpackers, and tourists from different countries, on output, employment and on government revenues can be estimated using the model.

Aviation Policy Changes

Aviation policies can impact on tourism flows and expenditure, and thus they will have impacts on the economy. With many aviation policy questions, the main issue may well be that of how they will affect tourism and thus the economy. For example, consider the proposed strategic alliance between Qantas and Air New Zealand- one of the key issues which policy makers will face will be that of whether it stimulates tourism, and if so, what the benefits from doing this will be. These benefits will need to be set against any costs to the economies that the alliance may bring. The model provides a means of assessing the impacts of the alliance on output and employment, and the net benefits which result. The model can be used for analysing a broad range of aviation questions, such as what the benefits and costs of opening up a previously restricted route market will be.

Evaluating Tourism Promotion

The main benefit from spending on tourism promotion comes about because more tourists come and they spend more. It is possible to make estimates of how promotion impacts on tourism flows and expenditure. However, this is not enough to answer the question of whether promotion is worthwhile. Is $100 spent to attract an additional tourist a good investment or not? To answer this question, it is necessary to determine what benefits for the economy the additional tourist brings (Dwyer & Forsyth 1994). The model provides a means of determining this, since it can estimate the impacts on output and employment, and the net benefits from changes in these can be calculated.

Exploring the Infrastructure Requirements of Tourism Growth

Tourists use the infrastructure, both that provided by local governments, such as beaches and parks, and by higher level governments, such as roads. Providing infrastructure is costly- sometimes infrastructure is charged for (eg. airport services) and sometimes it is not (most roads in Australia). It is possible to use the model to explore infrastructure questions. Where users pay for the infrastructure they make use of, the infrastructure is already built into the model. A major extension of the model, currently underway, is to incorporate unpriced infrastructure (such as roads) into it. CGE models do not invariably build this link into their structure; however, when models are used to examine the impacts and benefits of tourism, it is important that the link be recognised. By doing this, more accurate measures of economic impacts and benefits of tourism can be obtained. It will also make it possible to use the model when forecasting the infrastructure requirements of tourism growth.

Estimating the Implications of Tourism Growth for Resource Use

The tourism industry requires resources that are in scarce supply, such as water and energy, and tourism growth will have implications for resource use. However this relationship is not simple since an increase in tourism could even lead to less water or energy being used. This is because of the inter industry effects of the growth of one sector in the economy such as tourism. As has been shown earlier, some industries will contract as a result of tourism growth, and their use of resources will decline- the net impact is not apparent *a priori*, as it depends on which industries expand and contract, and their water or energy intensiveness. The model provides us with a means of estimating the direct and indirect effects of tourism growth on the use of resources.

Changes in Tourism Competitiveness

Tourism competitiveness changes for many reasons. Australia's tourism competitiveness may fall if its exchange rate rises. Productivity growth in the tourism sector, the arrival of low cost airlines lowering air fares, and the price level changes in other countries can all affect tourism competitiveness (Dwyer & Kim 2003). With information about demand elasticities, it is possible to estimate the changes in tourism flows and expenditure as a result of changes in competitiveness, and then it is possible to use the model to estimate the economic impacts. Is a rise in tourism competitiveness desirable from Australia's overall point of view? Using the model, it is possible to answer this question.

Tourism Satellite Accounts

Where CGE models have been applied to tourism in the past they have generally been used for analysing economic impacts and policy options at the national level. While the model developed under this project is equally at home being used for Australia as a whole, it is of particular interest for its capacity to be used for

applied analysis at the state level. So far it has been developed for the state of New South Wales but its application to other Australian states would be relatively straight forward, requiring only the input of appropriate tourism data. An interesting side benefit of this is the potential to simultaneously develop state level Tourism Satellite Accounts as a spin off from the CGE model development. These state level TSAs would be fully consistent with the model and thus with outcomes from its application. They would also be consistent with the national TSA developed by the Australian Bureau of Statistics which was drawn on to develop the tourism data component of within the model. A consequent opportunity presents itself for analysis of tourism impacts and policy options, which incorporate fully consistent comparisons between Australian states and between any one state and the nation as a whole.

Chapter 10

Conclusion

As a result of the development of more sophisticated modelling techniques in recent years, the economic impacts of tourism is set to become a more fertile ground for research. In a CGE model which incorporates a realistic set of economy wide constraints, the effects of tourism growth cannot be anticipated a priori - the increased output of the tourism industry may be more than offset by contractions in output elsewhere in the economy and effects on the trade balance depend on whether the net increase in aggregate demand is greater or less than the increase in domestic demand.

As a result of these considerations we conclude that, in a CGE model which incorporates a realistic set of economy - wide constraints, the effects of inbound tourism growth cannot be anticipated *a priori*.

The discussion has also shown that the use of I-O modelling to estimate economic impacts provides only a partial, and sometimes misleading, picture. CGE models can allow for detailed inter-industry analysis together with supply-side constraints and an active price mechanism. They also include more general specifications of the behaviour of consumers, producers, investors, and employees than those allowed for in I-O analysis, as well as flexibility in allowing for different macroeconomic policy stances of government. CGE modelling explicitly recognises the 'crowding out' effects that occur when the expansion of one industry has an adverse impact on others. The effects of increased inbound tourism on income and employment in an economy are very much also dependent on the assumptions made about the workings of labour markets, the effect on the exchange rate, and current government policy.

The relevance of the findings here go beyond their immediate interest to tourism economists. They demand the attention of tourism planners and tourism marketers as well as public policy makers. Tourism continues to be regarded by many public sector policy makers as a catalyst for economic development. In various tourism destinations around the world, tourism planning continues to be based on estimates of economic potential that ignore the effects of tourism development on industry composition The implications for tourism planning arise from the realisation that, since tourism growth can impact adversely on the size of other industry sectors, it no longer suffices to consider the economic impacts of tourism in isolation from inter- industry effects.

To be credible, assessments of tourism’s economic impacts will need to be made using best practice techniques, such as CGE analysis, rather than techniques with acknowledged limitations.

Appendix A: The M2RNSW Model

The model used in this study to estimate the contribution of tourism to the NSW economy is the M2RNSW model, which is a modified version of the M2R model the basic of which is an adaptation of the Monash Multi-regional Forecasting (MMRF) model of Australia. A detailed description of the MMRF model is given in Naqvi and Peter (1996). See Han, Madden and Pant (1998) for a description of M2R (NSW).

The MMRF model contains a full multi-regional specification and data base for Australia, defined at the level of eight regions (comprising the six states and two territories of Australia). A two-region model is created by preserving the separate identity of only the New South Wales state, while all the remaining seven regions of MMRF are aggregated into a single RoA region. The two region model, which we label M2RNSW , is an adaptation of the standard MMRF model with the number of regions reduced to two (NSW and the RoA), but with a larger degree of industry disaggregation. An industry classification of 42 non-tourism industries is used for the M2RNSW model, which is then extended to a 56 industry tourism version of the model by introducing fourteen (14) tourism industries. These fourteen new tourism industries are distinguished by the source of the traveller (4 categories: intrastate, interstate, overseas and outbound) and the purpose of travel (4 categories: holiday, visiting friends & relatives, business & conference, other; for the outbound there are only two purposes: business and households). Each of these new tourism industries purchases a range of products from the *42* standard industries identified in the model, and on-sells them to the actual travellers at cost price. This level of disaggregation of total tourism expenditure is important because the expenditure pattern and the extent of substitutability with other consumption goods vary among the fourteen components of total tourism expenditure.

There is also a representative household in each region, together with a state government. The Commonwealth Government is modelled as interacting with each region, providing public services, taxing and distributing transfer payments.

Assumptions

Behavioural

All industries in both regions are modelled as minimising the costs of producing a given level of output insofar as their production technology and the input prices they face will permit them. Producers thus choose their inputs in accordance with the relative price and substitutability of the inputs.

The fourteen tourism industries are so-called “dummy industries”. They assemble tourism goods from the various standard industries and on-sell them to the travellers at cost. Such a treatment of the tourism industry implies that there is no value added directly created in the 14 dummy industries and hence the capital stock, employment and other components of value added need not be estimated. The resulting CGE model can focus on the tourism industries purely from the demand side.

The representative regional households in the model divide their disposable income between expenditure on goods and services and savings. They maximise the satisfaction they can obtain from their expenditure budget by making purchases in accordance with the pattern of their preferences and of relative prices.

The model assumes that goods and services from different sources (local, interstate, and overseas) are not perfect substitutes. The model also covers the behaviour of investors (who allocate their investable funds to attempt to maximise their rate of return), import and export agents, and, as indicated above, two tiers of government.

For specifying the tourism version of this model, the core task consisted of preparing a column of final demand for each of the 14 artificially created tourism industries in each region and to re-balance the two region data base for all other industries and agents specified.

Structural

The results of the contribution simulations are, as with all economic modelling, conditioned by the various assumptions underlying the model. While there are many such assumptions, the macroeconomic assumptions are the key to the broad nature of the results. The main assumptions for the simulations reported here are:

- in the long run, the rate of unemployment for the Australian economy is not affected by changes in the level of aggregate demand. It is assumed that the national unemployment rate is determined in the long-run by labour market conditions, population levels etc., with changes in the level of the aggregate demand for labour being fully accommodated by changes in the national real wage rate. It is further assumed that changes in regional population (via changes in interstate migration rates) act to equalise the level of unemployment between regions;

- tourism expenditure in the long-run does not affect the real rate of return on capital; tourism

expenditure affects the real exchange rate through movements in domestic prices, with the nominal exchange rate and import prices held fixed. In reality there may be some effect of tourism on the nominal exchange rate, but this would simply alter the balance in the effect on the real exchange rate between changes in the domestic price level and the nominal exchange rate. The effects on the real exchange rate and other economic variables are not altered by this assumption.

- in the long-run the Australian government sterilises the effect of tourism on the balance of trade by appropriate tax policy. This assumption only alters the compositional distribution of real GDP. That is, it merely turns any positive effect of tourism on the nation's trade balance into real consumption benefits.
- real state government current consumption varies in accordance with state population. This contrasts with the normal assumption of government consumption altering by the same percentage as private consumption. The relevant MMRF equation was altered in this case, as were the equations relating to current and capital grants from the Commonwealth. These grants were made to move in line with the state population and the government's price index.
- there are no long-term effects of tourism on the NSW and RoA public borrowing requirements, with both governments altering tax rates to accommodate this.

The Tourism Model Database

A major database task was required to implement the two-region tourism CGE model. For each of the fourteen tourism industries, the total expenditure of that tourism category was decomposed by the 42 standard commodities of the model. Then, expenditure on each commodity was split between the three geographical sources of supply for each commodity (NSW, RoA and overseas). Following this, the purchasers' price of each commodity from each source was split into its basic price received by the producer, the price component due to the different types of margin services, eg. transport costs, retail and wholesale mark-ups, and insurance costs, and the price component due to state and Commonwealth taxes. The new tourism industries were then subtracted from existing values of industries' rows and columns of the standard M2RNSW data-base. Finally, it was necessary to reconcile any incompatibilities between the tourism data and the original database, and to re-balance the new database.

In the M2RNSW model, the database has been updated and its base year is 2000-01. Further, the tourism data was derived by using the information from the BTR (Bureau of Tourism Research) and ABS's TSA (Tourism Satellite Account) of Australia. The model's tourism database has been made consistent with the TSA data.

Solution

The model was solved using an Euler multistep solution procedure designed to minimise any linearisation errors using the GEMPACK program (Harrison & Pearson 1996).

Appendix B: Economic Impacts of Tourism to New South Wales and the Rest of Australia

The manner in which the economic contribution of tourism in NSW is simulated is to estimate the effects on the NSW economy of tourism expenditure being increased by 10 percent (the increase in tourism demand can come from overseas or domestic tourists). The contribution of tourism is then taken as the difference between the values of the economic variables actually observed (with 10 percent increase in tourism demand from a particular origin market) and values that would have been observed in the complete absence of the demand increase.

Assumptions

Assumption of Uniform Increase in International Tourism across Australia

For overseas tourism, with a uniform increase in tourism demand for Australia, the simulations assume that foreign demand for Australia as a tourist destination increases by 10 percent (= $ 1.71 billion, using 2000-01 tourism data from the TSA) and is evenly distributed across the six Australian states plus two territories according to their existing market shares. NSW, with 37.2 per cent of the Australian inbound tourism market thus gains 37.2 per cent of the increased tourism expenditure (representing an increase of $635.9 million) with the remaining 62.8 per cent allocated to the RoA. If the result of this simulation is that the 10 percent increase of overseas tourism is estimated to change an economic variable in New South Wales by *x* per cent, then the contribution of a 10 percent increase in overseas tourism to that variable is deemed to be *x* per cent. The same technique is applied to project the effects of increased tourism expenditure to NSW from other origin markets.

Assumption of Increase in International Tourism to NSW only

In the simulations the effects of a ten percent increase in international tourism to New South Wales assume constant demand for tourism to the RoA. In these simulations the State is assumed to gain 100% of the increased tourism expenditure to Australia.

Assumptions with 10% Increase in Interstate Tourism to NSW

In the case of the additional expenditure on interstate tourism to NSW from RoA, this can come at the expense of RoA's intrastate tourism (to compensate for the increase in interstate tourism) or through RoA's reduced expenditure on non-tourism goods and services. In the first case, where full substitution from the RoA's intrastate tourism is assumed, the increased tourism is proportionate to each other state's market share of interstate tourism to NSW.

Assumptions with 10% Increase in NSW Intrastate Tourism

The scenario for increased intrastate tourism in NSW presents a particular complication in that the additional expenditure can come at the expense of interstate tourism (i.e. NSW tourism expenditure in RoA) or through reduced expenditure on non-tourism goods and services purchased from all sources (local New South Wales and imported).

The economic simulations are based on four key assumptions about the federal government fiscal policy stance, two key assumptions about the wage setting environment, and four key assumptions about the aggregate level of employment.

Assumptions about Government Fiscal Policy Stance

The economic contribution of increased inbound tourism to a destination will depend on the nature of current government policy. When there is an increase in tourism demand, there is likely to be a change in the government's budgetary position. Tourists buy goods and services that are taxed and this adds to government revenue. Other industries will also expand or contract and, depending on the tax rates in different industries, there can be a positive or negative overall impact on government revenue.

Suppose an increase in tourism expenditure has a positive effect on revenue - the government will need to determine how it is going to respond, and its choice will affect economic activity. It could allow the budget surplus (deficit) to increase or decrease. It could increase expenditure, with consequent further impacts on economic activity. Alternatively, it could cut tax rates, also having an impact on activity. In analysing the impacts of additional tourism expenditures, we need to allow for the different possible responses by the governments that find their fiscal position altered. There is flexibility in CGE modelling to allow government revenue and expenditure to change independently. The gap between aggregate revenue and expenditure is filled by a broad measure of public borrowing.

In the specific simulations reported in this paper, the assumptions about the *Federal and State government fiscal policy stance* were:

- The budget deficits (government expenditure less government revenue) are variable, but income and payroll tax rates are fixed.
- The budget deficits are fixed, but income and payroll tax rates can vary (Neutral budget deficit).
- The budget deficit is variable, income and tax rates can vary, but nominal government consumption and investment expenditure is fixed.
- The budget deficit is variable; income and tax rates can vary but real government consumption and investment expenditure, and subsidies, are fixed.

Assumptions Relating to the Wage Setting Environment

The economic impacts of an increase in inbound tourism in the State of NSW will depend critically on the assumptions made about the extent of wages flexibility in the economy. The effects of tourism growth on macroeconomic and microeconomic variables in NSW will differ according to the ability of the tourism sector to obtain labour without resulting in higher wages (that is, whether or not there is a pool of unemployed labour ready to move into the tourism industry).

Specific assumptions are as follows:

- Fixed real wage (defined as the average nominal wages received by workers in the State of NSW divided by the national CPI), with flexible State real wage (deflated by State CPI). Nominal wage rates received by workers in NSW are assumed to move with the national CPI. In this case, employment is free to vary.
- Flexible real wage (defined as the average nominal wages received by NSW workers divided by the national CPI), with flexible State real wages (deflated by NSW CPI).) - this assumption corresponds to the fixed employment cases.

Assumptions relating to the Aggregate Level of Employment

These are:

- Fixed national employment and fixed regional aggregate employment (and unemployment).
- Fixed national employment with variable regional employment/unemployment

In some of the long-run simulations it is assumed that there can be different movements in regional unemployment rates, regional labour supply and population and interregional migration. Some long-run simulations also assume a fixed national population. Thus,

- Fixed national aggregate employment

Specific assumptions include:

- Fixed state labour supply and population
- Flexible state unemployment rates
- No changes in interstate migration
- Fixed state employment rates
- Flexible state labour supply and population accommodated by interstate migration
- Fixed national population

The projected impacts of the increased tourism were found to differ according to the type of visitation, and the particular macroeconomic policy context. They also depend on whether a short-run or long-run perspective is adopted.

Short Run Simulations

Table 9 provides a summary of the maximum impacts of the set of simulations for each type of tourism increase undertaken by Dwyer, Forsyth, Spurr and Ho (2002) The table shows key impacts for NSW, for the RoA and for (total) Australia (NSW plus RoA). These short run simulations assume that industry capital stocks are fixed and that there are no changes in industry investment.

Table 9. Summary of maximum impacts on New South Wales and RoA of simulations of ten percent increase in tourism, short run, 2000-01

Source of Increased Tourism Expenditure		Increased Tourism Expenditure	Impact on Real Gross State Product		Impact on Employment	
		A$ million	A$ million	per cent	jobs	per cent
Intrastate tourism in NSW substituted for NSW tourism in RoA	NSW RoA Australia	1,032 -1,032 0	734 -615 119	0.308 0.142 0.018	11,238 -10,891 347	0.369 -0.179 **0.017**
Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S	NSW RoA Australia	540 0 540	382 -210 172	0.160 -0.049 0.026	6,111 -3,772 2,338	0.201 -0.062 0.032
Interstate tourism to NSW with full substitution from tourism in RoA	NSW RoA Australia	540 -540 0	322 -383 -60	0.135 -0.089 -0.009	4,992 -6,672 -1680	0.164 0.110 -0.012
International tourism to NSW	NSW RoA Australia	636 0 636	364 -121 244	0.153 -0.028 0.107	6,012 -2,736 3,276	0.197 -0.045 0.042
Intrastate tourism in NSW substituted for other goods and services	NSW RoA Australia	1032 0 1032	354 168 522	0.148 0.039 0.078	4,998 3,696 8,694	0.164 0.061 0.098
International tourism to Australia	NSW RoA Australia	636 1,074 1,710	249 471 718	0.104 0.109 0.107	3,666 8,013 11,679	0.120 0.132 0.128

The estimates in Table 9 assume a fixed budget deficit and fixed income real wages and a fixed nominal exchange rate. In reality there may be some effect of tourism on the nominal exchange rate, but this would simply alter the balance in the effect on the real exchange rate between changes in the domestic price level and the nominal exchange rate. The effects on the real exchange rate and other economic variables are not altered by this assumption.

An assumption about the flexibility or fixity of real wages is needed because the effects of tourism growth on macroeconomic and microeconomic variables in a tourism destination differ depending on the ability of the tourism sector to obtain labour without resulting in higher wages (that is, whether or not there is a pool of unemployed labour ready to move into the tourism industry). Employment generation is generally greater where real wages are fixed, irrespective of the government's fiscal policy stance. Real wages may be fixed if there is unemployment in the economy or if there are no shortages of labour with the skills necessary to serve the increased demand for tourism goods and services. The assumption of fixed real wages implies that the supply of labour to all industries is perfectly elastic. That is, the supply can be increased indefinitely without an increase in real wage levels. With labour prices constrained, most of the adjustment in the labour market occurs in the transfer of persons from unemployed or outside the workforce, to employment. It also implies that any initial price pressure reflected in the Consumer Price Index leads to an increase in money wages sufficient to maintain a constant level of real wages.

The economic contribution of increased inbound tourism to a destination will also depend on the nature of current government fiscal policy. When there is an increase in tourism demand, there is likely to be a change in the government's budgetary position. Tourists buy goods and services that are taxed and this adds to government revenue. Other industries will also expand or contract, and, depending on the tax rates in different industries, there can be a positive or negative overall impact on government revenue.

Suppose an increase in tourism expenditure has a positive effect on revenue- the government will need to determine how it is going to respond, and its choice will affect economic activity. It could allow the budget surplus (deficit) to increase or decrease. It could increase expenditure, with consequent further impacts on economic activity. Alternatively, it could cut tax rates, also having an impact on activity. In analysing the

impacts of additional tourism expenditures, we need to allow for the different possible responses by the governments that find their fiscal position altered. There is flexibility in CGE modelling to allow government revenue and expenditure to change independently. The gap between aggregate revenue and expenditure is filled by a broad measure of public borrowing.

In an environment of fixed real wages, the largest gains in employment and real GDP occur when the government fixes the budget deficit. With real government borrowing fixed, any projected changes in government revenue and expenditure have direct implications for rates of income and payroll taxes. Average tax rates are projected to fall, stimulating economic activity and generating employment. From the production side, the cut in the payroll tax rate reduces the price of labour, leading to a further decrease in the product real wage. From the demand side, the cut in the income tax rates contributes to an increase in the household disposable income, leading to a larger increase in household real consumption and hence a larger expansion in employment.

In the short run simulations undertaken, the most expansionary government policy stance is that where the (Federal and State) government budget deficits are fixed and income and payroll tax rates can vary. These results appear in Table 9. The fall in average tax rates in these simulations results in the largest increases in real household disposable income and real household consumption, leading to the largest increase in employment and the largest change in real GDP. In respect of the budget deficit itself, the most improvement in the deficit occurs when nominal government consumption and investment expenditure is fixed, regardless of whether real wages are fixed or variable.

Interestingly, in the simulations undertaken by Dwyer, Forsyth, Spurr and Ho (2002), the greatest gains in NSW GSP and employment were associated with an increase in intrastate tourism by NSW residents. The additional expenditure replaced that which would otherwise have been spent on interstate tourism by NSW residents to the RoA. In the simulations undertaken, Real GSP in the State increased by 0.308 per cent while employment increased by 0.369 per cent. The next highest impact markets are, in order, interstate tourism (with full substitution from RoA expenditure on other goods and services), international tourism to New South Wales, and intrastate tourism by NSW residents, where the additional substitution replaces that which would have been spent on other goods and services, and finally interstate tourism to NSW (with full substitution from intra-tourism in RoA). International tourism to Australia is associated with the smallest effects on the State, with impact on GSP and employment of 0.104 per cent and 0.120 per cent respectively.

Table 9 reveals that those markets that potentially contribute the largest gains to the State may produce lower impacts to the RoA and Australia. For only two origin markets- an increase in international tourism to Australia, and an increase in intrastate tourism substituted for other goods and services, are the gains positive for both New South Wales and RoA. In each of the other cases, the RoA suffers reduced Real GSP and employment. However, for Australia as a whole, that is including the effects in NSW, the results are positive in five of the six scenarios. In the case of increased interstate tourism to New South Wales with full substitution from intra-tourism in RoA, the nation as a whole experiences reduced GDP and employment.

Comparison of Results by Source of Change

Since the base volume of tourist expenditure is different for each origin market the assumed ten per cent increase in tourist expenditure implies different increases in tourist expenditure in New South Wales. The initial expenditure changes, which range between $540 million for the interstate tourism market, $636 million for the international tourism scenarios, and $1,032 million for the intrastate scenarios, are shown in Column Two of Table 9. To provide a more meaningful comparison of the differential impacts of expenditure injections from the different origin markets we can estimate the economic impacts on the State of a one million dollar change in tourist expenditure. The estimates are set out in Table 10, which provides a summary of the maximum impacts of the set of simulations for each type of tourism increase for the short run.

Table 10 reveals that a one million dollar increase in tourism expenditure in New South Wales from intrastate tourism, substituted for RoA interstate tourism, or a similar increase in interstate tourism to NSW, substituted for RoA expenditure on non-tourism goods and services, have the greatest impact on GSP and employment in the State at A$711,000 in GSP and 10.89 jobs and A$707,000 in GSP and 11.32 jobs respectively. The next highest impact market interstate tourism substituted for intra-tourism in RoA (A$597,000 and 9.24 jobs). The next largest gains in GSP and employment come from international tourism to New South Wales (A$573,000 and 9.45 jobs). Interestingly, the second smallest job creating tourism market for the State (but not for the nation) is international tourism to Australia. At A$393,000 GSP and 2.14 jobs created per one million dollars expenditure this is below the impact of intrastate tourism with full substitution from other goods and services at A$343,000 and 4.84 jobs).

Table 10. Economic impacts of $1 million increase in tourist expenditure by origin market, short run, 2000-01

Source of Change in Tourist Expenditure		Increase in GSP /GDP per $1 million Increase in Tourism Expenditure	Increase in Employment per $1 million Increase in Tourism Expenditure
		$ million	jobs
Intrastate tourism in NSW substituted for NSW tourism to RoA	NSW Australia	0.711 0.115	10.89 0.34
Interstate tourism to NSW substituted for other G&S	NSW Australia	0.707 0.319	11.32 4.33
Interstate tourism to NSW substituted for tourism in RoA	NSW Australia	0.597 -0.111	9.24 -3.11
International tourism to NSW	NSW Australia	0.572 0.383	9.45 5.15
International tourism to Australia	NSW Australia	0.393 1.289	5.76 18.36
Intrastate tourism in NSW substituted for other G&S	NSW Australia	0.343 0.506	4.84 8.42

Table 10 also reveals which of the selected markets generate the greatest impacts for Australia per million dollar tourism expenditure increase. By far the greatest gains to GDP and employment for the nation as a whole are associated with international tourism ($1.289 million contribution to GDP and 18.36 jobs). This is followed by intrastate tourism in New South Wales substituted for other goods and services ($506,000 and 8.4 jobs respectively). The next greatest impacts for Australia are associated with international tourism to New South Wales ($383,000 and 5.15 jobs). This is followed by interstate tourism to New South Wales substituted for RoA expenditure on other goods and services ($319,000 and 4.33 jobs) and intrastate tourism in NSW substituted for interstate tourism to RoA ($115,000 and 0.34 jobs). For interstate tourism to New South Wales, substituted for intra-tourism in RoA, the impacts on Australia overall are negative (although the impact is small).

These differential impacts are associated with the different spending patterns of different types of tourists. The largest gains in GSP and employment for NSW come from intrastate and interstate tourism because domestic tourists spend relatively more on domestic goods and services than international tourists. The 10 percent increase in international tourism in NSW produces a better result for NSW than the case of increased international tourism to Australia also due primarily to a smaller increase in the price of output. Intuitively, the uniform case also generates high demand and output for RoA, leading to an increase in its prices. Since NSW also demands inputs from RoA, this contributes to an increase in NSW prices. As a result, the increase in real international exports in NSW, in the case of a 10 percent increase in international tourism in NSW, is larger than that in the uniform case, leading to a larger increase in employment and GSP.

Long Run Simulations

The long run is characterised by variable capital (capital stocks used by industries can be changed, and borrowing/lending abroad can be varied) and investment and variable real wages, nationally and regionally. The additional economic activity in the domestic economy, generated by the increase in tourism, generates an increase in investment and capital. In the simulations undertaken, the same assumptions were made regarding the government fiscal policy stance. National employment is assumed to be fixed while regional employment is flexible, implying that an increase in employment in one region (State or RoA), implies a decrease in employment in the other. Further, changes in regional labour supply are assumed to be accommodated by regional migration, implying no changes in regional unemployment in the long run.

In the simulations undertaken by Dwyer, Forsyth, Spurr and Ho (2002), the greatest impacts on GSP and employment in New South Wales, in the long run, for each of the origin markets, occurred under the assumptions of a fixed budget deficit, fixed national employment, fixed state unemployment rates, flexible state labour supply, and population accommodated by interstate migration. Table 11 provides a summary of these impacts.

Table 11. Summary of maximum impacts on New South Wales of simulations of ten percent increase in tourism, long run, 2000-01

Source of Increased Tourism Expenditure		Increased Tourism Expenditure	Impact on Real Gross State Product		Impact on Employment (% & number of jobs) and on Real Wages	
		A$ million	A$ million	per cent	Jobs	per cent
Intrastate tourism in NSW substituted for NSW tourism to RoA	NSW RoA Australia	1032 -1032 0	2,722 -2451 271	1.142 -0.567 0.040	33,343 -33,343 0	1.095% -0.549% 0 jobs Real Wages: $17.4 million
Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S	NSW RoA Australia	540 0 540	1,440 -1282 158	0.604 -0.297 0.024	17,483 -17,483 0	0.574 -0.288 0 Real Wages: $45.8 million
Interstate tourism to NSW with full substitution from intra-tourism in RoA	NSW RoA Australia	540 -540 0	1,492 -1,339 153	0.626 -0.310 0.023	18,239 -18,239 0	0.599% -0.301% 0 Real Wages: $5.3 million
International tourism to NSW	NSW RoA Australia	636 0 636	1,366 -1,123 243	0.573 -0.260 0.036	16,672 -16,672 0	0.548 -0.275% 0 Real wages: $218.4million
International tourism to Australia	NSW RoA Australia	636 1,074 1,710	246 47 292	0.103 0.011 0.044	1,432 -1432 0	0.047% -0.024% 0 Real wages: $577.5 million
Intrastate tourism in NSW substituted for other goods and services	NSW RoA Australia	1,032 0 1,032	258 -224 34	0.108 -0.052 0.005	3,395 -3,395 0	0.112% -0.056% 0 Real Wages: $76.2 million

The projected gains for the long run simulations are greater than those for the short run, since increases in the CPI and the real exchange rate are relatively smaller than for the short run case. This reflects the fact that the capital stock is no longer fixed, and can be augmented to enable additional production. This can be funded by borrowing abroad given savings does not change much.

In these long run simulations, the national income real wage is endogenous. It is determined by macroeconomic circumstances rather than influenced by changes in sectoral demand and supply of the type analysed here. The state nominal wage rates are assumed to move by the same percentage, which is assumed to be equal to the percentage change in national CPI plus that in the national income real wage. With a fixed level of employment nationally, the increase in capital supplied to meet the additional tourism demand means an increase in the marginal productivity of labour. This produces a smaller change in output price and the CPI, and a larger increase in the income real wage and real household disposable income and consumption. As a result, there is a stronger increase in real GSP in New South Wales (Dwyer, Forsyth, Spurr & Ho 2002). The simulations confirm this for increases in intrastate tourism (with full substitution of tourism elsewhere in Australia), interstate tourism and international tourism to New South Wales.

Again, the greatest gains in State GSP and employment are associated with intrastate tourism, where the additional expenditure replaces that which would otherwise have been spent outside of the State. In the wider set of simulations undertaken, Real GSP in the State increased by 1.142 per cent while employment increased by 1.095 per cent. These increases are around three times the size of the projected increases in the short run. The next high impact markets are, in order, interstate tourism (on either substitution assumption), international tourism to New South Wales, intrastate tourism that replaces expenditure other goods and services in New South Wales, and international tourism to Australia. For increased intrastate tourism that replaced expenditure on other goods and services and for international tourism to Australia the long run effects on GSP and employment are smaller than the short run effects due to the higher real wage. In the short run, higher employment is associated with lower product real wage (equal to the nominal wage paid by producers minus the price of value added). In

the long run, a lower level of employment is associated with the higher real wage.

Table 11, reveals that some of those markets that potentially contribute the largest gains to New South Wales in the long run may produce negative impacts to the RoA. For each different origin market there are negative impacts on GSP and employment in RoA. However the national results, for Australia as a whole, are positive in all cases.

Table 12 reveals that a dollar expenditure injection into New South Wales from interstate tourism substituted for intratourism in RoA has the greatest impact on GSP and employment in the State in the long run. An additional one million dollar expenditure from this market generates A$2.76 million GSP and 33.78 jobs. The next highest impact market is interstate tourism to New South Wales substituted for expenditure on other goods and services (A$2.67 million and 32.38 jobs respectively) followed by intrastate tourism to New South Wales substituted for tourism in RoA (A$2.64 million contribution to GSP and 32.3 jobs). Next in terms of gains in GSP and employment come from international tourism to New South Wales (A$2.15 million and 26.2 jobs). Once again, international tourism to Australia provides a relatively small boost to GSP and jobs in the State (A$0.387 million contribution and 2.25 jobs), while the smallest projected impacts on GDP are again associated with intrastate tourism with full substitution from other goods and services (A$0.250 million and 3.3 jobs).

Table 12. Economic impacts of $1 million increase in tourist expenditure by origin market, long run, 2000-01

Source of change in Tourist Expenditure		Increase in GSP /GDP per $1 million increase in Tourism Expenditure	Increase in Employment per $1 million increase in Tourism expenditure
		$million	jobs
Intrastate tourism in NSW substituted for tourism in RoA	NSW Australia	2.64 0.263	32.31 0
Interstate tourism to NSW substituted for other G&S	NSW Australia	2.67 0.293	32.38 0
Interstate tourism to NSW substituted for intra-tourism in RoA	NSW Australia	2.76 0.283	33.78 0
International tourism to NSW	NSW Australia	2.15 0.382	26.22 0
International tourism to Australia	NSW Australia	0.387 0.459	2.25 0
Intrastate tourism to NSW substituted for other G&S	NSW Australia	0.250 0.033	3.29 0

Table 12 also reveals which of the selected markets generate the greatest long run impacts for Australia per million dollar tourism expenditure. The greatest contribution to GDP is associated with international tourism to Australia ($0.459), increased international tourism to New South Wales ($0.382 million), interstate tourism in New South Wales substituted for other goods and services ($0.293 million), interstate tourism in New South Wales substitutes for tourism in RoA ($0.283 million), intrastate tourism in New South Wales substituted for tourism in RoA ($0.263 million), and lastly intrastate tourism to New South Wales substituted for other goods and services ($0.033 million)

Industry Effects

Underpinning the above results are the changes in output and employment of industries as a result of changes in the amount and patterns of tourism expenditure. The following represents a preliminary discussion of some of the main changes in employment in different industries resulting from increased tourism in different origin markets. Only the greatest percentage changes in employment are shown based on estimated changes in industry output.

Short Run

Table 13 indicates the positive short run impacts on employment for key industry sectors, while Table 14 indicates those key industries that experience negative effects on employment in the short run. The assumptions underpinning the results are the same as for the results in Tables 9 and 10.

Table 13. Positive employment effects on selected industries in New South Wales of a ten percent increase in demand for New South Wales tourism, by origin market, short run (%)

International tourism to Australia		International tourism to NSW		Interstate tourism to NSW with full substitution from intra-tourism in RoA		Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S		Intrastate tourism in NSW substituted for NSW tourism to RoA		Intrastate tourism in NSW substituted for other goods and services	
NSW	**RoA**	**NSW**	**R0A**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**
Air Trans 2.4087	Air trans 4.3474	Air Trans 1.7533	Air Trans 0.7312	Hotels 1.9493	Dwel l. 0	Hotels 1.9943	Air Trans 0.9493	Hotels 3.6300	Water trans 0.0153	Hotels 3.3752	Brown coal 0.4839
Hotels 1.4756	Hotels 1.2141	Hotels 1.5916	Welfare 0.0177	Air trans 0.6400		Air trans 0.8093	Trans serv 0.3036	Petrol. Ref. 0.9133	Dwell. 0	Petrol ref. 0.9987	Oil 0.3273
Educ. 0.4305	Cult/rec 0.4025	Educ 0.4659	Admin Other Serv 0.0064	Elect. Other 0.3010		Petrol refining 0.4115	Alum. Mag 0.0734	Retail trade 0.6871		Trans serv. 0.7903	Water trans 0.1830
Cult/rec 0.3855	Trans serv 0.3946	Rail trans 0.3943	Cult/rec 0.0058	Elect/gas 0.2989		Cult/rec 0.3888	Rail trans 0.0566	Elect. Other 0.6769		Road transp 0.3803	Urban gas dist 0.1536
Rail trans 0.3475	Educ. 0.3946	Road trans 0.3904	Dwelling 0	Elect. Supply 0.2977		Elect. Other 0.3696	Oil 0.0505	Elect/gas 0.6724		Min ore 0.2897	Elect. Black 0.1421
Road trans 0.3476	Road trans 0.3074	Cult/ rec 0.3771		Motor vehicles 0.2852		Elect/gas 0.3671	Min ore 0.0183	Urban gas dist. 0.6538		Motor veh 0.2885	Air trans 0.1507
Retail trade 0.3014	Retail Trade 0.2931	Retail Trade 0.3078		Elect. Black 0.2628		Urban Gas dist 0.3669	Const. 0.0007	Motor vehicles 0.6407		Cult/re c 0.2838	Elect. Black 0.1421

Table 14. Negative employment effects on selected industries in New South Wales of a ten percent increase in demand for New South Wales tourism, by origin market, short run (%)

International Tourism to Australia		International Tourism to NSW		Interstate tourism to NSW with full substitution from intra-tourism in RoA		Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S		Intrastate tourism in NSW substituted for NSW tourism to RoA		Intrastate tourism in NSW substituted for other goods and services	
NSW	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**
Water trans -1.0503	Water trans -0.3422	Water trans -0.4515	Brown Coal -0.3674	Dwell 0	Hotels -0.970	Dwell 0	Brown coal -1.142	Air transp. -0.958	Hotels -1.788	Insure -0.3083	Dwell. 0
Metal prod -0.6688	Metal Prod -0.6056	Metal Prod -0.2245	Water trans -0.3045	Brown Coal 0	Brown Coal -0.744	Brown Coal 0	Elect. Brown -0.312		Air transp. -1.363	Elect. Supply -0.2367	
Other Manuf -0.5305	Oil -0.4384	Other Man -0.1828	Metal prod -0.2578	Oil 0	Elect. Brown -0.203	Oil 0	Urban gas dist -0.312		Brown coal -1.203.	Elect/gas -0.2214	
Chem -0.3747	Min ore -0.3256	Chem -0.0945	Oil -0.2028	Nat. Gas 0	Elect. Black -0.195	Nat. Gas 0	Elect black -0.279		Petrol. Ref. -0.391	Elect. Other -0.2214	
Alum Magnes -0.3423	Chem -0.3214	Agric -0.0275	Chem -0.1812	Elect. Brown 0	Urban gas dist. -0.195	Elect. Brown 0	Elect supply -0.274		Trans serv. -0.348	Repairs -0.2116	

Impacts on Industry in New South Wales

Industries in the State that experience the most positive growth in sectoral output and employment include Air Transport and Hotels. The state's Air Transport industry receives the greatest boost from the expenditure of international tourists, whereas hotel sector output and employment responds most positively to expenditure from interstate and intrastate markets. Expenditure by international tourists also generates positive growth in the

outputs of industry sectors such as Education, Culture/Recreation, Retail Trade and Rail and Road Transport.

Interstate tourism to New South Wales impacts most positively on the output of Hotels and Air Transport and also Power Generation related industries. Intrastate tourism impacts positively on Hotels in the state but also on Petroleum Refining, Retail Trade, Motor Vehicles and Culture/Recreation. Again, there is a positive effect on employment in Power Generation.

Industries in the State that experience the most negative percentage decline in output and employment as a result of increased international tourism include Water Transport, Metal Products, Other Manufacturing, Chemicals, Agriculture and Aluminium/Magnesium. These are primarily import competing or export sectors. It is noticeable that, except for the growth in direct tourism employment in Hotels and Air Services, the percentage reductions in the traditional export and import competing sectors are generally higher than the positive increases in other industries.

For interstate tourism to New South Wales, , no industries within the State experience a decline in output or employment although Dwellings, Brown Coal, Oil, Natural Gas, and Electric Brown Coal, experience no change in these variables. For increased intrastate tourism funded by foregoing a trip to RoA, Air transport in New South Wales experiences a decline in employment. In the case where intrastate tourism to New South Wales is a substitute for expenditure on other (non tourism) goods and services, there is a decline in employment in several services sectors with the greatest reductions experienced in Insurance, Electric Power generation and Repairs.

Impacts on Industry in RoA

Several industries in RoA experience positive growth in sectoral output and employment from international tourism growth to Australia consistent with existing state market shares, and to a lesser extent, increased international tourism to the state. For the across- the- board international tourism growth, the state industry sectors most positively affected include Air Transport Services, Hotels, Culture/Recreation, Transport Services, Education, Road Transport and Retail Trade. For an increase in international tourism only to New South Wales, increased employment occurs only in the industry sectors of Air Transport, Welfare, Administrative Services and Culture/Recreation.

For increased tourism to New South Wales from domestic tourism (interstate and intrastate), there are no positive effects on the output of any industry in the RoA. As indicated in Table 13, the only industry with non-negative growth as a result of the increased domestic tourism to New South Wales was Dwellings with zero growth.

Industries in the State that experience the most negative percentage decline in output and employment in RoA as a result of increased international tourism include Water Transport, Metal Products, Oils, Mineral Ore, and Chemicals. For interstate tourism, industry sectoral employment most adversely affected in percentage terms include Power generation, Brown Coal, and, for tourism substituted for other tourism, Hotels. For intrastate tourism substituted for tourism outside the state, the largest percentage decreases in employment in RoA occur in Hotels, Air Transport, Brown Coal, Petroleum Refining, and Transport Services. For intrastate tourism that is a substitute for expenditure on other goods and services, there are no negative effects on industry employment in RoA.

Long Run

Table 15 indicates the positive long run impacts on employment for key industry sectors, while Table 16 indicates those key industries that experience negative effects on employment in the long run. The assumptions underpinning the results are the same as for the results in Tables 11 and 12.

Table 15. Positive employment effects on selected industries in New South Wales of a ten percent increase in demand for New South Wales tourism, by origin market, long run (%)

International tourism to Australia		International tourism to NSW		Interstate tourism to NSW with full substitution from intra-tourism in RoA		Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S		Intrastate tourism in NSW substituted for NSW tourism to RoA		Intrastate tourism in NSW substituted for other goods and services	
NSW	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**
Air Trans 1.8659	Air trans 2.6669	Air Trans 2.3542	Dwell 0	Hotels 2.0314	Dwell. 0	Hotels 2.0145	Dwell 0	Hotels 3.627	Dwell 0	Hotels 2.805	Dwel l 0
Hotels 1.2349	Hotels 0.9421	Hotels 1.6774		Motor vehicles 1.4065		Motor veh 1.3417		Motor Veh 2.648		Petrol ref. 0.703	
Educ. 0.4401	Educ 0.2533.	Motor veh 0.9804		Air trans 1.1864		Air trans 1.1509		Retail trade 1.537		Motor veh 0.647	
Cult/rec 0.2997	Cult/rec 0.2415	Educ 0.9305		Cult/rec 0.7554		Cult/rec 0.7407		Cult/rec 1.507		Transp. Serv 0.557	
Retail trade 0.2971	Retail trade 0.2136	Retail trade 0.7404		Retail trade 0.7282		Retail trade 0.7091		TFC, wood, paper 1.333		Air transp 0.299	
Rail trans 0.1853	Health 0.1214	Cult/rec 0.6997		TFC, wood, paper 0.6874		TFC, wood, paper 0.6424		Food, drink 1.264		Road transp 0.283	
Road trans 0.1713	Road trans 0.0835	Health 0.6198		Food and drink 0.6443		Food, drink 0.6276		Wholesale Trade 1.164		Cult/ rec 0.247	

Table 16. Negative employment effects on selected industries in New South Wales of a ten percent increase in demand for New South Wales tourism, by origin market, long run (%)

International Tourism to Australia		International Tourism to NSW		Interstate tourism to NSW with full substitution from intra-tourism in RoA		Interstate Tourism to NSW with full substitution from RoA expenditure on other G&S		Intrastate tourism in NSW substituted for NSW tourism to RoA		Intrastate tourism in NSW substituted for other goods and services	
NSW	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**	**NSW**	**RoA**
Water trans -1.3091	Water trans -1.3120	Water trans- 0.0046	Water trans -0.6741	Dwell 0	Hotels -0.960	Dwell 0	Insure -0.428	Air trans -0.100	Hotels -1.838	Insure -0.339	Water trans -0.125
Metal prod -0.8478	Metal Prod -0.9734	Alum mag -0.0029	Metal prod -0.5915	Brown Coal 0	Petrol ref -0.446	Brown Coal 0	Retail trade -0.4228		Air trans -1.271	Repairs 0.167	Metal prod -0.121
Other Manuf -0.7684	Oil -0.9513		Oil -0.4979	Oil 0	Motor veh -0.407	Oil 0	Urban gas dist -0.397		Cult/ rec -0.759	Water -0.154	Hotels -0.106
Alum mag -0.6349	Alum mag -0.6769		Chem. -0.5133	Nat. Gas 0	Cult/ rec -0.398	Nat. Gas 0	Brown coal -0.370		Motor veh -0.737	Welfare -0.146	Chem -0.108
Min ore -0.5429	Chem -0.6326		TFC, Wood, paper -0.4478	Elect. Brown 0	Retail trade -0.394	Elect. Brown 0	TFC, wood, paper -0.367		Retail trade -0.684	Urban gas dist. -0.100	Air tranp. -0.101

Impacts on Industry in New South Wales

Industries in the State that experience the most positive growth in sectoral output and employment in the long run from each origin market include Air Transport and Hotels.

Expenditure from international tourism has the greatest percentage impacts on employment in Hotels and Air Transport. Other industries positively affected include Education, Culture/Recreation, Retail Trade, Rail and

Road Transport, Motor Vehicles and Health. Interstate and intrastate tourism, irrespective of whether it is a substitute for other tourism of for other goods and services, has the greatest percentage employment effects on Hotels, Motor Vehicles, Air Transport, Culture/Recreation, Retail Trade, TFC, Wood and Paper, Food and Drink, Transport Services and Wholesale Trade.

Industries in the state that experience the greatest percentage decline in employment in the long run from international tourism include Water transport, Metal Products, other Manufacturing, Aluminium Magnesium and Mineral Ores. For interstate tourism, regardless of what it is a substitute for, no industries in the state experience adverse employment effects in the long run. For the increase in intrastate tourism that substitutes for tourism to RoA, industries the only industry experiencing reduced employment is Air transport. For the increase in intrastate tourism that substitutes for expenditure on other goods and services, employment decreases most in percentage terms in Insurance, Repairs, Water, Welfare and Urban gas Distribution. Interestingly these are all service sectors.

Impacts on Industry in RoA

International tourism evenly distributed to Australian states according to existing market shares will lead to increased output and employment in Air transport, Hotels, Education, Culture/recreation, retail trade, Health and Road transport. For all other origin markets, there are no positive impacts on industry output and employment in RoA.

International tourism evenly distributed to Australian states according to existing market shares will lead to reduced output and employment particularly in Water transport, Metal Products, Oil, Aluminium Magnesium, Chemicals, and TFC, Wood and paper. These are primarily import competing industry sectors. For increased interstate tourism to New South Wales with full substitution from intrastate tourism in RoA, adverse output and employment effects occur in Hotels, Petroleum Refining, Motor vehicles, Culture/Recreation and Retail Trade. Where the increased interstate tourism is substituted for other goods and services, the largest percentage reductions in employment occur in Insurance, Retail trade, Urban Gas Distribution, Motor vehicles and TFD, Wood and paper. For increased intrastate tourism in New South Wales, irrespective of how it is funded, the largest percentage employment reductions occur in Hotels, Water transport, Air transport, Retail trade, Motor vehicles and Culture/Recreation. The adverse impacts on employment in RoA are greater for the case where intrastate tourism is substituted for tourism outside the state. This is to be expected as the RoA forgoes receipt of tourist expenditure when visitors remain within New South Wales.

The results reflect the particular industry structure of the State of New South Wales and RoA and depend on particular assumptions about labour and capital markets, exchange rate movements, and government fiscal policy. However, they have general significance. They highlight the fact that in real world economies with factor constraints, an expanding tourism industry is likely to have adverse impacts on other industry sectors. Thus tourism development may be a ‘catalyst’ for the growth of some industries in an economy but not for others.

More detailed analysis of industry effects is needed and this will be the subject of further research. It is clear, however, that use of a standard input-output framework for estimating the affects of an expanded demand for tourism would ignore the adverse employment impacts on other sectors in the economy and thus provide a very incomplete picture of tourism’s links with other sectors. While the assumptions used to generate these results, can, and should, be subject to critical examination, the use of CGE models in place of Input-output models implies that researchers must avoid simplistic statements concerning tourism’s alleged complementary links with all other industries.

References

Adams, P.D. & Parmenter, B.R. (1991). *The Medium Term Significance of International Tourism for the Australian Economy*. Report prepared for the Bureau of Tourism Research, Canberra.

Adams, P.D. & Parmenter, B.R. (1992). *The Medium-Term Significance of International Tourism for the State Economies, Part II*. Occasional Paper No. 7, Bureau of Tourism Research, Canberra.

Adams, P.D. & Parmenter, B.R. (1993). *The Medium Term Significance of International Tourism for the State Economies*. Report prepared for the Bureau of Tourism Research, Canberra.

Adams, P.D. & Parmenter, B.R. (1995). 'An Applied General Equilibrium Analysis of Tourism in a Quite Small, Quite Open Economy', *Applied Economics*, vol. 27, pp. 985-994.

Adams, P.D. and Parmenter, B.R. (1999). 'General Equilibrium Models'. In: K. Corcoran (Ed). *Valuing Tourism: Methods and Techniques*, Bureau of Tourism Research, Canberra

Archer, B. (1977a). 'Tourism Multipliers: The State of the Art', Bangor, Occasional papers in Economics No.11, University of Wales Press, Bangor

Archer, B. (1977b). 'Tourism in the Bahamas and Bermuda: two case studies', Occasional Papers in Economics No. 10, Bangor: University of Wales Press.

Archer, B. (1985). 'Tourism in Mauritius: an economic impact study with marketing implications', *Tourism Management* vol. 6, pp. 50-54.

Archer , B. (1995). 'Importance of Tourism for the Economy of Bermuda', *Annals of Tourism Research*, vol. 22, pp. 918-930

Archer, B. & Cooper, C. (1995).'The Positive and Negative Impacts of Tourism'. In: W. Theobald (Ed). *Global Tourism: The Next Decade*, Butterworth-Heinnemann Ltd. Oxford.

Archer, B. & Fletcher, J. (1996). 'The Economic Impact of Tourism in the Seychelles', *Annals of Tourism Research*, vol. 23, pp. 32-47.

Australian Capital Territory, Auditor-General (2002), 'Performance Audit V8 Car Races in Canberra- Costs and Benefits', Canberra, July

Baum, T. (1991) 'Scope of the Tourism Industry and its Employment Impact in Ireland', *Services Industry Journal*, vol. 11, pp. 140-151

Blake A. (2000). 'The Economic Effects of Tourism in Spain Discussion Paper', 2001/2 Tourism and Travel Research Institute Discussion Paper. http://www.nottingham.ac.uk/ttri/series.html

Blake, A., Durbarry, R., Sinclair, T., & Sugiyarto, G. (2000). *Modelling Tourism and Travel Using Tourism Satellite Accounts and Tourism Policy and Forecasting Models*. Tourism and Travel Research Institute Discussion Paper 2001/4. http://www.nottingham.ac.uk/ttri/series.html.

Bounds, M., Dwyer, W., & Mallik, G. (1999). 'The Sydney Olympics and Movements in the Price of Residential Property', *Australian Property Journal*, vol 35, pp. 650-654.

Briassoulis, H. (1991). 'Methodological Issues: Tourism Input-Output Analysis', *Annals of Tourism Research*, vol. 18, pp. 435-449.

Bull, A. (1995). *The Economics of Travel and Tourism* second edition, Longman, Sydney.

Bureau of Industry Economics (1984). *Tourist Expenditure in Australia*, Research Report 16, Canberra: AGPS

Centre for International Economics (1988). *Economic Effects of International Tourism*, Canberra.

Dixon P., & Parmenter, B.R. (1996) 'Computable General Equilibrium Modelling for Policy Analysis and Forecasting'. In: H. Aman, D. Kendrick and J. Rust (Eds), *Handbook of Computational Economics*, Volume 1, Elsevier Science B.V. pp 4-85.

Dixon P., Parmenter, B.R., Sutton, J., & Vincent, D. (1982). *ORANI-F: a Multisectoral Model of the Australian Economy*, North Holland Publishing Co., Amsterdam.

Dwyer, L. (2000). 'Economic Contribution of Tourism to Andhra Pradesh'**,** *Tourism Recreation Research*, vol. 25, pp. 1-11.

Dwyer, L. (2003). 'Cooperative Destination Marketing: revisiting the assumed economic impacts', *Pacific Tourism Review*, vol. 6, pp. 95-105.

Dwyer, L., & Edwards, D. (2001). 'Nature-based Tourism on the Edge of Urban Development', *Journal of Sustainable Tourism*, vol. 8, pp. 267-287.

Dwyer, L., & Forsyth, P. (1993). 'Assessing the Benefits and Costs of Inbound Tourism', *Annals of Tourism*

Research, vol. 20, pp. 751-768. (Selected for inclusion in The Economics of Tourism Vol II edited C. A. Tisdell, International Library of Critical Writings in Economics (Mark Blaug series editor) Edward Elgar Publishing Ltd, Cheltenham U.K. 2000. pp 286- 303)

Dwyer, L., & Forsyth, P. (1994a). 'Government Support for Tourism Promotion: Some Neglected Issues', *Australian Economic Papers*, pp. 355-374. (Selected for inclusion in The Economics of Tourism Vol II edited C.A. Tisdell, International Library of Critical Writings in Economics (Mark Blaug series editor) Edward Edgar Publishing Ltd, Cheltenham U.K. pp 304-323 (Originally published in Australian Economic Papers 1994).

Dwyer, L. & Forsyth, P. (1994b). 'Foreign Tourism Investment: Motivation and Impact', *Annals of Tourism Research*, vol 21, pp. 512-537.

Dwyer, L. & Forsyth, P. (1996). 'International Trade in Tourism Services', *Asia-Pacific Economic Review*, Vol. 2, pp. 32-38.

Dwyer, L. &, Forsyth, P. (1997). 'Measuring the Benefits & Yield from Foreign Tourism', *International Journal of Social Economics*, vol. 24 pp. 223-236.

Dwyer L. & Forsyth, P. (1998). 'Estimating the Employment Impacts of Tourism to a Nation', *Tourism Recreation Research* vol 23, pp. 1-12.

Dwyer, L., Forsyth, P., Madden, J., & Spurr, R. (2000). 'Economic Impacts of Inbound Tourism under Different Assumptions about the Macroeconomy', *Current Issues in Tourism*, vol 3, pp. 325-363.

Dwyer, L., Forsyth, P., &, Rao, P. (2000a). 'The Price Competitiveness of Travel and Tourism: a comparison of nineteen destinations', *Tourism Management***,** Special issue: the Competitive Destination, vol. 21, pp. 9-22.

Dwyer, L., Forsyth, P., & Rao, P. (2000b). 'Sectoral Analysis of Price Competitiveness of Tourism: an International Comparison', *Tourism Analysis*, vol 5, pp. 1-12.

Dwyer, L., Forsyth, P., &, Rao, P. (2001). 'Destination Price Competitiveness: Exchange Rate Changes Vs Inflation Rates', *Journal of Travel Research*, vol 40, pp. 340-348.

Dwyer, L., Forsyth, P., & Spurr, R. (2003). 'Inter-Industry Effects of Tourism Growth: Some Implications for Destination Managers', *Tourism Economics*, vol. 9, pp. 117-132.

Dwyer, L. & Kim, C.W. (2003). 'Destination Competitiveness: Determinants and Indicators'. *Proceedings of 33rd Annual Conference Travel and Tourism Research Association*, Washington, 22 June.

Dwyer, L., Forsyth, P., & Spurr, R. (2003). 'Evaluating Tourism's Economic Effects: New and Old Approaches' unpublished.

Dwyer, L., Forsyth, P., Spurr, R., & Ho, T. (2003a). 'The Contribution of Tourism to a State and National Economy: A multi-regional general equilibrium analysis', forthcoming in *Tourism Economics.*

Dwyer, L., Forsyth, P., Spurr, R., & Ho, T. (2003b). 'Economic Impact of Special Events: A Re-assessment', unpublished.

Fletcher, J. (1994a). 'Economic Impact'. In: S. Witt & L. Moutinho (Eds), *Tourism Marketing and Management Handbook*, (2nd ed.), Prentice Hall International, UK, pp 475-479.

Fletcher J. (1994b). 'Input-output Analysis'. In: S. Witt & L. Moutinho (Eds), *Tourism Marketing and Management Handbook*, (2nd ed.), Prentice Hall International, UK, pp 480-484.

Fletcher J., & Archer, B. (1991). 'The Development and Application of Multiplier Analysis'. In: C. Cooper (ed), *Progress in Tourism, Recreation and Hospitality Management*, Vol 1, London, Bellhaven.

Frechtling, D. (1987). 'Assessing the Impacts of Travel and Tourism- Measuring Economic Benefits'. In: J.R.B. Ritchie and C.R. Goeldner (Eds), *Travel, Tourism and Hospitality Research- a Handbook for Managers and Researchers*, John Wiley and Sons, New York.

Frechtling, D. & Horvath, E. (1998). 'Estimating the Multiplier Effects of Tourism Expenditures on a Local Economy through a Regional Input-output Model', *Journal of Travel Research*, vol. 37, pp. 324-332.

Gunn, C. (1994). *Tourism Planning*, 2nd ed., Taylor & Francis, New York.

Han, S.H., Madden, J.R. & Pant, H.M. (1998). 'M2R (NSW): A Two-region version of the Monash Multiregional Model', CREA Research Memorandum, Centre for Regional Economic Analysis, University of Tasmania.

Harrison, G., Jensen, S., Pedersen, L., & Rutherford, T. (2000). 'Using dynamic general Equilibrium Models for Policy Analysis'. In: G. Harrison, S. Jensen, L. Pedersen and T. Rutherford (Eds), *Contributions to Economic Analysis*, Vol. 248, Elsevier, North Holland, Oxford and New York.

Harrison, W.J. & Pearson, K.R. (1996). 'Computing Solutions to Large General Equilibrium Models Using GEMPACK', *Computational Economics*, vol. 9, pp. 87-127.

Heng, T.M., & Low, L. (1990). 'The Economic Impact of Tourism in Singapore', *Annals of Tourism Research*, vol. 17, pp. 246-249.

Henry, E.W. & Deane, B. (1997). 'The Contribution of Tourism to the Economy of Ireland in 1990 and 1995', *Tourism Management*, vol. 18, pp. 535-553.

Hertel, T.W. (1997). *Global Trade Analysis: Modelling and Applications*, Cambridge University Press, Cambridge.

Holloway, J.C. (1989). *The Business of Tourism* (2nd ed.), McDonald and Evans, Plymouth.

Hunn, C. & Mangan, J. (1999). 'Estimating the Economic Impact of tourism at the local, regional and State or territory level, including consideration of the multiplier effect'. In: *Valuing Tourism: Methods and Techniques*, Occasional paper No. 28, Bureau of Tourism Research, Canberra.

Industry Commission (1996a). *Tourism Accommodation and Training Report No. 50*, Industry Commission, Canberra.

Industry Commission (1996b). *State Territory and Local Government Assistance to Industry. Report No. 55* October, AGPS, Canberra.

Inskeep, T. (1991). *Tourism Planning: an Integrated and Sustainable Development Approach*, Van Nostrand Reinhold, New York.

Jackson, M.J. (1986). *Economic Impact Studies: The Methodology Applied to Tourism*, Bristol Polytechnic, Bristol.

Johnson, R. (1999). 'Input-output Models with and without the Multiplier Effect'. In: *Valuing Tourism: Methods and Techniques*, Occasional Paper No. 28, Bureau of Tourism Research, Canberra.

Kahn, H., Seng, C., & Cheong, W. (1989). 'The Economic and Social Impact of Tourism on Singapore'. In: C. Tisdell, C. Aislabee and J.Stanton (Eds), *Economics of Tourism: Case Study and Analysis*, University of Newcastle, Australia.

Lin, T., & Sung, Y. (1983). 'Hong Kong'. In: E.A. Pye and T. Lin (Eds), *Tourism in Asia: the Economic Impact*, Singapore University Press, Singapore.

Lundberg, D., Stavenga, M., & Krishnamoorthy, M. (1995), *Tourism Economics*, John Wiley, New York.

McDougall, R. (1995). 'Computable General Equilibrium Modelling: Introduction and Overview', *Asia-Pacific Economic Review*, vol 1, pp. 88-91.

Madden, J. R. (1996). 'FEDERAL: A Two Region Multisectoral Fiscal Model of the Australian Economy'. In: L. Vlacic et. al. (Eds), *Modelling and Control of National and Regional Economies*, pp 347-352, Pergamon, Oxford.

Madden, J.R., & Thapa, P.J. (2000). *The Contribution of Tourism to the New South Wales Economy*. Report commissioned by the Sustainable Tourism CRC, Centre for Regional Economic Analysis, University of Tasmania, Hobart.

Mathieson, A., & Wall, G. (1982). *Tourism: Economic, Physical and Social Impacts*, Longman, London.

Meagher, G., & Parmenter, B. (1990). *ORANI-NT*: *A Multisectoral Model of the Northern Territory Economy*, The Australian National University, North Australia Research Unit, Darwin.

Mules, G. (1999). 'Estimating the Economic Impact of an Event on a Local Government Area, Region, State or Territory'. In: *Valuing Tourism: Methods and Techniques*, Occasional Paper No. 28 Bureau of Tourism Research, Canberra.

Naqvi, F. & Peter, M.W. (1996). 'A Multiregional, Multisectoral Model of The Australian Economy With An Illustrative Application', *Australian Economic Papers*, vol. 35, pp. 94 -113.

New South Wales Treasury and Centre for Regional Economic Analysis (1997). 'The Economic Impact of the Sydney Olympic Games. Final Report', NSW Treasury, November.

Oxford Economic Forecasting (1999). 'The Contribution of the Aviation Industry to the UK economy', November, http://www.oef.co.uk/AviationUK.html

Pavaskar, M. (1987). 'Employment Effects of Tourism and the Indian Experience', *Journal of Travel Research*, vol. 10, pp. 32-38.

'Policy: Recruitment and Retention'. In: *Tourism and Job Creation.* Selected Papers from the CLR 1989 Tourism Conference, Edinburgh, January.

Peter, M. (1994). 'An Overview of MONASH-MRF: A Multiregional Model of Australia". Mimeo, Centre of Policy Studies, Monash University, 26pp.

Pollard, A. (1976). 'Antigua, West Indies: an example of the operation of the multiplier process arising from

tourism', *Revue de Tourisme*, vol. 3, pp 30-34.

Productivity Commission (1999). *International Air Services*, Canberra, June.

Ruiz, A.L (1985). 'Tourism and the Economy of Puerto Rico: an Input-output Approach', *Tourism Management*, vol. 6, pp. 61-65.

Sadler, P., Archer, B., & Owen, C. (1973). *Regional Income Multipliers*, Occasional Papers in Economics, No. 1, University of Wales Press, Bangor.

Sinclair, M.T. (1998). 'Tourism and Economic Development: A Survey', *Journal of Development Studies*, vol. 34, pp. 1-51.

Skene, J. (1993a). 'The Economic Impact of Growth in Visitor Expenditure: a Quantitative Assessment', Bureau of Industry Economics Working Paper No. 92, August.

Skene, J. (1993b). 'Some Short-run Effects of an Increase in International Visitor Expenditure', Bureau of Industry Economics Working Paper No. 94, December.

Song, B.N., & Ahn, C. (1983). 'Korea'. In: E.A Pye and T. Lin (Eds), *Tourism in Asia: the Economic Impact*, Singapore University Press, Singapore.

Sugiyarto, G., Blake, A., & Sinclair, T. (2002). 'Economic Impact of Tourism and Globalisation in Indonesia Discussion Paper', 2002/2 Tourism and Travel Research Institute. http://www.nottingham.ac.uk/ttri/series.html

Tourism Industry Working Group (2001). *Report on the Implications of the Ansett Collapse and the US Terrorist Attacks on the Australian Tourist Industry*, Department of Industry Science and Resources, Canberra, October.

Tribe, J. (1999). *The Economics of Leisure and Tourism*, Butterworth-Heinneman, Oxford.

Van Sinderen, J. & Roelandt, T.J.A. (1998). 'Policy Implications of Endogenous Growth Models'. In: S. Brakman, H. van Ees and S.K. Kuipers (Eds), *Market Behaviour and Macroeconomic Modelling*, Macmillan Press, Houndmills/London, pp. 341-358.

Wanhill, S. (1988). 'Tourism Multipliers Under Capacity Constraints', *Service Industries Journal*, vol. 8, pp. 136-142.

West, G. (1993) 'Economic Significance of Tourism in Queensland', *Annals of Tourism Research*, vol. 20, pp. 490-504.

West, G. &. Gamage, A. (2001). 'Macro Effects of Tourism in Victoria: a Nonlinear Input-output Approach', *Journal of Travel Research*, vol. 40, pp. 101-109.

Witt, S.F. (1987). 'Economic Impact of Tourism on Wales', *Tourism Management*, vol. 8, pp. 306-316.

Woollett, G., Townsend, J., & Watts, G. (2001). *Development of QGEM-T A Computable General Equilibrium Model of Tourism*, Office of Economic and Statistical Research, Queensland Government Treasury.

World Tourism Organisation (1999a). *Tourism Development and Management Plan for Andhra Pradesh*, for Government of Andhra Pradesh, WTO, Madrid.

World Tourism Organisation (1999b). *Tourism Satellite Account (TSA): The Conceptual Framework* WTO, Madrid

Yao, S., & Liu, A. (2000). 'Policy Analysis in a General Equilibrium Framework', *Journal of Policy Modelling*, vol. 22, pp. 589-610.

Zhao, D., Yanagida, J., Chakravorty, V., & Leung, P. (1997). 'Estimating Economic Impacts from Tourism', *Annals of Tourism Research*, vol. 24, pp. 76-89.

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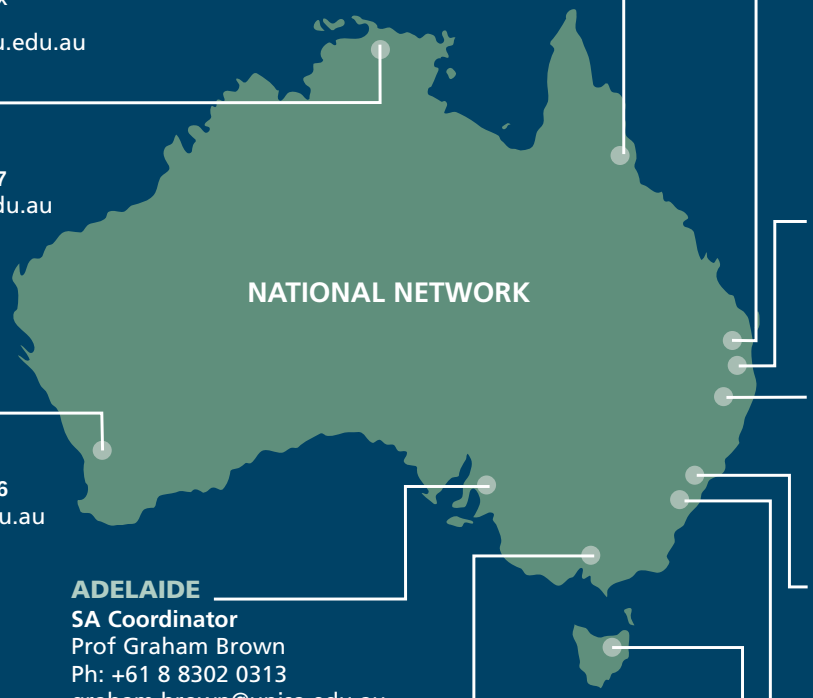

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