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The Economic Impact of the Sydney Olympic Games

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The Economic Impact of the Sydney Olympic Games

A Collaborative Study by NSW Treasury and The Centre for Regional Economic Analysis University of Tasmania

Final Report

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1. Introduction

The Sydney Olympics is an event of sufficient magnitude that it is expected to have a significant positive impact on the NSW and national economies. Through the exposure that it gives to Sydney and New South Wales in particular, and as a consequence of the experience gained in preparing for and running the Games, there is scope for some longer term economic gains to be enjoyed. The prospect of the shorter term economic benefits being maximised, and longer term benefits being realised will be assisted by understanding the ways in which activities generated by the Olympics have consequences for the economy. This report identifies the ways in which the Olympic Games are likely to directly affect the economy, and contains a detailed quantitative assessment of the probable impacts on the Australian and NSW economies of the Sydney Olympic Games.

The report is the outcome of a collaborative study by the NSW Treasury and the Centre for Regional Economic Analysis at the University of Tasmania. The study has quantified many of the direct impacts associated with the Olympics, and the flow on impacts throughout the State and national economies. The broader economic impacts have been assessed using a model of the Australian economy, the Monash Multi-Regional Model, that separately distinguishes the NSW economy and each of the other State economies. This model arguably represents the most sophisticated analytical tool with which such a study could be undertaken.

The report contains estimates of the economic impacts that are expected to occur over the twelve year period from 1994/5 to 2005/6, as a consequence of the holding of the Sydney Olympic Games in 2000. For the purposes of the analysis, the assessment has been divided into three time periods, with results being provided in terms of annual averages during each of these three phases of the Games:

- The pre-Games (preparation/construction) phase, 1994/95 to 1999/2000;
- The Games year, 2000/01;
- The post-Games phase, 2001/02 to 2005/06

The first of these phases is characterised by two types of direct impact associated with the Games: almost $2.5 billion of construction of the Games site and associated infrastructure, and a significant increase in international visitors arising from the extra exposure the Olympics has brought to Australia and Sydney in particular. The Olympics-induced addition to inbound tourism to Australia is expected also to be a key feature of the Games and post-Games years, with the number of extra international tourists expected to reach a peak of almost 340 thousand in 2001 before gradually returning over several years, towards the non-Olympics underlying trend. As a consequence of the experience gained from running the Olympics, it has been assumed that there will be a small increase in labour productivity in the post-Games period. In addition, some increase in Australian exports of manufactures is also projected for the post-Games phase as a consequence of the Olympics exposure. The Games year itself will feature significant additions to aggregate demand via the export of the Olympics television rights, Olympics promotion, ticket sales and the expected influx of some 700,000 visitors including over 80,000 overseas spectators, media and Olympics athletes and officials.

2. The Economics of the Impact of the Sydney Olympics

The conclusion of the study is that there are likely to be significant net economic benefits flowing from the Olympics, as indicated by the results reported below. However, those benefits that have been taken into account will be concentrated predominantly in New South Wales, and will be reasonably modest in relation to the economy overall with the total increase in NSW gross state product (GSP) over the eleven year period, worth around 4 per cent of 1995/96 GSP. The study also demonstrates that the extent of the economic benefits from the Olympics can be influenced by government policies, and considerable efforts will be required by both governments and the business community to maximise the longer term gains. And, even though a great deal of effort has been taken in the study to derive the best estimates of the direct impacts and associated flow on impacts, there is inevitably a degree of uncertainty surrounding such estimates not least because it will not be possible to see what the economy would have looked like in the absence of the Games. Therefore a range of results have been reported corresponding to different scenarios.

In economic terms, the construction activity, additional tourism, and sales of Olympics related outputs such as tickets and television pictures can be thought of as additional sources of demand for the NSW economy. There can be a simplistic tendency to view additions to demands, and additional exports in particular, as an unambiguous benefit. The study indicates that the operation of the economy, and the implications of Olympics demand shocks, is rather more complicated than the simplistic view implies. In particular, consideration needs to be given to the supply side of the economy as well as the demand side.

In order for the demands related to the Olympics to be satisfied, resources are required, and some of those resources may be diverted from other uses. To the extent that demands related to the Olympics absorb resources that would not otherwise have been utilised, such as labour resources, they will add to both employment and the total output of the economy. However, where Olympics demands compete with other sources of demand, there will be some redirection of resources away from existing uses. Moreover, some Olympics related demands will be at the expense of demands elsewhere, with consequential distributional impacts. According to the literature reviewed as part of the current study, all of these kinds of interactions have been evident for previous Olympic Games.

One of the lessons that has been drawn from the economic analysis associated with the Atlanta Olympics in 1996 in particular, is that a clear understanding of how the economy functions, and of the likely interaction of Olympic related activity with the rest of the economy, will help to ensure that appropriate economic decisions are made. Nevertheless, the issues are often fairly complex.

Specifically, the ways in which the economy adjusts in response to demand shocks is complex, and the model utilised in the study is necessarily elaborate. The model is capable of producing estimates of the impacts for a very wide range of economic variables, but it can not capture all potential sources of economic impact. Such a modelling exercise inevitably relies on a number of assumptions about the functioning of the economy and the responsiveness of various sectors of the economy. Estimates for the flow-on economic impacts of the Olympics will be more sensitive to some of these assumptions than others. A lot of effort in the study has been given to investigating the implications of changed assumptions, and consequently this report pays significant attention to this issue. .

3. Estimates of the Expected Impact of the Sydney Olympics

A number of assumptions were identified as being of particular importance in deriving estimates of the economic impacts. These were:

- The magnitude of the direct impacts - construction expenditure, additions to tourism, exports of television pictures, ticket sales and sales of souvenirs;
- Conditions in the labour market;
- Commonwealth government macro-economic policy;
- The sources of finance for the Olympics;
- The impact of the games on productivity; and
- The impact of the Games in terms of increasing the demand for Australian produce.

The results for the central scenario are summarised in Table 1. These results are the expected impacts of the Olympics for a given set of assumptions above what otherwise would have been the case, and are not forecasts of the future values of variables.

In absolute terms these are significant impacts. For instance NSW gross state product is projected to be over $0.75 billion (or over half a per cent) higher in an average year of the six year construction period. In the Games year a $1.7 billion expansion in NSW gross state product and an additional twenty-four thousand jobs in the State are expected. These jobs are full-time and full-year equivalents, so that the actual number of persons to find work in the Games year could be considerably higher, given some part-time work and the average period of employment being for only part of the year. Estimates for changes in household consumption are included as a measure of economic welfare. Care must be taken in interpreting state results as much of the increased NSW output reflects labour movement to New South Wales from other Australian states rather than increased output per capita.

Table 1: Economy Wide Impact of the Sydney Olympics - Central Scenario, Annual Average by Period

		Gross Domestic Product ($95/96 million)	Real Household Consumption ($95/96 million)	Employment ('000 annual jobs)
Pre-Games, 94/95-99/00	NSW Aust	750 775	350 275	10.1 11.1
Games year, 2000/01	NSW Aust	1,700 1,550	350 525	24.0 29.4
Post-Games, 01/02-05/06	NSW Aust	400 425	375 650	3.0 0.4

All values have been rounded to the nearest $25 million.

Table 2 shows the impacts on aggregate investment, exports, and the consumer price index under the central scenario.

Table 2: Impact of the Sydney Olympics - Central Scenario, Annual Average by Period

percentage change above base		Investment	Exports	Consumer Price Index[(a)]
Pre-Games, 94/95-99/00	NSW Aust	1.35 0.51	0.71 0.14	0.04 0.04
Games year, 2000/01	NSW Aust	0.09 0.02	5.76 1.43	0.53 0.33
Post-Games, 01/02-05/06	NSW Aust	0.10 0.25	0.22 -0.27	0.29 0.30

(a) CPI results show the percentage change in the rate of price growth, rather than the percentage point change in the price index.

The Olympics is expected to cause some modest increases in investment, in particular in the pre-Games period. The increase in exports is expected to be significant in the Games year. In the pre-Games phase there is expected to be a negligible increases in consumer prices. In the Games and post-Games phases CPI growth is expected to increase by about one third of a per cent. The NSW CPI is expected to grow by an additional half a per cent in the Games year and just over a quarter of a per cent in the post-Games phase.

Table 3: Industry Impact of the Sydney Olympics - Central Scenario, Annual Average by Period

percentage change above base	Pre-Games, 94/95-99/00		Games Year, 2000/01		Post-Games, 01/02-05/06	
	NSW	Aust	NSW	Aust	NSW	Aust
Rural	0.07	0.01	0.06	-0.02	-0.20	-0.25
Mining	0.09	-0.04	-0.23	-0.16	-0.97	-0.69
Manufacturing	0.25	0.12	0.24	0.13	0.06	-0.03
Public Utilities	0.32	0.11	0.61	0.16	0.23	0.08
Construction	1.55	0.54	1.85	0.63	0.26	0.12
Domestic Trade	0.37	0.12	0.59	0.14	0.24	0.11
Transport & Communication	0.45	0.28	1.24	0.99	0.35	0.23
Finance	0.36	0.13	0.47	0.15	0.20	0.05
Housing	0.33	0.15	0.09	0.03	0.30	0.19
Public Services	0.22	0.08	0.27	0.15	0.21	0.14
Community Services	0.30	0.07	0.45	0.12	0.26	0.14
Personal Services	0.50	0.26	2.49	1.12	0.50	0.35

Table 3 shows that the impacts on different industries is expected to vary, with a particularly favourable effect on NSW construction, projected to expand by over 1.5 per cent in the pre-Games phase and almost 2 per cent in the Games year. There is also a large increase in output of the personal services industry in the Games year, and to a lesser extent the transport and communication industry, both associated with the increase in tourism demands.

The study also considered the impacts for the eight major occupational categories, and does not identify any significant skill-shortage effects. However, this evidence is inconclusive given the high degree of occupational aggregation: there may well be skills shortages within these broad occupational classifications, especially during the intense activity of the Games period. . (

4. Timing of Impacts

Some simplifying assumptions have been made in regard to the timing of the direct impacts, such as that all Olympic construction activity is completed in the pre-Games period. Nevertheless, those assumptions are not material to the discussion below.

It can be seen from Table 1 on the previous page, that in the central scenario the effects of the Games are spread unevenly over the three phases with the bulk of the gains accruing in the first seven years of the twelve-year Olympic period. For instance, 61 per cent (or almost $3.8 billion) of the NSW increase in GSP, in net-present value terms, results from the pre-Games phase, while the Games year, which results in the largest single-year impact, contributes a further $1.2 billion (present value to 1995/96).

The last phase, despite significant Olympics-induced tourism and manufactured goods exports and an assumed slight Olympics-induced boost in labour productivity, contributes less than $1.3 billion to the total impact on the net present value of NSW GSP. The main reason why the earlier phases produce the bulk of the gains is simply that the Olympics is most successful in generating additional Australian jobs during the pre-Games period.

However, if it is assumed that Commonwealth Government policy ensures that the Olympics construction is in part financed from overseas savings, the effects of the Olympics will be somewhat less evenly spread, with even more of the gains being enjoyed in the earlier years, particularly with regard to real household consumption. .

5. Sensitivity of Results

The most important assumptions for the central scenario are as follows:

- some scope for non-inflationary increases in employment in the pre-Games period and the Games year, but none in the post-Games period;
- no productivity gains in the pre-Games period, and a small increase in productivity in the post-Games period;
- Commonwealth Government policy such that all capital costs are funded at the macro level from domestic savings in the pre-Games period;
- the NSW Government funds its share of the capital costs from a combination of Olympic induced tax revenues, lower capital expenditure, and direct Olympics revenues, with short-term debt being used only to bridge the gap between capital outlays and Olympics receipts, the debt being fully discharged in the Games year;
- a small increase in manufactured exports in the post-Games period.

The most important assumptions behind the substantial positive result generated by the Olympics relate to two macro-economic factors accompanying the considerable direct effects: the stimulus which the Olympics gives to employment in the pre-Games phase and Games-Year; and an increase in Australian labour productivity in the post-Games period. The increase in productivity is expected to arise as a consequence of the lessons learnt from successfully running an Olympics, and associated developments in technology. In the pre-Games phase the impetus to the NSW construction industry and the Olympics-induced boost to international tourism will increase the demand for labour. This in

turn should cause an increase in both the Australian real wage and level of employment. The extent to which the real wage increase is constrained, thus allowing for a greater increase in national employment, is very important in influencing the magnitude of the pre-Games result. Similarly, the assumed labour productivity increase in the post-Games phase, while only one-twentieth of one per cent for the Australian workforce as a whole, is vital to the post-Games phase having a substantial positive impact on the Australian economy.

Without these two labour-market effects, significant positive effects from the Games for Australia as a whole would be limited to the Games year, with the other two phases in aggregate reducing the national GDP gains from the Olympics to only half a billion dollars (in part because the Olympics related capital is not productive prior to the Games). While such a constrained supply side result is unlikely, the clear message is that if wage and productivity outcomes are less favourable than assumed, the gains from the Games will be reduced somewhat. Alternatively, a better than expected labour-market outcome would enhance the Olympic gains.

Table 4: Net Present Value of GDP and Consumption Impacts Under Alternative Scenarios

		Gross Domestic Product ($95/96 million)	Real Household Consumption ($95/96 million)	Cumulative Employment ('000 annual jobs)
Central scenario	NSW Aust	6,300 6,350	3,125 3,700	99.5 98.7
Flexible supply-side scenario	NSW Aust	7,125 8,025	3,575 4,675	108.2 120.4
Resource constrained scenario	NSW Aust	5,200 4,050	2,400 2,100	88.5 78.9

Table 4 indicates how the impact of the Olympics is projected to vary under alternative scenarios concerning both the size of direct effects and various macro-economics settings.

From the above results it can be seen that the Olympics, under reasonably conservative assumptions, can still be expected to bring significant positive economic impacts, particularly for New South Wales.

The changed assumptions in the flexible supply-side scenario are:

- More scope for non-inflationary increases in employment in the pre-Games period;
- A slightly bigger productivity gain in the post-Games period;
- More Olympics induced tourism in all three periods;
- More induced exports of manufactured goods in the post-Games period;
- Commonwealth Government policy is such that some of the capital costs of the Olympics are, at the macro level, funded from foreign savings in the pre-Games period, with the foreign debt being repaid in the post-Games period.

The changed assumptions in the resource constrained scenario are:

- Less scope for non-inflationary increases in employment in the pre-Games period;
- No productivity gain in the post-Games period;
- Less Olympics induced tourism in all three periods;
- No induced exports of manufactured goods in the post-Games period;
- Macro-economic capital cost funding as per the central scenario.

The way in which the country as a whole finances the construction at the macro level is seen to only impact on the timing of the effects. The assumption regarding the financing of the NSW Government's share of construction costs is consistent with government policy, and is unchanged in all three scenarios. Because the construction outlays have to be made before the Olympics generates any cash flows for the government (from additional tax revenues plus direct Olympics related revenues), short term debt is required to bridge this gap. However, once the majority of cash flows become available in 2000, the debt is fully repaid leaving no long term additions to debt to be serviced by future generations.

The Olympics should bring a number of other major benefits besides increases in measured GDP, household consumption and employment. These gains include:

- Substantial consumer surplus in addition to increased household consumption;
- A greatly improved stock of international-standard sporting facilities;
- Increased national pride from the games being staged in Australia.

While there are also unmeasured costs of holding the Games in Sydney (e.g. environmental, increased maintenance of infrastructure and of new venues), the study indicates that there should be very substantial benefits from hosting the Olympics, flowing to Australia and New South Wales in particular.

6. Comparisons with Other Studies of Olympic Economic Impacts

The only other attempt to estimate the economic impacts of the Sydney Olympics that we are aware of is that undertaken by KPMG in 1993, prior to the awarding of the Games to Sydney. On a comparable basis, the KPMG and the current study estimates for total impacts on national GDP and employment are close. However, the current study estimates of the impacts in terms of NSW GSP are almost 50 per cent higher than KPMG, and hence the benefits to Australia outside New South Wales are much smaller than according to KPMG. There are two main reasons why the current study's estimates for New South Wales are higher:

- The NSW economy will have to draw resources in from the other States in the pre-Games and Games year periods at the expense of those States;
- There will be demand switching in favour of New South Wales at the expense of other States, including from those State's residents.

The experience of Atlanta for the 1996 Olympic Games was consistent with the first point, with the tight labour market for the State of Georgia making it necessary to bring in labour from other States. The demand switching issue is of particular importance, and accords with experience from other Olympic Games including the Atlanta Olympics.

The closeness of the current study results and KPMG estimates is something of a coincidence given that there are major methodological differences between the two studies. Of most importance, the input-output approach utilised in the KPMG study implies a particular macro-economic environment, and ignores resource constraints. The input-output model allowed no scope to vary the macro environment. The only factors that could be varied in the KPMG study were the size of the direct induced visitor impacts, though in the current study the variability of the results to changes in the size of the direct impacts was much smaller than the variability associated with macro-economic factors. Therefore, the degree of precision associated with the KPMG estimates is misleading.

The current study provides a much richer range of results for a broader range of variables than the KPMG study. The modelling approach undertaken in the current study makes the treatment of key assumptions much more explicit, and allows the impact of changes in those assumptions to be explored in detail. It also has the advantage of utilising the most recent estimates of the direct impacts of the Games, including the latest estimates for the Olympics budget.

The analysis contained in this report was completed before the most recent update of the SOCOG and OCA budgets. In the period since these budget updates a study of the impact of the games by Madden was presented to the 'Living in the Olympic State' Conference. While the methodology employed in Madden (1997) is very similar to the methodology of this report, the assumptions employed are different. In particular, Madden assumes higher Olympic revenues (reflecting better than expected TV rights sales) and increased construction and operating expenditure (consistent with new budget estimates). Another difference between Madden (1997) and the current study is that Madden (1997) assumes no post-games labour productivity gains.

The results of the two studies are similar with both suggesting gains to the national economy between $6 billion and $6.5 billion in net present value terms. Employment and consumption results are also very similar for both studies. The more up-to-date budget estimates and other different assumptions used in Madden (1997) results in an estimated impact on the NSW economy of almost $7 billion which is slightly more than the estimate reported in this study of $6.3 billion.

7. Conclusions

Experience from previous Olympic Games has demonstrated the possibility of, on the one hand, a legacy of significant economic costs, as for the 1976 Montreal Olympic Games, or on the other hand substantial economic benefits, as for the 1984 Los Angeles Games. Therefore a well conducted Olympics has the potential to bring about some reasonable economic benefits, and the study suggests such a favourable outcome is in prospect for the 2000 Sydney Olympic Games.

Uncertainty surrounds the economic impacts of the Sydney Olympics. The current study has therefore determined estimates for a range of possible outcomes, and through the use of a detailed model of the economy which provides considerable scope to vary assumptions has identified the most critical factors affecting those outcomes. The approach taken has been more rigorous than any previous study undertaken of the economic impacts of an Olympic Games, and allows for future revisions of the estimates.

The central scenario is for total additions to both NSW GSP and national GDP to be around $6 billion in net present value terms, peaking in the Games year for New South Wales at over $1.5 billion, equivalent to almost one per cent of GSP. Almost one hundred thousand full-time equivalent annual jobs are associated with these increases in output over the twelve year period considered. While the expected benefits are likely to be concentrated in New South Wales, there should be some small gains for other parts of the nation. The range of possible outcomes for New South Wales is somewhat narrower than the range for Australia.

Evidence from previous Olympics that has been examined as part of the study suggests a tendency for excessive claims to be made about the economic impact of the Olympic Games, particularly before the event. The current study has not produced forecasts for the economy, but has attempted to isolate the impact of the Olympics from the underlying path that the economy will take. It therefore should be emphasised that even though the estimates for the impacts are quite large in absolute terms, given the size of the direct impacts and the considerable size of the construction costs in particular, the flow-on benefits identified are fairly modest. This conclusion should not be surprising when the brevity of the Olympics is contemplated alongside all of the other economic activity that takes place in a twelve month period.

Furthermore, because the direct impacts associated with the Olympic Games amount to increases in demand, and higher export demand in particular, there may be a tendency to see these as an unambiguous benefit. However, as the study emphasises, some Olympic demands will cause a displacement of resources from other uses, and some sources of demand will merely substitute for alternative sources of demand - so called expenditure switching. This will mean that to some extent the gains for New South Wales may be at the expense of other States, and the gains for the "Olympics Industry" may in part be at the expense of other sectors. This is a lesson that has not always been learnt by past Olympic cities, including Atlanta.

The state of the economy observed over the period leading up to and following the Olympics is not likely to be very different from that which would be experienced in the absence of the Games. In spite of the magnitude of the estimated impacts in total, any economic booms during this period will not be primarily the consequence of the Olympics, and bearing in mind that annual output in New South Wales is currently in the order of $170 billion, the impact of the Olympics on economic activity is unlikely to be very apparent to many participants in the economy.

The key economic issues associated with the holding of an Olympic Games, and the factors that are important in ensuring that the potential benefits are realised, are those associated with the macro-economic environment in which the Olympics related activity takes place:

- The functioning of the labour market, and in particular the scope for employment to increase without threatening inflation is of particular importance. Recently published evidence from the 1996 Atlanta Olympics suggests that the gains to the economy of Georgia were reduced somewhat because of the tight labour market in that state in 1996.
- The more effective the Olympics are in providing experience that assists future domestic production, and generates increases in productivity, the larger the longer term benefits;
- The greater the extent to which the Olympics is ultimately financed (in a macro sense) from overseas savings, the greater the proportion of the benefits earned in the pre-games period, being offset by repayment of foreign debt in the post-games period;
- The assumed funding strategy for the nsw government's share of the costs of the Olympics produces much better outcomes than a tax funded strategy;
- While the size of the direct impacts is of some significance, they are of less importance than the macro-economic environment in which the Olympics takes place.

There are some important messages for policy suggested by the current study. Widespread economic benefits from the Olympics cannot be taken for granted, and neither can economic benefits that will be sustainable over the longer term. Therefore the policy decisions of both the NSW and Commonwealth governments along with the efforts of the business community can help to ensure that the opportunity for benefits associated with the Olympic Games will be maximised for NSW and Australia. These include:

- Cost pressures associated with the Games, including in the construction industry and through the labour market in particular, need to be combated to ensure maximum employment and output benefits are realised.
- In order to produce longer lasting benefits associated with the Games it is highly desirable to increase productivity, and therefore any opportunities provided by the Games to develop technologies and human capital need to be fully exploited.
- The more flexible the labour market, the greater the net economic benefits from the Olympics are likely to be.
- Attracting overseas sourced investment through the "trade fair" effect (the shift of foreigners tastes towards Australian produce because of the Olympics exposure) for projects that offer prospects of high returns is highly desirable.
- Domestically funded investments related to the Olympics made in the expectation of ongoing returns following the Games, will provide benefits for some sectors of the economy, but will in general displace activity elsewhere. The economy wide benefits are then likely to be small.
- Nevertheless, the stage of the business cycle will affect the extent of the economic benefits in the Games year in particular, with the Olympics likely to produce smaller gains if it coincides with the peak of the cycle.
- The government should avoid pressures from particular industries for preferential treatment, and leave it to the capital markets to determine investment risk.
- The greater the profits that can be earned by the Games related exports, including from the sale of television pictures and overseas sponsorship, the bigger the net economic benefits will be.

- It is also desirable to maximise the profit contribution through sales of tickets and souvenirs to overseas visitors to the Games.
- Maximising the profit contribution from ticket sales to domestic residents will minimise the demands on NSW government finances, and therefore will minimise the extent to which the Olympics constrain other expenditure priorities.
- The greater the use of facilities developed for the Games in the post-Games period, and the returns generated, the bigger the likely economic benefits.

1. Introduction

1.1 Joint Study

This report presents the results of a collaborative study undertaken by the NSW Treasury and the Centre for Regional Economic Analysis (CREA) at the University of Tasmania into the effects of the Sydney Olympics on the New South Wales and Australian economies.[1]

[1] A supplementary report is also being prepared documenting technical issues not covered in this report.

1.2 Terms of Reference

Under the terms of reference for the study the impact of the Olympics would be assessed in relation to:

- Economic activity
- Economic welfare

Economic activity effects would be reported for a wide range of variables, particularly:

- Real household consumption
- Industry output
- Real investment
- Exports
- Employment by industry
- Demand for labour by occupation
- Price effects
- Government revenue

Results would be reported at two geographical levels:

- Australia
- New South Wales

The effects of the Games would be estimated for an average year in each of the three time periods associated with the Games:

- Pre-Games/Preparation phase, 1994/95-1999/2000
- Games year, 2000/01
- Post-Games phase, 2001/02-2005/06

1.3 Authorship

This report was written by John Madden of the Centre for Regional Economic Analysis at the University of Tasmania and Matthew Crowe of the Economic Research and Forecasting Branch of the NSW Treasury. Dr Madden was responsible for overall direction of the project in conjunction with Richard Cox of the NSW Treasury. Mr Crowe undertook all computations for the study.

The authors wish to thank Michael Lambert, John Pierce and Daniel Graham of the NSW Treasury for their comments and advice.

1.4 Defining the Olympics

The intention of this study is to estimate the total change, both direct and indirect, which will occur in the NSW economy and the wider Australian economy, as a result of the Olympics being staged in Sydney in the year 2000, rather than in some other country.

Three basic direct effects of the Games have been identified. They are:

- Games activities - the operation of the Games themselves over a two week period from 15 September 2000, together with certain preparations for the Games year, such as promotion and ticketing.
- Construction activity - necessary to assemble the infrastructure required for the staging of the Games. This includes the construction of sporting venues, participants' accommodation, and media and official facilities, plus the upgrading of transport and tourism facilities.
- International visitor effects - an increase in visitation to Sydney and other Australian destinations, comprising visits by those engaged in Games-related activities (e.g. spectators) and induced visits resulting from Sydney's higher international profile.

The distribution of the direct effects across the three time periods of the Sydney Olympics are shown in Table 1.1 below.

Table 1.1: Timing of the Direct Effects of the Games

	Construction Activity	*Games Activities*	*Visitor Effects*
Pre-Games phase	Yes	No	Yes
Games year	No	Yes	Yes
Post-Games phase	No	No	Yes

In Section 3 and associated appendices, we examine in detail the direct effects of the Olympics. In order to properly estimate the economic impact of the Olympics it is necessary to clearly isolate those expenditures which directly arise purely because the Olympics are being staged in Sydney in 2000.[2] In the case of operating expenses the matter is not so much a conceptual one, but rather it is one of correctly estimating all the costs which will arise. [3] Much the same can be said of the induced

international tourism, where the task is to estimate the responsiveness of potential overseas visitors to the additional international exposure that the Olympics provides Sydney and Australia, and to estimate how much they will spend (and on what goods) once they arrive here. These are nonetheless considerable tasks to which a great deal of time was devoted in this study.

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[2] See Cox (1995

[3] There are, nevertheless, some minor conceptual problems associated with the operating phase, such as a consideration of how domestic Olympic sponsors organise their internal finances to pay for the sponsorship. Should it be treated as additional expenditure, or as crowding out some existing expenditure such as advertising?

In the case of estimating construction expenditure, an additional complexity arises. It is much more difficult to establish a base case (i.e. a state of the world which would have occurred had the Olympics not been awarded to Sydney) for this sort of expenditure. Some of the sporting facilities and infrastructure being built for the Olympics may have been built in any case. The main impact of the Olympics may be to either bring forward such expenditure or to lead to some change in the scale or nature of the facility.

Our approach has been to exclude construction undertaken prior to 1994. It may be claimed that the Aquatic Centre, for which most of the construction expenditure would be excluded on this basis, formed part of the bid and should be included. We do not share this view. The Aquatic Centre, as far as we can ascertain, would have gone ahead without the Olympic bid. [4] Inclusion in Olympic expenditure of the construction cost for this venue would not seem appropriate.

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[4] See Graham (1995), Section 3.3

Our approach also involved including as direct Olympics construction expenditure only those items which have been listed as publicly-funded Olympic construction in the 1996-97 NSW Budget papers or as privately-funded Olympic construction expenditure in the Olympic Coordination Authority's 'State of Play' (OCA 1996). This may exclude certain construction for which the Olympics may have been partly a motivating force (at least in regard to timing and extent of expenditure). The proportion of such expenditures which should properly be assigned to the Olympics are difficult to estimate, however, and are likely to be small. Conversely, some expenditure that we did include might have had some non-Olympics motivation. Our approach is both a clean and defensible one.

It should be noted that while we do not include the construction of accommodation and other facilities to cater for Olympics-induced tourism, such construction is computed as an indirect effect by the economic model which is described in the next section.

Despite the assumed cut-off point of the beginning of 1994, a problem arises regarding the allocation of direct expenditures to the three separate phases. Some construction expenditure is not due to be finalised until after the Games, while certain operating activities (such as promotion and advanced ticketing) are likely to commence before the construction phase ends. Again we take as straight-

forward an approach as possible. All construction expenditure (apart from Olympic-operating construction expenditure) is assigned to the pre-Games period, while operating expenditure is entirely consigned to the Games year. The adoption of any other approach is likely to have made little difference to the results and to have lessened the clarity with which those results are interpreted.

2. Method of Analysis

2.1 Overview of Method

The major steps taken by the NSW Treasury/CREA team to accomplish the task of analysing the effects of the Olympics are depicted in Figure 1. We started by estimating the direct effects on industries of those Olympic activities outlined in Section 1.4 This was a major task which is fully described in Section 3, and the associated Appendix B, of this report. Following this we used these direct effects as input to simulations with a multi-regional economic model in order to obtain an estimation of the total effects, both direct and indirect, of the Olympic activities.

Figure 1: Overview of Method

2.2 The MMRF Model

The multi-regional model used for the analysis was the MONASH Multi-regional (MMRF) model of the Australian economy. MMRF captures the behaviour of twelve industries, a representative regional household, State and Territory Governments, the Commonwealth Government and investors in each of Australia's eight states and territories. MMRF recognises that the economies of the eight regions are linked via interstate movements of commodities and factors of production (particularly labour). The complexity of the model is indicated by the fact that in total, the model contains over 27,500 equations relating to more than 50,000 variables.[5]

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[5] The version of MMRF used in this study is larger than the standard version due to the addition of Olympics related industries.

The model is composed of five modules. These are:

i. The core module which determines the outputs of regional industries and their demand for commodity and factor inputs, international and interstate exports and imports, regional household demands, demands by nine governments (Commonwealth and eight states and territories) and factor and commodity prices;
ii. The government finance module which computes revenue and outlays growth for the Commonwealth Government and each of the eight State and Territory governments. The module also determines the gross domestic products of the eight regions from the income and expenditure side using variables determined in the core module, together with regional household income;
iii. The capital and investment module which determines the relationship between changes in the capital stock and annual investment;
iv. The foreign debt accumulation module which relates changes in foreign debt over the solution/forecast period to changes in the average annual trade deficit;

v. The labour market and regional migration module which computes the changes in population from natural growth and foreign and interregional migration and relates it to labour supply.

The MMRF results are 'comparative static'. They represent a snapshot of the national and State economies in the future showing the difference due only to the Sydney Olympic Games. The results represent the percentage change in the value of variables above or below what would have occurred in the absence of the Games. The results are not forecasts as they do not indicate the future values or growth rates of any economic variables, and the model does not provide any indication of the adjustment path to the new equilibrium.

For further details on the model see Naqvi and Peter (1996) and Crowe (1995) and for a full description of the theoretical structure of the model see Peter, *et.al* (1996).

2.3 Amendments to the MMRF Model

A number of changes have been made to the MMRF model for this project including the introduction of three new industries. The new industries which were introduced were:

- Olympic Operations
- International Tourism
- Interstate Tourism

The reason for the introduction of these industries is explained in Section 3.

These three changes will be introduced in order to improve the range of detailed results from the study and to provide modelling facilities to the NSW Treasury for study on other topics, such as budgetary policy. However, all model amendments with the exception of the introduction of the new industries, are still not completely developed and have not been used in the results presented in this report. (

2.4 Advantages of the MMRF Approach

The MMRF modelling approach has a number of distinct advantages over alternative methods. Relative to the input-output method which has been a common form of analysing projects in the past, and was used in the previous KPMG study of the Olympics (KPMG, 1993, see Appendix A), the MMRF model has a much more sophisticated structure. It provides:

- A far superior theoretical framework which takes into account resource and balance-of-payments constraints, and price responsive behaviour
- Results for a greater range of variables.

It is for these reasons that a number of major Australian projects have been examined with the aid of computable general equilibrium (CGE) models, the class of models to which MMRF falls. Examples of such studies are:

- The proposed Very Fast Train (Madden and Dixon, 1990)
- The Multi-function Polis (Dixon, Horridge and Johnson, 1992)
- Australia's road investments (Allen, 1993)
- The Melbourne Western Ring Road (Naqvi and Peter, 1995).

Over the last two decades CGE models have become Australia's major method of inter-industry analysis. They are widely used by governments, industry and academics to examine a very wide range of economic questions, with many hundreds of important applications.[6]

MMRF has a particular advantage as a multi-regional CGE model, as it allows for the consistent computation of the impact of the Olympics on New South Wales and the other states, and the nation as a whole.

3. Simulating the Economics of the Olympics

3.1 Simulation Inputs

In this section we describe the different aspects of the hosting of the Olympic Games which were modelled and the assumptions underlying the simulations. We look at each of the phases of the Olympics and consider the nature and size of each activity directly associated with the hosting of the Games. We then outline the major assumptions under which these direct effects were simulated, particularly in respect of macro-economic settings and the financing of the Games.

3.2 Direct Effects of Hosting the Games

3.2.1 Publicly-Funded Construction

The NSW Budget papers 1996-97 identify $1.91 billion worth of publicly-funded Olympics related capital works to be completed before 2002. In Section 1.4 the issue of what construction costs should be attributed to the Sydney Olympics was raised. In line with that discussion we have classified Olympics construction more narrowly than the Budget Papers. The items included are listed in Table 3.1.

Table 3.1: Publicly-Funded Projects Attributed to the Olympics

Project	*Start*	*Completion*	*$(1996-97)M*
Stadium Contribution	1996	2002	151.6
Olympic Village: Site, Infrastructure	1996	2000	93.1
Rowing Facility	1988	1998	12.8
Rail Line	1992	1999	89.6
Other Infrastructure	1992	2001	115.0
Stadium Development	1994	1997	4.0
Olympic Village Development	1994	1997	8.8
Other Facilities	1994	2001	360.8
Site Redemption	1992	2001	18.3
Service Infrastructure	1992	2001	99.1
Transport Infrastructure	1992	2001	267.0
Total			**1,220.2**

Thus only $1.22 billion or around two-thirds of the budgeted publicly-funded Olympics construction are considered to have arisen primarily from Sydney winning the right to host the 2000 Olympics.

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[7] All Table 3.1 estimates are in 1996-97 dollars and are based on the 1996-97 Budget Paper - State Capital Program

The bulk of the construction work which was excluded from Table 3.1 was connected with Homebush Bay developments. This includes the relocation of the Royal Agricultural Show Grounds from Moore Park to Homebush Bay at a cost of $384 million and estimated expenditure of $216 million for the redevelopment of Homebush Bay. While both items were included in the Olympics Capital Program, the former was excluded from our analysis because the Show Grounds relocation would seem to be largely unconnected with the Olympic Games, while the latter, Homebush Bay redevelopment, was already underway at the time of the Olympics Bid and the project would not appear to have owed its existence to the Olympics.

Some Olympic facilities, mainly the Aquatic Centre, were well advanced at the time of the Olympics Bid. Although, the Aquatic Centre was an integral part of the Sydney Bid it would appear that the decision to build the Centre was not dependent on there being such a Bid. The Olympic Bid would appear to have been responsible for the inclusion in the design of the Aquatic Centre of a facility to

allow temporary expansion of the seating capacity from 4,400 to 12,500. However, as discussed in Section 1.4, it was decided to omit all construction costs of the Aquatic Centre and other Olympic facilities completed prior to 1994/95, the first year of the Construction phase as defined for this study.

It can be seen from Table 3.1 that a number of other Olympics-construction projects, while having completion dates still some way off, were underway well before the commencement of the construction phase in 1994/95. For example, construction of the International Rowing facility began in 1988 and is more than 80 per cent complete. Similarly, the remediation of the Olympic site (excluding the village site) is almost 85 per cent complete. Where significant expenditure had already taken place prior to 1994/95, only that portion of the project's expenditure incurred after the start of 1994/95 is included in Table 3.1. [8]

[8] NSW Budget papers give estimates of construction costs incurred prior to June 1996. An estimate of the pre-1994 construction costs is derived assuming equal expenditure in each year prior to 1996

There are some parts of projects, such as the post-Games removal of temporary seating from the Olympic Stadium, which clearly fall into the category of Olympic construction, but are not scheduled to occur until after the completion of the construction period. This is evidenced by the completion dates for some projects being listed as 2001 or, in the case of the Stadium, 2002. In these cases we have modelled the construction as if it all occurred in the Construction phase. This is in line with our discussion in Section 1.4. The effects of such timing decisions on the simulation results is negligible.

3.2.2 Privately-Funded Construction

The expected contribution of the private sector to Olympics construction is considerable, although less than had been originally anticipated. For instance, such projects as the velodrome and shooting facilities were initially flagged for private sector financing, but offers were not forthcoming.

Table 3.2 below comprises all items identified in August 1996 in OCA (1996) as expected to attract private sector funding.

Table 3.2: Privately-Funded Olympic Construction

Project	*Start*	*Completion*	*$(1996-97)M*
Olympic Stadium	1996	1999	454.1
Athletes' Village	1997	2000	407.0
International Sector	1997	2000	52.0
Media and Technical Officials' Village	1997	2000	278.0
Multi-Use Indoor Arena	1996	1999	57.8
Total			**1,248.9**

Total Olympic construction activity for the purpose of this study is thus almost $2.5 billion, comprising virtually equal contributions from the private and public sectors.

3.2.3 Games Activities

Auditor-General (1994) provides an estimate of the operating cost of staging the Olympic Games equivalent to $1,463 million in 1995-96 prices. [9] While the actual Olympic events will occupy a period of just two weeks, the expenditure, which includes such items as advertising and promotion, is spread over a much longer period. We make the assumption, however, that all the expenditure occurs in 2000-01. This seems a reasonable stylisation of Games expenditures since the bulk of these are on items such as events, ceremonies and media which clearly fall into the period. Similarly we assumed that the $1,486 million (1995-96 prices) [10] of Olympic sales will also all occur in 2000-01. [11]

[9] Auditor-General (1994) reports all figures in 1992 prices. The figure in the publication is $1,372 million (in 1992 prices).

[10] The figure in Auditor General (1994) expressed in 1992 prices is $1,393 million.

[11] The figure in Auditor General (1994) expressed in 1992 prices is $1,393 million.The sales and costs figures in this paragraph suggest returns to Olympic capital of only $23 million (=1,486 - 1,463). However, a substantial proportion of operating costs ($329 million) are returns to the NSW Government and can be regarded as additional returns to capital.

It was decided that the best way to model the Games activities involved, as a first step, the introduction of an Olympics industry into the MMRF data base. This industry would be introduced as a very small one, an embryonic industry, in each state and territory. The industry was introduced in all states and territories to ease computing problems which would have occurred if the embryonic industry had been introduced for one state only. The values for sales and costs in the new minute industry were assigned so as to not damage the integrity of the model in any way. For each region other than New South Wales, sales of only a trivial amount ($1,000) were assigned to foreign exports

of 'Olympics' from the region, while the only cost item was for an equivalent amount of labour. The data base remained balanced and the addition to the wages bill and foreign exports were immaterial.

For the NSW Olympics industry we also introduced very small numbers into its sales and costs vectors. However, in this case we carefully introduced the sales and cost figures so that their pattern represented the pattern of sales and costs which was expected to occur for the actual Olympics industry in the Games year. However, the new NSW Olympics industry was kept extremely small in the data base year, just 10^{-6} of its expected size. In Section 3.3 we describe the simulation which brings the nascent NSW Olympics industry to its expected operating size in the year 2000.

The primary source of sales and cost information for the operation of the Sydney Olympics was Auditor-General (1994) which showed eleven categories of operating expenditure (see Table 1.2, page 8 of that report). It was necessary to turn this information into a detailed commodity by source categorisation of costs and into a detailed categorisation of sales by destination region and class of buyer, as required for the MMRF data base. This required a lengthy process which is fully described in Appendix B.1.

3.2.4 Increased Travel to New South Wales and Australia Resulting from the Olympics

3.2.4.1 Sources of Increased Travel

Two types of increased travel were modelled:

- Increased travel to New South Wales and other Australian regions by foreigners
- Increased travel to New South Wales by residents of other states

These will be considered in turn. The Olympics is expected to give rise to increased international travel to Australia for three reasons:

- Pre-Games visitors (such as officials, sponsors, athletes, spectators, etc.)
- Games visitors
- Induced tourism, resulting from Sydney's Olympic profile [12]

[12]. Throughout this paper, the definition of 'tourists' includes international business visitors as well as holiday makers.

While the first two types of visitors are confined to their respective phases, the last type of travel is assumed to be a feature of all three phases. The overall size of these travel effects is described in the next section, with the detailed estimation of total expenditure by each of the above three types of visitors being described in Appendix C. The commodity pattern of international tourism expenditure is captured by the introduction of an International Tourism industry into the MMRF model. The estimation of the data base for this industry is described in Appendix B.2.

Additional net interstate travel is assumed to arise from the Olympics only in the Games year. It was estimated that the additional travellers to New South Wales would spend almost $650 million (in 1995-96 prices) in 2000/01. Over a third of this expenditure was expected to be made by Victorians. Queensland was estimated to be responsible for almost a quarter of the expenditure, while Western

Australians were estimated to be responsible for almost as much due to the high travel costs from that State. One component of the expenditure of interstate tourist expenditure was assumed to be tickets for the Olympic Games. Interstate tourism was modelled, like the Olympics industry, as an embryonic industry. Full details of the construction of its data base is provided in Appendix B.3.

3.2.4.2 International Tourism Effects

The total addition to international expenditure in a pre-Games year was estimated to be $283.6 million on average. This is made up of $2.0 million spent by pre-Olympic visitors and $281.6 million spent by induced tourists. [13] The additional spending was modelled as international tourism in each region with the implicit assumption that pre-Olympic visitors would spend money on similar products as induced tourists. While this may not be true, the magnitude of pre-Games visitor spending ($2.0 million) compared with pre-Games induced tourist spending ($281.6 million) does not warrant separate modelling.

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[13] . All figures are expressed in 1995-96 dollars

Additional international visitor spending in the Games year was estimated to be $660.8 million comprising of $146.9 million from Games visitors and $513.9 million from induced tourism. Again, all spending including Games visitor spending was modelled as international tourism. Unlike the pre-Games scenario, spending by Games visitors in the Games year was expected to be a significant component of total international visitor spending. However as most of the Games visitor spending was expected to be due to spectators the assumption that Games visitors purchase similar commodities to international tourists was retained.

International visitor expenditure in an average post-Games year was estimated to be $413.4 million. The entire amount was due to induced tourism. The international tourism expenditure estimates for each state in each period are given in the table below.

Table 3.3: Olympics Related International Spending

International Tourism Spending $(1995-96)m						
	Pre-Games		*Games*		*Post-Games*	
	Induced tourists	*Olympic visitors*	*Induced tourists*	*Olympic visitors*	*Induced tourists*	*Olympic visitors*
NSW	154.9	1.8	282.7	126.2	227.4	0
Vic	33.8	0.1	61.7	5.5	49.6	0
Qld	62.0	0.1	113.1	10.1	91.0	0
SA	5.6	0.0	10.3	0.9	8.3	0
WA	14.1	0.0	25.7	2.3	20.7	0
Tas	2.8	0.0	5.1	0.5	4.1	0
NT	4.2	0.0	7.7	0.7	6.2	0
ACT	4.2	0.0	7.7	0.7	6.2	0
Total	**281.6**	**2.0**	**513.9**	**146.9**	**413.4**	**0**

Prior to simulation the figures shown in Table 3.3 were deflated to the MMRF model's base period (1990-91) to account for changes in prices and real economic growth, then divided by the base-year international tourism expenditures to generate percentage increases (shocks). Appendix C outlines this procedure.

It should also be noted that the Games period expenditures were decomposed into two separate shocks. A long-run shock representing the level of tourism expenditure to which the economy had already adjusted in the pre-Games phase, plus a short-run shock representing *additional* Games period tourism expenditure (see Section 3.3.3).

3.3 Major Simulation Assumptions

3.3.1 General Approach

In order to solve the MMRF model it is necessary not only to provide the model with the appropriate information relevant to the size of the direct Olympic effects, but also a set of assumptions regarding macro-economic settings.

In the following three sub-sections we outline the settings chosen for the simulations undertaken in each of the three phases of the Olympics on the basis of what we considered most appropriate to capture the impact of the Olympics as correctly as possible.

In any economic modelling exercise of an occurrence of the magnitude of the Olympics there must be a degree of uncertainty as to both the size of the event and the economic environment in which the event occurs. In the KPMG study into the economic impact of the Olympics (KPMG, 1993), uncertainty over the direct impacts was accounted for by providing results for three scenarios: 'low', 'most likely' and 'high'. However, the input-output modelling approach used by KPMG provides no

genuine avenues for altering the macro-economic settings under which the analysis is done. An advantage of CGE analysis is that it allows significant scope for altering the underlying macro-economic (and other) assumptions. [14]

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[14] . It will be seen in the results section that, once economy-wide constraints have been correctly taken into account, that it is to the macro-economic settings, and not to the size of the direct effects, to which the size of the total impacts are sensitive

In this study, we also present three scenarios. The scenario with the direct impacts described in Section 3 and the macro-economic settings described in the next three sub-sections are designated the 'central' scenario. We form the other two scenarios (constrained supply side and flexible supply side) by allowing for variations in both the size of the direct effect about which we can be least certain - the induced tourism export effect - and those macro-economic settings to which our results are most sensitive.

3.3.2 Pre-Games Simulations (central scenario)

The pre-Games phase stretches over a six-year period. The length of this period led us to model this phase in long-run mode. The key characterisation of this mode is that the phase runs over a long enough period for most of the Australian employment arising from the Olympic construction and increased visitors from overseas, to have dissipated via adjustments in the real wage, and for all desired movements in the capital stock to have occurred.

Simulations are referred to here as depicting an average year of the pre-Games phase without any consideration being given to the time-path of adjustment. We would expect the period of adjustment to the pre-Games effects to be reasonably short as a result of producers being able to anticipate major construction expenditures, and the predicted inbound tourism expansion. We do, however, make allowance for some delay in wage adjustment, as discussed below.

There are a number of key assumptions underlying the pre-Games simulations. They are:

- The pre-Games activities have only a limited impact on regional unemployment rates. Three quarters of the increased demand for labour generated by the activities is met by a real wage rise, with only a quarter of the demand acting to increase employment. [15]
- No change in participation rate or Australia's population growth rate. This and the previous assumption imply that changes in national unemployment are severely circumscribed.
- Direct and indirect activities have no effect on interstate wage differentials, with persons moving between states to remove any initial disturbance to differentials
- No change in real rate of return on capital - together with the above labour market assumptions this determines the change in the national capital stock
- The rate of technical change is unaffected by the pre-Games activities
- The nominal exchange rate is the numeraire
- Governments (with the exception of the NSW Government dealt with below) keep their real borrowing requirements constant by allowing tax rates to vary [16]
- Australia's trade balance remains constant due to the Commonwealth Government setting income tax rates at the level necessary to achieve a fixed trade balance

[15]. A detailed explanation of the two-step procedure used to carry out this simulation will be provided in the supplementary report.

[16] This assumptions removes any scope to analyse the impact of pre-Games activity on the revenues of governments in states other than New South Wales as they are assumed to vary taxes in order to maintain the real budget deficits.

The justification for the last assumption is that the pre-Games phase is sufficiently long for the Commonwealth Government to anticipate any increased demand for overseas borrowing and act to constrain changes in the trade balance. We recognise, however, that our balance-of-trade assumption is arguable and consequently we relax this assumption in the flexible supply side scenario.

The other macro-economic assumption that requires comment is our treatment of the labour market. In most Australian CGE studies of large investment projects, involving construction periods of around half a decade, it is assumed that nation-wide employment is fixed, or near fixed, at the base-case level, with the national real wage varying to the degree necessary to ensure this. Examples of this approach can be found in Madden and Dixon (1990) and Naqvi and Peter (1995).

It is generally argued that major investment projects are unlikely to affect the level of long-run employment, normally considered to be a function of demographic variables, the business cycle and the industrial relations climate. [17] We consider, however, that there are two reasons for allowing the pre-Games phase to have some effect on employment levels as well as the real wage. The first concerns our reporting of average years. While it may be true that the effect on employment may have dissipated well before the end of the pre-Games phase, any early employment effects should be taken into account when calculating the average effect. We assume that Olympic construction will have no effect on the real wage for the first two years of the phase 1994/95 and 1995/96. About ten per cent of total public Olympic construction appears to have occurred in that period. [18]

[17].. See Appendix D for a further discussion of this issue.

[18] . Estimated from Figure 5.14 (Olympic Co-ordination Authority Capital Cash Flows to 2001) of New South Wales Budget Papers 1995-96.

A second reason for allowing some movement in employment is an expected change in labour market conditions resulting from industrial relations policies promoting more decentralised wage setting and the demise of the Accord. It may be argued that the increase in demand generated by the pre-Olympic phase (particularly for tourism exports) would allow more widespread application of enterprise agreements. Our assumption in the central scenario is to constrain the rise in the national real wage to only seventy-five per cent of that which would keep the rate of unemployment fixed.

From the general macro-economic settings, we turn to the assumptions regarding the NSW Government's financing of the publicly-funded portion of Olympic construction. We assume that just over half (54.2 per cent) of the public Olympic construction will be funded by short-term debt. The use of debt financing is limited to the amount that can be paid back by the end of the Games period. Approximately half the borrowed funds (or just under thirty per cent (27.8 per cent) of the publicly-

funded capital costs) plus the associated accumulated interest will be repaid by the profits earned in the Games year, the remaining debt is completely repaid by the end of the Games period from additional government revenue resulting from Olympics induced economic activity.

The remainder of the publicly funded construction costs (45.8 per cent) are assumed to be financed through a reduction in NSW capital expenditure. The financing assumptions are such that by the conclusion of the Games period NSW taxes and government debt are no higher or lower than they would have been had the Games not taken place. All results shown in this report are based on the public financing assumptions outlined above. It should be noted that financing assumption is just one of many possible financing assumptions. Other possible financing assumptions include increased use of debt financing, reductions in current spending and increased taxation.

The direct effects of the construction expenditure and Olympic-induced tourism expenditures, technically referred to as the shocks, were entered into the model as follows. The $2.47 billion of construction expenditure was deflated from 1996-97 dollars to 1990-91 dollars to allow for movements in the nominal size of the economy since the data-base year.[19] The deflated amount was then divided by six in order to give the average annual construction expenditure for the pre-Games phase.

The simulations of the pre-Games phase comprised a number of construction shocks, involving portions of total average annual construction expenditure under different funding scenarios (private, public financed by capital expenditure-switching, public financed by borrowing) and the international tourism shocks depicted in Table 3.3. Construction and tourism shocks involved imposing percentage changes on final demand for NSW public and private construction [20] and percentage changes to export demands for international tourism.[21]

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[19]... This ensured that when we instituted a percentage change shock to NSW construction, it bore the correct relationship to the size of the economy in the data-base year.

[20] Technically all construction shocks were instituted as changes to other final (government) demands with privately-funded Olympics reallocated to private investment in a post simulation calculation.

[21] It will be noted that as the construction shock was imposed as an increase in demand for the existing NSW Construction industry it is explicitly being assumed that the input composition of Olympic construction is the same as the existing Construction industry's input pattern. This assumption was necessitated by there being insufficient information to distinguish Olympics construction from NSW construction in general

3.3.3 Games Year Simulations (central scenario)

The Games year is simulated essentially in short-run mode. This is normally characterised by fixed capital stocks and a slack labour market. We justify our choice of a short-run economic environment for modelling Games activities, principally due to the short (two weeks) time period in which much of the expenditure occurs. While we account for the Olympics capital stock put in place during the pre-Games phase by allowing for additional capital in that industry, [22] we consider the Games period too short for investors to have put in place additional capital to accommodate the burst in activity anticipated for September 2000.

The major assumptions of the Games year simulation are:

- Fixed capital stocks in all non-Olympic industries with rates of return adjusting to reflect changes in demands for capital services [23]
- Nominal wages fixed with aggregate employment changing in line with the change in labour demand [24]
- Governments keep all tax rates constant with changes in revenue and expenditure impacting on their borrowing requirements
- Trade balance allowed to vary in line with changes in domestic savings and investment
- Games year events impact on the exports performance of the Olympics industry and the International Tourism industries only [25]

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[22] Some of the construction in the pre-Games phase could have been allocated to the Transport and Communication industry, rather than the Olympics industry (for example Homebush Bay rail line). However this was not done as the Olympic transport infrastructure is not typical of the capital stock of the Transport and Communication industry. Furthermore, the extent to which Olympic transport infrastructure would increase NSW's Transport and Communication capital stock is negligible.

[23] The Olympic industry's rate of return and use of capital services is determined by the industry's data base entries shown in Appendix B.2.1.

[24] The games period is assumed to be too short for nominal wages to adjust but long enough for prices to adjust therefore resulting in changes to the *real* wage.

[25] The standard short-run treatment of demand shocks such as the Games is to allow for variation in the real exchanges rate, and as a consequence, changes in export quantities. However for the Games simulation it has been assumed that the two week duration of the Games is too short to have any impact on merchandise export contracts. There is however, a small impact on export industries during the Games year due to the continual increase in international tourism demand in the pre-Games and Games periods.

An exception to the use of a short-run environment for the Games year occurred in the case of international tourism. By the time of the Games year, industries will have had six years to adjust to Olympics-induced increases in international tourism demand. As a consequence we model only the increase in international tourism demand *above its pre-Games level* under the short-run scenario. The difference between the projected international tourism level for the Games year and the base-case (no Olympics) level was modelled under the long-run scenario outlined in the previous section.[26]

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[26] With employment treated as outlined in Section 3.3.2.

The simulations involved the following imposition of direct effects (or shocks):

- Increase in international tourism sales (exports);
- Nascent Olympic industry brought to Games year size by following demand shocks:
    - Overseas exports of ticket sales to foreign spectators, of international TV rights and of international sponsorship
    - Taste change by NSW consumers towards Olympic tickets (and because of household budget constraint, away from all other goods to varying extents)

    - Technological switch by local sponsors to Olympics, funded by a switch away from traditional advertising sold by the Financial Services industry
- Switch in interstate (non-NSW) household demands toward Olympic tourism and away from other goods. The NSW interstate tourism industries purchase Olympic tickets, this being the final step which brings the Olympic industry in New South Wales to life. See Appendix B.3 for details.

3.3.4 Post-Games Simulations (central scenario)

The post-Games simulations are conducted under a similar assumed economic environment to that for the pre-Games simulations, described in Section 3.3.2, but with some important differences. These are:

- The unemployment rate is completely unaffected by the post-Games phase, with all labour-market adjustment at the national level falling on the real wage
- It is assumed that the successful organisation of the Olympics adds to the stock of Australia's human capital resulting in a small (0.05 per cent) increase in measured national labour productivity[27]
- It is assumed that Australia's higher profile following the Olympics has the effect of inducing a small increase in the demand for Australia's manufactured exports, resulting in an additional one half of a per cent rise in the volume of these exports
- Payroll tax rates in all States including New South Wales adjust to ensure all State budget deficits remain constant in real terms

[27] While we somewhat arbitrarily assign the small productivity rise to all Australian workers, we consider that, more realistically, around 5 per cent of workers would be sufficiently affected by the Olympics to experience a 1 per cent increase in productivity.

The international tourism effect is introduced into the MMRF model in the same way as in the earlier phase.

3.3.5 Alternative Scenarios

We now look at how the scenarios outlined in Sections 3.3.2 to 3.3.4 above were altered to allow for our alternative scenarios; constrained supply side and flexible supply side.

The alternative scenarios involved different assumptions regarding the impact on long-run employment, the level of induced international tourism exports, the degree of post-Games productivity increase, the strength of the induced increase in manufactured exports and the use of overseas borrowing in the pre-Games phase. We deal with each of these in turn before presenting a summary of scenarios in Table 3.4.

- *Labour-market assumption*. This assumption is varied for the pre-Games phase only. We assume, rather than the national real wage being allowed to rise by only seventy-five per cent of that which would keep unemployment fixed as was assumed for the central scenario, that it is allowed to rise by up to eighty per cent of that level for the constrained supply side

scenario. For the flexible supply side scenario the relevant figure is reduced to seventy per cent.

- *Level of international tourism*. For the constrained supply side scenario we reduced the level of international tourism by twenty per cent for all three phases, while for the flexible supply side scenario we raise it by twenty per cent in each phase. This is much less than the degree of variability between some previous forecasts (see Griffiths, *et. al.*, 1995, p.10), but would seem appropriate in light of a much higher degree of conformity among recent forecasts. As explained in Section 5, our results are not particularly sensitive to the size of the tourism shocks.
- *Degree of post-Games productivity increase*. In the constrained supply side scenario we assume that there is *no* productivity increase, whereas in the flexible supply side scenario we assume a productivity increase is 20 per cent higher than for the central scenario. [28]
- *Induced manufacturing exports*. For the constrained supply side scenario we assume *no* induced increase in manufactured exports, but for the flexible supply side scenario we double the central scenario induced increase in manufactured exports to one per cent.
- *Use of overseas finance.* In the central scenario we assume that during the pre-Games phase the economy operates under a balance of trade constraint. That is, all expenditure in the pre-Games phase is domestically financed. The same assumption is made for the constrained supply side scenario.
- However, in the flexible supply side scenario this assumption is relaxed to allow for overseas financing of domestic economic activity in the pre-Games phase. [29] In the post-Games phase Australia's trade balance moves into surplus, by tax-induced changes in domestic absorption and output, in order to pay back overseas debt (including interest) incurred during the pre-Games phase. The real interest rate assumed is 7 per cent and allowance is made for the surplus in the balance of trade in the Games year.
- *Method of financing public construction*. In all three scenarios similar combinations of short-term debt and reduced capital expenditure are assumed. In each case the level of government debt financing is equal to that which can be paid back from the games profit plus additional tax revenue from games induced economic activity. While there are small differences in the amount of debt used in each scenario, due to different levels of economic activity and hence revenue, all three use debt and capital spending cuts in the approximate proportions 54 per cent to 46 per cent.

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[28] The productivity improvements assumed in the central and flexible supply side scenarios are 0.05 per cent and 0.06 per cent respectively.

[29] This does not mean that we assume that private and public sector borrowing to fund the Olympics is directly from overseas. Rather, we assume that at a macro-economic level, the increased investment ultimately leads to an increase in overseas borrowing at the margin.

Table 3.4: Summary of Olympics Scenarios

Variable	***Scenarios***		
	Constrained Supply Side	*Central*	*Flexible Supply Side*
Pre-Games, Proportion of Labour Market Adjustment Through Real Wages	80 %	75 %	70 %
Increase in International Tourism in All Periods	-20 %	0 %	+20 %
Post-Games Export Increase	0.0 %	0.5 %	1.0 %
Post-Games Labour Productivity Gain	0.00 %	0.05 %	0.06 %
Partial Overseas Financing	No	No	Yes
Proportion of Public Debt Financing	53.9 %	54.2 %	54.5 %
Public Capital Spending Reduction	46.1 %	45.8 %	45.6 %

4. Results

4.1 Introduction

In this section we provide detailed results for the MMRF simulation of the economic impact of the Olympic Games in all three phases of the Games under the three scenarios presented in Section 3. The assumptions outlined in that section should be borne in mind while examining the results presented below.

All results reported in this section are deviations caused by the Olympics in an average year of a particular phase of the Games. For each variable, except the real deficit of governments and the balance of trade, the deviations are expressed as percentages of the variable's base-economy value in the relevant time period. All figures are expressed in terms of 1995-96 dollars.

4.2 Pre-Games Results

The macro-economic effects of the pre-Games phase are shown in Table 4.1. The effects are shown for each of the three scenarios - central, constrained supply side and flexible supply side.

For the central scenario the pre-Games phase involves a boost to Australia's aggregate demand of around $700 million [30] in an average year, about 60 per cent of which is Olympic construction and the remaining amount increased exports of tourism. This annual expenditure is equal to almost 0.15 per cent of base-case GDP and as can be seen from Table 4.1, this is also around the total effect that the pre-Games phase is projected to have on Australian Gross Domestic Product (GDP) under the central scenario.

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[30] All $ results have been rounded to the nearest $25 million in this section.

[31] Nominal GDP in 1995-96 was approximately $485 billion, NSW nominal GSP for the same period was approximately $170 billion (ABS).

Table 4.1: Effects of Pre-Games Phase on Macro-economic Variables

Percentage Change		*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
Real GDP	- NSW	0.350	0.413	0.533
	- Aust	0.104	0.151	0.213
Employment	- NSW	0.393	0.455	0.557
	- Aust	0.125	0.172	0.227
Capital Stock	- NSW	0.293	0.362	0.518
	- Aust	0.079	0.130	0.207
Real Consumption	- NSW	0.250	0.310	0.498
	- Aust	0.040	0.087	0.230
Real Investment	- NSW	1.283	1.351	1.495
	- Aust	0.459	0.512	0.599
Real Deficit ($b)	- NSW	0.075	0.075	0.075
	- Aust	-0.375	-0.350	-
Australian export volume		0.097	0.140	-0.142
Australian import volume		0.133	0.184	0.292
Australian trade balance ($b) [(a)]		-	-	-0.212
Consumer Price Index [(b)]	- NSW	0.029	0.037	0.141
	- Aust	0.028	0.037	0.146
National Real Wage		0.030	0.032	0.043

(a) Figures have been rounded to nearest $25 million

(b) CPI results should be interpreted as the *percentage change* in the rate of price growth, rather than as the *percentage point change* in price growth..

The projected increase in GDP for the pre-Games phase is entirely a measure of the assumed success of pre-Games Olympic activities in drawing additional resources into the economy. If the industrial relations climate and the business cycle were such that the effects of the pre-Games phase were to generate no national increase in employment, but rather lead to a greater rise in real wages, then GDP would be estimated not to expand at all. Indeed, there would be a very slight projected fall in GDP as productivity in the pre-Games Olympics activities is slightly less than the activities it would crowd out. Under such assumptions the real wage would be projected to increase by 0.044 per cent. Under

the central scenario we can see in Table 4.1 that the real wage is projected to be only 0.032 per cent higher than would be the case in the absence of the Olympics. It is this dampening of the real wage increase which allows the Olympics demand increase to pull additional labour resources from the unemployment pool.

Looking at the national results for the central scenario, it can be seen that only one component of final demand is projected to increase by more than real GDP. The increase in Australian real investment of 0.51 per cent is well above the real GDP increase of 0.15 per cent, with two thirds of the investment increase being Olympic investment. Real private consumption is estimated to increase by just 0.09 per cent, indicating a significant switch from consumption expenditure to investment at the national level. [32] Net exports make no contribution to economic output as the Balance of Trade is assumed fixed in the central scenario. The remaining component of national real aggregate expenditure, government consumption, is negatively affected by the pre-Games phase. The estimated slight fall in aggregate (non-Olympics) real government expenditure is due to the NSW Government directing some of its capital budget to Olympics investment. [33]

An important feature of the central scenario is the assumption that pre-Games expenditure is domestically financed. While relaxing this assumption would add only a 0.01 percentage points to GDP, the major effect would be on the composition of GDP. The estimated increase in real private consumption would be more than doubled if foreign financing were allowed under the central scenario. This increase would be significantly offset by a deterioration in the balance of trade. [34]

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[32] This switch from consumption to investment expenditure is due to the assumed balance of trade constraint which ensures that pre-Games activity is financed from domestic sources including foregone consumption.

[33] Changes in government expenditure are not reported in Table 4.1.

[34] This point is illustrated by recalling the national accounting identity: $Y = C + I + G + (X - M)$. That is, output is equal to the sum of consumption (C), investment (I), the public sector (G) and net exports / trade balance (X - M).

As expected the economic impact of the pre-Games phase is much greater in percentage change terms on NSW Gross State Product (GSP) than on the country as a whole. Most of the projected increase in Australian GDP of 0.15 per cent or about $775 million is comprised of the projected increase in NSW GSP of 0.41 per cent or about $750 million. While the other states do gain from the flow-on effects of Olympics activities in New South Wales, and from some increase in their own tourism exports, this is largely offset by the increase in the national real wage negatively affecting the international competitiveness of all states.

The constrained supply side scenario and flexible supply side scenario columns in Table 4.1 show the effects of introducing the alternative assumptions outlined in Section 3.3.5. The sensitivity to the change in assumptions can be seen to be quite considerable, particularly for the nation as a whole. The divergence in the results is due to the change in assumptions regarding the *ultimate* source of financing for Olympic construction (domestic or overseas finances), the change in the assumed labour market reaction and a difference in assumptions about the direct changes in tourism demand. In Table 4.2 we decompose the difference between the constrained supply side and central scenario for the effects of these factors.

Table 4.2: Factors Underlying Differences Between Constrained Supply Side and Central Scenarios

Percentage Change	*Constrained Supply Side Scenario*	*Increased Tourism*	*Change in Wage Assumption*	*Central Scenario*
GDP - NSW	0.350	0.017	0.046	0.413
- Aust	0.104	0.001	0.046	0.151
Real consumption - NSW	0.250	0.016	0.044	0.310
- Aust	0.040	0.003	0.044	0.087
Gross Exports - Aust	0.097	-0.001	0.044	0.140

It should be noted that the decomposition in Table 4.2 is path dependent. That is, if we were to switch the order of the two middle columns, the numbers would undergo some change. The Australian GDP figure in the 'Change in Wage Assumption' column would be 0.03 not 0.04. Nevertheless, Table 4.2 does indicate that the size of induced tourism, while important, still only accounts for about one quarter of the difference between the two sets of results.

The differences in results of the central and constrained supply side scenarios are differences in magnitude rather than composition. This reflects the underlying assumptions of the constrained supply side scenario of less international tourism and less slack labour in the pre-Games period. The financing assumptions of these two scenarios are virtually identical leading to estimates that are similar in composition. The flexible supply side scenario, on the other hand, relaxes the balance of trade assumption allowing for the use of foreign funds to finance pre-Games activity. The main result is an increase in consumption expenditure (relative to the GDP increase) and a deterioration in the balance of trade. [35] Under the flexible supply side scenario it is not necessary to reduce consumption to domestically fund pre-Games construction.

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[35] The impact of the overseas financing assumption is negligible when viewed over the three Olympic phases because any overseas borrowing must be repaid (with interest) during the Games and post-Games phases. See Section 4.2.

Table 4.3: Effects of Pre-Games Phase on New South Wales and Australian Output by Industry

Percentage Change	Constrained Supply Side Scenario	Central Scenario	Flexible Supply Side Scenario
New South Wales			
1. Rural	0.054	0.073	0.021
2. Mining	0.067	0.087	-0.189
3. Manufacturing	0.210	0.253	0.265
4. Public Utilities	0.253	0.319	0.464
5. Construction	1.475	1.545	1.708
6. Domestic Trade	0.308	0.368	0.491
7. Transport & Communication	0.363	0.453	0.584
8. Finance	0.296	0.358	0.482
9. Housing	0.254	0.326	0.519
10 Public Services	0.164	0.218	0.373
11. Community Services	0.234	0.298	0.486
12. Personal Services	0.393	0.504	0.719
Australia			
1. Rural	0.002	0.014	-0.061
2. Mining	-0.056	-0.036	-0.236
3. Manufacturing	0.084	0.118	0.087
4. Public Utilities	0.058	0.105	0.183
5. Construction	0.489	0.543	0.646
6. Domestic Trade	0.077	0.119	0.185
7. Transport & Communication	0.203	0.279	0.355
8. Finance	0.084	0.130	0.190
9. Housing	0.088	0.150	0.303
10 Public Services	0.038	0.084	0.207
11. Community Services	0.027	0.076	0.212
12. Personal Services	0.179	0.258	0.418

The middle column of Table 4.3 shows the effects of the pre-Games phase under the central scenario on individual industries. Olympic construction will have strong stimulatory effects on the Construction industry. In an average year of the pre-Games phase, the NSW Construction industry is expected to be about 1.55 per cent larger than it would have been in the absence of the Sydney Olympics. The Construction industry expands at a slightly faster rate than real investment, which is projected to increase by about 1.35 per cent in New South Wales, due to the construction-intensity of Olympic investment.

Table 4.3 shows that the impact on the national Construction industry is much greater than on other industries, with an estimated expansion of 0.54 per cent. Personal Services is the second most positively affected industry as it is a major supplier of services to international tourists. The Transport and Communication industry, is the third most positively affected industry in the phase - a consequence of it being the largest component in the international tourists' budget. Transport and Communication is also affected by the performance of the traded-goods sectors, to which it supplies margins. At the national level the worst performing industries are Rural and Mining which suffer from an increase in real wage costs which can not easily be passed on in price sensitive export markets.

The composition of results for the constrained supply side scenario is similar to that of the central scenario. Again, the industries to perform well in New South Wales are Construction (1.48 per cent increase), Transport and Communication (0.36 per cent increase) and Personal Services (0.39 per cent increase). The Rural and Mining industries both expand but by less than any other NSW industries. The composition of results from the flexible supply side scenario, on the other hand, is quite different to that of the central scenario. While the same industries do well the distribution of benefits between industries is more uneven. The difference is mostly due to the use of overseas borrowing to finance pre-Games construction.

In the flexible supply side scenario it is assumed that financing is partly via a deterioration in the balance of trade (rather than reduced consumption). It is necessary for resources to come from the export-oriented industries such as Rural and Mining, which in New South Wales increase by just 0.02 per cent and decrease by 0.19 per cent respectively (the negative impact at the national level is more severe). Some resources also come from the Manufacturing sector which contains both export activities and import-competing activities, such as textiles, clothing and footwear. The mechanism in MMRF which causes the transfer of resources out of the traded-goods sector is the real exchange rate which appreciates by 0.16 per cent compared with the no Olympics situation. The best performing industries are again Construction (1.71 per cent increase), Transport and Communication (0.58 per cent increase) and Personal Services (0.72 per cent increase) which undergoes an additional increase due to an expansion in private consumption expenditure.

Turning to the effects of the pre-Games phase on broad occupational groups, it can be seen from Table 4.4 that there is an increase in demand for each of the skill categories under all three scenarios for the pre-Games phase. Looking at the central scenario results it can be seen that the demand for most skill classes at the Australian level is estimated to increase at reasonably close to the projected percentage increase in GDP of 0.151 per cent. The only occupational group to show a significantly greater estimated change is Tradespersons which expands nationally by 0.26 per cent, as the Construction industry is an intensive user of Tradespersons. That skill class makes up 45 per cent of Construction industry workers, while it accounts for under sixteen per cent of all workers. The all industry average change in employment for all skill classes is 0.17 per cent (see Table 4.1). The

reason that the effects on skills is so evenly spread is that while particular industries may be intensive users of certain skill classes no individual industry has even half of all the workers in any particular skill class employed in its industry. For instance, less than 30 per cent of Tradespersons are employed in the Construction industry. This means that, particularly at the broad level of skill aggregation, positive impacts on demand for a skill class through increased output by one industry which is intensive in the use of that skill may be reduced or offset by reduced output by other industries.

Table 4.4: Effects of Pre-Games Phase on Employment by Broad Occupation

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
New South Wales			
1. Managers and Administrators	0.367	0.424	0.505
2. Professionals	0.296	0.359	0.497
3. Para-professionals	0.352	0.416	0.555
4. Tradespersons	0.639	0.700	0.788
5. Clerks	0.340	0.402	0.517
6. Salespersons & Personal Service Workers	0.317	0.385	0.512
7. Plant & Machinery Operators & Drivers	0.362	0.424	0.473
8. Labourers	0.417	0.475	0.551
Australia			
1. Managers and Administrators	0.116	0.158	0.189
2. Professionals	0.071	0.118	0.211
3. Para-professionals	0.091	0.139	0.233
4. Tradespersons	0.217	0.263	0.302
5. Clerks	0.109	0.157	0.227
6. Salespersons & Personal Service Workers	0.101	0.151	0.226
7. Plant & Machinery Operators & Drivers	0.146	0.195	0.200
8. Labourers	0.138	0.182	0.212

At the broad level of aggregation, there appears to be little likelihood of an Olympic-induced skill shortage. In New South Wales demand for Tradespersons is projected, even under the flexible supply side scenario, to be less than 0.80 per cent higher in an average pre-Games year than would be the case without the Olympics. Occupational forecasts at this level of disaggregation are not widely produced, however Centre of Policy Studies (CoPS) forecasts indicate that in New South Wales this broad occupational group will undergo a growth rate of only 1.18 per cent per annum over this period, only half the growth rate for all occupations. [36] This reflects a lower than average growth rate in the industries intensive in the use of Tradespersons and a substantial shift by individual industries away from usage of that occupation and towards other skill groups. Prospects for the skill group Australia-wide are similar to the case for New South Wales. It would thus seem that the projected increase in demand for Tradespersons of 0.26 per cent, or even 0.30 per cent, generated by pre-Games construction may well ameliorate the slower growth prospects for that occupation over the rest of the decade.

While there are no indications of a skill shortage at the 8-occupation group level, there is the possibility of Olympic-induced demand for some more narrowly-defined skills within the broad Tradespersons group. Work being undertaken to introduce skill classes at the 283 ASCO [37] unit group level into MMRF in order to investigate this matter will be reported on in the supplementary report. It is unlikely, however, that this work will reveal any significant addition to skill-shortage problems where any might exist without the Olympics. Even if a unit-group skill class were only employed by construction, the modelled impact of the pre-Games phase on that unit-group in New South Wales would at most be only 1.7 per cent in an average year, [38] (the projected expansion in Construction in the flexible supply side scenario, see Table 4.3) [39]. While the Tradespersons unit group that is projected to grow fastest over the period to 2001-02, Office Equipment and Computer Services, has a forecast annual expansion of 8.8 per cent per annum which might imply some skill shortage problems in media centre construction, few other apparently relevant Tradespersons unit groups are expected to have this sort of growth. Demand for certain Tradespersons workers, such as bricklayers and carpenters and joiners, is actually projected by CoPS to fall over the period. Only if Olympic construction is very intensive in its use of particular unit groups in its peak construction years, will the Olympics be able to make a significant addition to any skill shortage problems that may exist for a unit group such as Office Equipment and Computer Services which is expected to experience an increase in employment of almost two thirds in the six years to the end of the pre-Games phase.

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[36] CoPS, Monash University, unpublished internal document.

[37] ASCO stands for Australian Standard Classification of Occupations.

[38] This is because even at a much finer disaggregation of occupational classes, we will still be modelling the pattern of labour usage in Olympic construction as having the same pattern as for the Construction industry in general. Without a detailed investigation of the exact labour requirements for Olympic construction it is difficult to improve upon this.

[39] It is unlikely that there are any skill groups entirely located within an industry at the 283 occupational-group level. However, it should be borne in mind that the pattern of Olympic construction is not even, and an increase of 1.7 per cent in demand for a unit group in an average year might translate into a very much higher increase in a peak year.

4.3 Games Year Results

The macro-economic effects of the Olympic Games on economic activity in the year 2000-01 are shown in Table 4.5, with the effects on output by industry shown in Table 4.6, while the employment effects by industry and by occupation are provided in Table 4.7. All three scenarios are modelled in short-run mode and therefore a balance of trade surplus is allowed to exist.

With slack labour in the short term, the Olympic Games provides a substantial stimulus to the Australian economy in the Games year. Table 4.5 shows the Olympics providing a significant boost to GDP of 0.27 per cent or just under $1.55 billion in 1995-96 prices. This boost is generated by direct additional expenditure in the year of about $1.50 billion, excluding re-allocation of expenditure by domestic producers to sponsorship and by domestic consumers to interstate travel and Olympic tickets.

The impact on GDP is virtually the same magnitude as the direct stimulus, largely due to very substantial restrictions on the expansion of non-Olympics capital stocks during the Games year. [40] This causes returns to capital to rise, increasing prices and the real exchange rate. However, the rise in prices is constrained by the assumption that the brevity of the phase will inhibit any increase in the nominal wage.

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[40] It is assumed that the Olympic industry has installed substantial excess capacity in preparation for the Games. However, with the intense activity of the Olympics confined to a brief period the only other capital expansion in the Games year is that associated with the continuation of the Olympics-induced tourism experienced in the pre-Games phase. Capital is assumed to have been continually adjusting to this level of induced tourism throughout the pre-Games and Games periods.

As would be expected New South Wales is the largest gainer in 2000-01 from the staging of the Olympics in Sydney. The projected increase in GSP for New South Wales is $1.70 billion which exceeds the projected increase in Australian GDP of $1.55 billion. However, there are projected positive spill-over effects to the other states in terms of both real consumption and employment. NSW real household consumption is expected to increase by $350 million in the Games year, with real household consumption in the other states estimated to rise by $190 million. The Games should bring the equivalent of 24,000 extra full time jobs to New South Wales in 2000-01, with an additional 5,000 full time equivalent jobs being generated in the other states.

Table 4.5: Effects of Games Year on Macro-economic Variables

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
Real GDP - NSW	0.837	0.866	0.894
- Aust	0.263	0.272	0.282
Employment - NSW	0.990	1.022	1.055
- Aust	0.413	0.427	0.441
Capital Stock - NSW	0.932	0.952	0.971
- Aust	0.284	0.285	0.286
Real Consumption - NSW	0.265	0.285	0.306
- Aust	0.148	0.155	0.161
Real Investment - NSW	0.074	0.093	0.111
- Aust	0.014	0.017	0.021
Real Deficit ($billion) - NSW	-0.135	-0.138	-0.141
- Aust	-0.308	-0.319	-0.329
Australian export volume	1.417	1.463	1.510
Australian import volume	0.602	0.626	0.650
Aust trade balance ($billion) [(b)]	0.775	0.825	0.850
Consumer Price Index[(b)]- NSW	0.501	0.529	0.557
- Aust	0.308	0.334	0.361
National Real Wage	-0.226	-0.231	-0.237

(a) Figures have been rounded to nearest $25 million

(b) CPI results should be interpreted as the *percentage change* in the rate of price growth, rather than as the *percentage point change* in price growth..

Looking at the GDP and employment results under the central scenario in Table 4.5 it can be seen that Australia employment is projected to expand during the Games year almost 60 per cent more than the estimated expansion in GDP. This reflects the necessity of expanding industries, facing constraints on the use of capital, but with no restrictions on the supply of labour, to cater for Olympic activities by increasing employment. In New South Wales, however, employment is only projected to expand around 0.18 per cent more than GDP. This results from the Olympics industry taking up the capital already put in place during the pre-Games period and New South Wales' greater share in Olympic-induced international tourism for which capital is allowed to expand above base-case levels.

The stimulus which the Olympics provides to the Australian economy in the Games year arises principally through increased export demand such as Olympic export sales of TV rights and increased tourism exports. Other activities such as local ticket sales, interstate tourism and local Olympic sponsorship essentially involve a switching of demand. With the assumption of a benign Commonwealth Government policy stance to a change in external balance during the Games year, these increased exports result in a $0.82 billion improvement in the trade balance. There is a muted increase in domestic absorption. Real investment nationally is estimated to increase by less than 0.02 per cent reflecting an assumption that the temporary Games year boom is not a stimulus for increased investment. Real consumption expands by only 0.16 per cent, 0.12 percentage points less than GDP, due to a temporary 0.23 per cent fall in real wages.

While real consumption is expected to expand by a greater percentage in New South Wales than in Australia as a whole, the ratio of the State's percentage increase in real consumption to that for the nation is less than two compared with a similar ratio for GDP of over three. The strong stimulus to the NSW economy increases prices in that State much more than for the economy as a whole. The CPI growth is projected to expand by 0.53 per cent in New South Wales, but by less than 0.33 per cent across the nation. This acts to squeeze NSW real consumption. [41]

[41] Nominal consumption in NSW is projected to expand at almost twice nominal consumption for the country as a whole.

Table 4.6: Effects of Games Year Phase on New South Wales and Australian Output by Industry

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
New South Wales			
1. Rural	0.069	0.062	0.055
2. Mining	-0.184	-0.234	-0.285
3. Manufacturing	0.231	0.237	0.243
4. Public Utilities	0.581	0.605	0.629
5. Construction	1.831	1.850	1.869
6. Domestic Trade	0.560	0.594	0.628
7. Transport & Communication	1.162	1.241	1.321
8. Finance	0.440	0.466	0.492
9. Housing	0.074	0.092	0.111
10 Public Services	0.253	0.267	0.281
11. Community Services	0.425	0.446	0.468
12. Personal Services	2.370	2.485	2.601
Australia			
1. Rural	0.027	-0.015	0.002
2. Mining	-0.114	-0.155	-0.196
3. Manufacturing	0.138	0.134	0.130
4. Public Utilities	0.149	0.155	0.161
5. Construction	0.628	0.631	0.635
6. Domestic Trade	0.132	0.144	0.156
7. Transport & Communication	0.926	0.992	1.058
8. Finance	0.147	0.154	0.161
9. Housing	0.024	0.030	0.036
10 Public Services	0.146	0.151	0.157
11. Community Services	0.109	0.115	0.120
12. Personal Services	1.057	1.119	1.181

The output by industry results presented in Table 4.6 show that three industries are projected to expand significantly more than the others at the national level. They are Personal Services (1.12 per cent increase in output) Transport and Communication (0.99 per cent) and Construction (0.63 per cent). The expansions in New South Wales are even greater. The first of these industries benefits from the strong international and domestic travel boom associated with the Games year, while about a quarter of the Olympics industry's costs comprise expenditure on NSW Construction. Transport and Communication benefits for both reasons, since transport is a major tourist purchase and communications is an important input into the Olympics industry. [42]

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[42] Most of the Games period construction activity evolves 'fitting out' previously constructed facilities. Fit-out costs are classified as operational costs rather than capital expenditure. This is consistent with costings published in Audit-General (1994).

In New South Wales the only industry that is negatively effected is the mining industry. While the actual Games activities are assumed to have no impact on overseas exports, growing international tourism demand continuing into the Games year, puts upward pressure on prices, adversely effecting the real exchange rate and reducing mining exports. These reductions in traded goods sector are the result of the continuation of increased tourism demand, rather than of short-term Games activity which is assumed to have no impact on merchandise exports.

Table 4.7: Effects of Games Year on Employment by Broad Occupation

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
New South Wales			
1. Managers and Administrators	1.106	1.136	1.165
2. Professionals	0.868	0.897	0.925
3. Para-professionals	0.983	1.013	1.042
4. Tradespersons	1.227	1.255	1.283
5. Clerks	0.866	0.900	0.934
6. Salespersons & Personal Service Workers	1.011	1.059	1.108
7. Plant & Machinery Operators & Drivers	0.940	0.979	1.017
8. Labourers	0.908	0.937	0.966
Australia			
1. Managers and Administrators	0.439	0.450	0.461
2. Professionals	0.305	0.315	0.325
3. Para-professionals	0.368	0.380	0.391
4. Tradespersons	0.480	0.490	0.500
5. Clerks	0.379	0.396	0.412
6. Salespersons & Personal Service Workers	0.416	0.441	0.465
7. Plant & Machinery Operators & Drivers	0.567	0.592	0.616
8. Labourers	0.396	0.467	0.416

Table 4.7 shows a very even spread in the impact on occupational demand at the ASCO Major Group level. While the percentage changes shown are reasonably small, particularly Australia-wide, they are on a full-year basis. With the employment increase in the year probably having quite a substantial peak, the increase in demand for certain skills in September 2000 may be substantially greater than the Table 4.7 annual estimates. However, the very shortness of the Olympic Games is likely to ease any skill shortage problem. Nevertheless if workers have to be temporarily drawn away from permanent jobs to work on Olympic activities, substantial pressure may be put on our assumption of no change in the nominal hourly wage.

4.4 Post-Games Results

The post-Games period is characterised by:

- A continuation of Olympics-induced inbound international tourism
- A small increase in foreign demand for Australian manufactured goods
- A small increase in the productivity of Australia's labour force
- Where necessary, repayment of any overseas borrowings (flexible supply side scenario only) [43]

[43] In the central and constrained supply side scenarios any balance of trade surplus from the Games period is consumed in the post-Games period, returning the balance of trade to its pre-Games period level.

Table 4.8 shows that under the central scenario, the post-Games phase generates an increase in GDP of 0.07 per cent (about $400 million) in an average year of the phase. Most of this increase ($325 million) is attributable to the assumed increase in Australia's labour productivity arising out of the experience of conducting the Olympics. In line with our assumptions for the post-Games phase there is virtually no change in national employment, but the improvement in labour productivity provides the country with an increased level of 'effective' labour resources. The estimated increase in GDP is of the same order as the labour productivity improvement of 0.05 per cent.

Under the central scenario, where construction was entirely domestically financed, it is assumed that the balance of trade surplus generated in the Games year allows the nation to run a larger balance of trade deficit during the post-Games phase than would have been the case in the absence of the Olympics. Under this scenario the nation's Balance of Trade deteriorates by $200 million. The net present value of the changes in the Balance of Trade over the entire 12 years of the Olympic period is zero.

National consumption increases by 0.17 per cent or $650 million, well above the GDP increase of 0.07 per cent or $400 million. The difference is due mainly to a deterioration in the trade balance of $200 million made possible by increased exports during the Games phase. Australian residents are markedly better off in terms of real consumption in the post-Games phase when Olympic construction is entirely domestically financed in the pre-Games phase. However, the net present value of real private consumption over the whole 12 year period is virtually the same regardless of the financing options.

Table 4.8: Effects of Post-Games Phase on Macro-economic Variables

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
Real GDP - NSW	0.127	0.204	0.148
- Aust	0.011	0.065	0.064
Employment - NSW	0.102	0.119	0.073
- Aust	0.004	0.006	0.003
Capital Stock - NSW	0.175	0.269	0.171
- Aust	0.022	0.077	0.053
Real Consumption - NSW	0.189	0.281	0.111
- Aust	0.098	0.173	0.044
Real Investment - NSW	0.162	0.246	0.159
- Aust	0.045	0.103	0.069
Real Deficit ($b) - NSW	-	-	-
- Aust	0.275	0.275	-0.325
Australian export volume	-0.308	-0.271	0.861
Australian import volume	0.122	0.255	0.334
Australian trade balance ($b) [(a)]	-0.200	-0.200	0.225
Consumer Price Index [(b)] - NSW	0.184	0.298	0.215
- Aust	0.193	0.287	0.221
National Real Wage	0.042	0.121	0.147

(a) Figures have been rounded to nearest $25 million.
(b) CPI results should be interpreted as the *percentage change* in the rate of price growth, rather than as the *percentage point change* in price growth.

In the central scenario NSW GSP increases by 0.20 per cent or $425 million or slightly more than the national gain of $400 million. There is therefore a $25 million fall in the output for the rest of Australia. The increased international tourism in the post-Games phase is concentrated in New South Wales with over 50 per cent of expenditure occurring in that State (See Table C.5 in Appendix C). With no slack labour available, some of the additional resources required to accommodate additional NSW tourism must come from other states. However, in terms of real private consumption there are

positive spill-overs to other states, with the NSW increase of 0.28 per cent or $375 million, $275 million less than the national gain.

Under the constrained supply side scenario the national GDP increase is 0.01 per cent or about $75 million. With no assumed increase in productivity, the only sources of increased output are increased tourism (albeit less than in the central scenario) and the balance of trade deterioration (made possible by Games year exports). Again, the NSW GSP gain ($275 million) is greater than the national GDP gain.

Interestingly the national GDP and consumption increases under the flexible supply side scenario (0.64 per cent and 0.44 per cent respectively) are *less* than the corresponding estimates of the central scenario. This consumption result reflects the flexible supply side scenario assumption that overseas debt incurred in the pre-Games period is repaid in the Games and post-Games periods. This involves the nation running a balance of trade surplus of about $225 million during the post-Games period. The GDP result is due to a larger capital stock under the central scenario.

Tables 4.9 and 4.10 show the impact on output and employment by industry respectively for an average year of the post-Games phase. Again the Transport and Communication and Personal Services industries do well due to post-Games tourism. However, the impact on Construction output in the post-Games phase is much lower than in the earlier phases and is similar to the GDP impact. Resources are again reallocated from the traded-goods sector to accommodate increased international tourism demand. Under the flexible supply side scenario the transfer from the traded-good sector is less severe due to Commonwealth Government macro-economic policy which has the impact of lowering domestic prices, leading to a more favourable real exchange rate.

While NSW industries on average, experience an estimated employment increase as well as an output increase, with all but three NSW industries projected to experience a positive impact on employment, this is not true for the nation as a whole. With Australian employment simply being reallocated between industries, almost half the industries in Table 4.11 are negatively affected in terms of employment. Again, in the flexible supply side scenario the reductions in the Rural and Mining industries are smaller due to a more favourable real exchange rate.

Table 4.9: Effects of Post-Games Phase on New South Wales and Australian Output by Industry

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
New South Wales			
1. Rural	-0.155	-0.199	-0.130
2. Mining	-0.630	-0.974	-0.809
3. Manufacturing	-0.057	0.057	0.205
4. Public Utilities	0.134	0.226	0.142
5. Construction	0.172	0.260	0.145
6. Domestic Trade	0.146	0.240	0.196
7. Transport & Communication	0.298	0.354	0.306
8. Finance	0.127	0.204	0.139
9. Housing	0.196	0.299	0.146
10 Public Services	0.132	0.215	0.085
11. Community Services	0.175	0.264	0.093
`12. Personal Services	0.414	0.496	0.361
Australia			
1. Rural	-0.193	-0.254	-0.170
2. Mining	-0.482	-0.688	-0.524
3. Manufacturing	-0.140	-0.029	0.176
4. Public Utilities	0.016	0.083	0.063
5. Construction	0.053	0.115	0.055
6. Domestic Trade	0.031	0.111	0.121
7. Transport & Communication	0.196	0.229	0.235
8. Finance	0.001	0.048	0.040
9. Housing	0.105	0.194	0.081
10 Public Services	0.069	0.138	0.034
11. Community Services	0.072	0.139	0.015
12. Personal Services	0.276	0.346	0.238

Table 4.10: Effects of Post-Games Phase on New South Wales and Australian Employment

Percentage Change	*Constrained Supply Side Scenario*	*Central Scenario*	*Flexible Supply Side Scenario*
New South Wales			
1. Rural	-0.253	-0.380	-0.276
2. Mining	-0.802	-1.290	-1.078
3. Manufacturing	-0.093	-0.030	0.143
4. Public Utilities	0.099	0.133	0.053
5. Construction	0.168	0.204	0.078
6. Domestic Trade	0.139	0.181	0.135
7. Transport & Communication	0.311	0.304	0.260
8. Finance	0.099	0.115	0.056
9. Housing		-	-
10 Public Services	0.127	0.159	0.017
11. Community Services	0.173	0.211	0.027
12. Personal Services	0.469	0.495	0.343
Australia			
1. Rural	-0.306	-0.458	-0.334
2. Mining	-0.728	-1.129	-0.901
3. Manufacturing	-0.170	-0.106	0.124
4. Public Utilities	-0.003	0.012	-0.009
5. Construction	0.052	0.062	-0.010
6. Domestic Trade	0.027	0.057	0.065
7. Transport & Communication	0.218	0.191	0.198
8. Finance	-0.011	-0.021	-0.030
9. Housing	-	-	-
10 Public Services	0.069	0.086	-0.029
11. Community Services	0.071	0.088	-0.046
12. Personal Services	0.335	0.355	0.219

5. Effects on Economic Welfare

The NSW Treasury/CREA study has been concerned principally with the measurement of the economic impact of the Olympic Games. To assess the welfare effects of the Sydney Olympics in full would involve a full-scale cost-benefit analysis covering, in addition to the matters discussed in the previous chapters, a proper measurement of consumer surplus obtained by Australian spectators at the Games, the increase in utility of Australians from elevated national pride accompanying a home Olympics, the long-term benefits from the improved sporting facilities constructed for the Olympics and possible environmental costs and congestion associated with the staging of the event.

Examination of possible consumer surplus and the long-term value of the additional sporting facilities have proved inconclusive up to now, but the matter will be considered further in the supplementary report. Questions such as the benefits of inflated national pride would require conducting a substantial survey and so no attempt has been made to examine either this or environmental/congestion costs.

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[44] Consumer surplus is a measure of the extra satisfaction gained by those consumers who pay an actual price for an Olympics ticket which is lower than that which they would have been prepared to pay.

[45] New data expected on possible ticket prices and sales of shares in Olympic facilities should improve this analysis. Of crucial importance to the measurement of a satisfactory estimate of consumer surplus is the degree to which the quantity of tickets demanded would fall as the price were raised by various amounts above the expected actual price.

In this section our analysis of economic welfare is thus restricted to the estimated real private and public consumption effects of the Games. We assume a welfare function of the following form:

Where r is the social discount rate,

$c_1(t)$ and $c_2(t)$ are the percentage changes in private and public consumption in year t which result from Sydney hosting the Olympic games, and

S_1 and S_2 are the shares of the value of private consumption and public consumption respectively in total consumption.

For our calculations here we have chosen a social discount rate of 7 per cent. This is a value suggested in NSW Government (1990) and it is also equal to the real rate of interest which we assumed on foreign and state government borrowings. Calculations of economic welfare from the 12 year Olympic period for all three scenarios are shown in Table 5.1 below.

Table 5.1: Net Present Value of New South Wales and National Economic Welfare from the Sydney Olympics ($1995-96 billion)

	Constrained Supply Side Scenario	*Central Scenario*	*Flexible Supply Side Scenario*
NSW	$2.105	$2.989	$3.604
Australia	$1.768	$3.792	$5.101

The increased economic welfare at the national level, shown in Table 5.1, indicates that the Australian population is expected to be better off as a result of the Games. The strong NSW welfare figures are largely due to labour movement increasing the NSW population rather than increased consumption per capita. For this reason the state results can not be interpreted in the same way as the national figures.

These net present value calculations assume that the additional economic activity of the pre-Games period is not equally distributed across each of the six years of the period. Rather, the pre-Games activity is assumed to build up during the period reaching a peak in the year 1999-00. The first year of the pre-Games period (1994-95) is assumed to experience 40 per cent of the reported 'average year' activity. The following three years (1995-96, 1996-97 and 1997-98) are assumed to experience 60 per cent, 80 per cent and 100 per cent of the average year pre-Games activity. The final two years of the period (1998-99 and 1999-00) experience 140 per cent and 180 percent of the average year activity respectively.

In order to test the sensitivity of welfare estimates to changes in the social discount rate and the real interest rate on public and foreign debt welfare calculations were carried out using values of 4 per cent and 10 per cent for both rates. Under the central scenario, a social discount rate and a real interest rate equal to 4 per cent increases the national and NSW welfare estimates by $600 million and $425 million respectively. Using 10 per cent for both rates decreases the national and NSW welfare estimates by $500 million and $350 million respectively.

6. Limitations and Conclusions

6.1 The Key Results

An overview of the impact of the three phases of the Olympic Games is provided in Section 2 of the Executive Summary. Only the most central results are presented here.

Over the twelve years ending in 2005/06, our best estimate of the net present value of the impact of the Olympics on NSW real GSP and real household consumption is $6.3 billion and $3.1 billion respectively. The corresponding real GDP and real consumption estimates for Australia as a whole are $6.3 billion and $3.7 billion respectively.[47]

The Olympics will see New South Wales with an average of around 8,000 extra jobs until 2005/06. However, the job spread will be uneven with by far the most jobs (over 24,000 full-time equivalents) being generated in the Games year, while there is estimated to be only around three thousand Olympics-generated jobs in an average post-Games year. The Olympics are expected to have only a minimal net impact on employment in states other than New South Wales.

Estimations of the impact of the Olympics on economic welfare relate only to real private and public consumption. The central estimate of the effect of the Olympics on New South Wales' economic welfare is just under $3 billion, with the corresponding figure for Australia as a whole being almost $3.8 billion. No estimate was made of the welfare Australians would obtain from increased consumer surplus or in increased national pride. We do not possess sufficient data to make any useful estimate of either. However, it is our intention to seek sufficient data to estimate the consumer surplus associated with the temporary introduction of a new good, Olympic events in Australia, and the outcome will be included in the supplementary report. Our prior expectation of a rough order of magnitude is that consumer surplus may add around another 10 per cent to our consumption based estimate of the impact on Australian's economic welfare.

The policy stance taken by the Commonwealth Government to the way the country as a whole finances the Olympics is unlikely to affect very significantly the net present value of the Games on Australia's real GDP and real household consumption given the assumption that the debt is fully repaid within the period under consideration. [48] However, under the flexible supply side scenario the overseas financing option has a quite significant effect on the timing of the real consumption effects in particular. With the Olympics construction being financed out of domestic savings (central and constrained supply side scenarios), the benefits to real consumption will be spread across the entire period, with the post-Games bringing the largest annual benefits.

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[47] The assumed distribution of economic activity across the six pre-Games years is the same as that outlined in Section 5.

[48] Total economic activity is slightly greater when economic activity is concentrated in the pre-Games phase because of the assumed slack labour market in the pre-Games period.

The industries to do best from the Olympics are Construction, Transport and Communication and Personal Services. Those estimated to fare worst are Rural and particularly Mining. These industries are especially hurt by the export of tourism services crowding out traditional export industries (see Adams and Parmenter, 1995, for a discussion of this issue).

These results relate to our central scenario concerning the level of induced tourism, labour-market tightness, and use of foreign funds. Alternative scenarios show the national benefits of the Olympics are just under two thirds of the central scenario estimates when more constrained supply side assumptions are employed. Alternatively, employing a more flexible supply side set of assumptions sees the national benefits around one quarter higher than our central scenario results. The potential for variation from the central outcome is less at the state level than at the national level. This range of results indicates the extent to which the results are sensitive to changes in assumptions, rather than indicating the likely lower and upper bounds of the Olympics' impact. Detailed results for these alternative constrained supply side impact and flexible supply side impact cases are provided in Section 4.

6.2 Study Limitations

6.2.1 Data Limitations

The basic data for this study consisted of the MMRF multi-regional data base and study estimates of Olympic construction and operating expenditures, Olympics sales, current international tourist expenditure patterns, induced tourist service exports, and interstate Olympic spectators' travel expenditure. MMRF data is based primarily on official ABS statistics and estimates of interstate commodity and factor flows, together with various behavioural elasticities. The MMRF database currently constitutes the best Australia-wide multi-regional database with detail on the NSW economy.

The estimates of data items undertaken in the course of this study were based mainly on published sources. Collection of primary data was outside the scope of this study and would have added little in the way of additional insights to the study. The main areas of uncertainty regarding the data estimates related to the level of induced tourism, overall Olympic construction costs and Olympics operating profitability. It is unlikely that access to additional data at this stage would cast significant additional light on these items given that the Olympics induced impacts are unobservable. We employed what we judged to be the best secondary data and projections available and have carefully written up our methodology for estimating all required data items in Section 3 and Appendices B and C. Our analysis of simulation results indicate that likely variations in the size of the direct effects are of some significance for a given macro-economic scenario, but that changes in the macro-economic scenario has a greater influence on the probable range of results. One of the most important estimated data items is for the profitability of the Olympics. We have been conservative in this regard, owing to the possibility of some remaining escalation in construction costs offsetting an increase in sales of TV rights.

6.2.2 Modelling Limitations

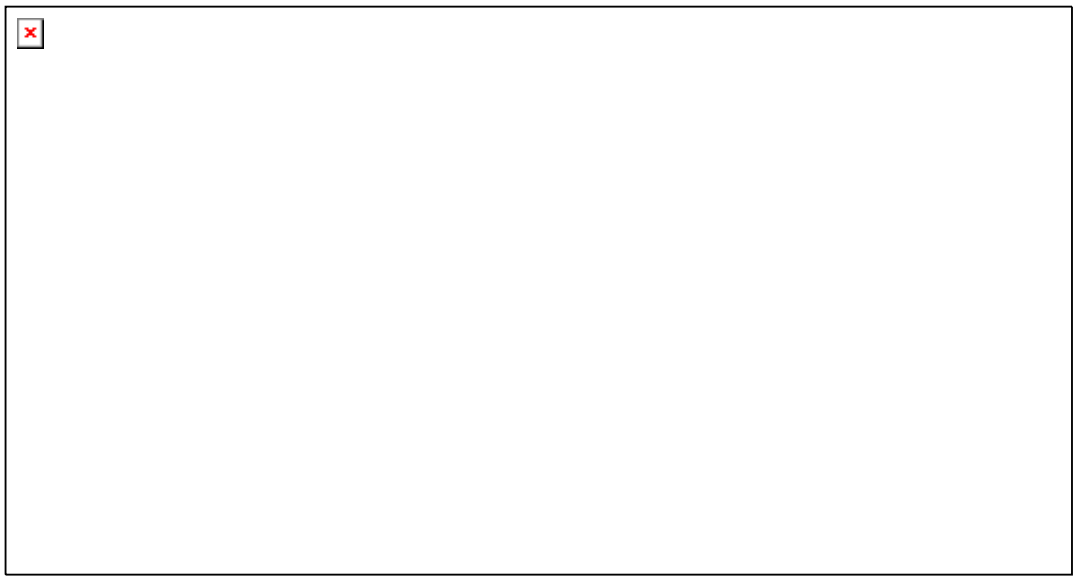
The estimates provided in Section 4 are model-based. This constitutes a limitation in the sense that, by definition, models depict the working of the Australian economy in an approximate way. Hence, the estimates based on these models must be regarded as approximations too. There is, however, no alternative to the use of a model of some sort if questions of the type addressed in this study are to be answered. The alternatives are to use a model which is, so to speak, in one's head and hence which is likely to be ill-formulated and beyond the reach of criticism, or to use a model which is carefully set out for all to see. It is the latter course that we have taken in this study.

The model we have employed is the one we consider best suited to the task in hand. MMRF is a large model which by its nature carries many explicit assumptions. In our study we have provided results under a variety of scenarios relating to those assumptions to which our model is most sensitive. It may appear a disadvantage of the study that there is considerable variation in our results according to the scenario chosen. However, simpler input-output studies merely ignore possible variations in macro-economic settings. Indeed they are basically incapable of handling them. However, ignoring the possibility of such factors as different labour market settings does not remove the fact that these possibilities exist in the actual world. The advantage of our approach is that our assumptions are explicit. Our different scenarios allow the reader to make judgments about possible outcomes under plausible sets of assumptions. For instance, while we allow some labour market slack, we do not take the extreme input-output view that all factor markets are slack, with usually the only constraint on the economy in an input-output world being the level of demand.

6.2.3 Sensitivity of Results to Labour Market Assumptions

While we do not consider sensitivity of results to be a weakness of the report, the issue does require some attention. Results from the pre-Games period are particularly sensitive to the assumed labour market conditions. In Figure 6.1 we show the importance of our assumption regarding the constraint on the real wage increase arising from the pre-Games phase.

Figure 6.1: Effect of Real Wage Constraint on GDP - Central Scenario



We do not consider that the impact of the pre-Games phase will cause a change in the real wage above 90 per cent of the constant-employment increase in an average year of the pre-Games phase. This is because almost ten per cent of the increased construction and tourism expenditure is expected to occur in the first two years of the phase, during which time it is unlikely that the Olympics would generate any substantial upward thrust in real wages. Even with this wages assumption, which we consider constrained supply side, the average annual impact of the Olympics on GDP in the phase would be around $275 million. As explained in Section 3.3.2, we consider the rise in the real wage is likely to be about three quarters of the constant-employment level; this is what yields the 0.032 per cent real wage rise for the central scenario shown in Table 4.1. This translates into an average annual

increase in GDP generated by the Olympics of around $775 million. For those who disagree with our assumption, Figure 6.1 provides information for the calculation of alternative results. [49] We do consider, however, that it is unlikely that the real-wage impact of the Olympics will be way out of the range used in our alternative scenarios, i.e. 70 per cent (flexible supply side scenario), to 80 per cent (constrained supply side scenario) of the constant-employment real-wage rise.

[49] It should be noted that while the relationship in Figure 6.1 is shown as being linear, this is an approximation introduced to save the study team from engaging in substantial extra computing. Such an approximation is acceptable when analysing small changes such as we have done here. However it is completely inappropriate for analysing large changes in the real wage where the sensitivity of GDP to reductions in the real wage is likely to be substantially lessened.

6.3 Conclusions

This study has estimated that the Sydney Olympics will bring substantial benefits to the economies of New South Wales and Australia as a whole. The estimated welfare effects of the Olympics to Australians are equivalent to over one per cent of annual private consumption. The corresponding figure for New South Wales is just under three per cent. However, our analysis indicates that these results hinge crucially on desirable labour market outcomes. In particular it is important that real wages do not rise to choke off any national increase in employment. Substantial gains are also involved in the Olympics leading Australia to develop a smarter labour force. It is important if New South Wales is to obtain the maximum gains and if these gains are not to be at the expense of the other states, that these labour market outcomes occur.

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APPENDICES

Appendix A: Evidence from Other Olympics Studies and Previous Olympics

A.1 KPMG Peat Marwick - Sydney Olympics 2000 Economic Impact Study

The most widely quoted study of the economic impact of Sydney's 2000 Olympic Games is KPMG Peat Marwick's *Sydney Olympics 2000 Economic Impact Study* (KPMG, 1993) released in May 1993, as part of Sydney's bid for the 2000 Games.

The report finds that the 2000 Olympics would add $7.3 billion (undiscounted 1990-91 dollars) to national GDP over the 14 years between 1991 and 2004. The equivalent net present value at a 7 per cent discount rate is $3.6 billion, equivalent to 1.1 per cent of 1990-91 GDP. The majority of Olympics activity is centred in New South Wales ($4.6 billion) and, in particular, Sydney ($3.6 billion) as shown on the summary table below. Table A1 also includes the NSW Treasury/CREA estimates which have been converted to 1990/91 dollars.

Table A1: Results from KPMG Peat Marwick Study

	KPMG: Total (undiscounted) *Effect on GDP*		*KPMG: Net Present Value of GDP Effect*		*NSW Treasury/CREA: Net Present Value of GDP Effect*	
	$90/91 m	*Percentage of 1991 GDP*	*$90/91 m*	*Percentage of 1991 GDP*	*$90/91 m*	*Percentage of 1991 GDP*
Australia	7,336	2.00	5,597	1.08	5,825	1.12
NSW	4,587	3.58	3,547	2.00	5,775	3.26
Sydney	3,560	n.a	2,759	n.a	n.a	n.a

KPMG (1993) estimates the Games will lead to significant job creation with additional employment of 156,000, 90,000 and 73,000 in Australia, New South Wales and Sydney respectively. The additional economic activity and employment is spread over a 14 year period with a significant peak in 2000.

There are several reasons for believing that the KPMG report on the benefits of staging the Olympic Games provides questionable estimates. The input-output framework used in the study does not take into account supply-side constraints, such as price increases due to resource scarcity, investment crowding out and public financing of construction costs. It is implicitly assumed that all activity associated with the Games is 'new' activity. For example, all Olympic construction is assumed to be additional to the 'normal' level of non-Olympic capital works. In reality it may be that some Olympics construction will be offset by reductions in other capital works. More importantly, the KPMG report does not take into account the impact of financing the construction of the Games

facilities whether through taxes, reduced public spending or increased debt. The ability of input-output models to measure the economic impact of a event such as the Olympic games reduces with the size of region under examination. While it way be a reasonable to use input-output models to analysis the economic impact on small regions that can attract resources from elsewhere, it is not an appropriate analytical tool to use to analyse economic impacts at the national or even state level.

KPMG estimated that the Games will have a $3.5 billion positive impact on the current account, predominantly through increased tourism exports. While the report acknowledges that additional tourism demand will lead to increased imports it does not address the relationship between the balance of trade and the level of national savings (see for example Industry Commission, 1995).

An important finding of the KPMG report is that the national benefits of the Games are significantly greater than the NSW benefits. That is, much of the Games benefits spill over into states other than New South Wales. This result is to be expected from a modelling approach that contains no economy-wide constraints. In the KPMG analysis, New South Wales is able to obtain all the resources it requires without drawing any resources away from the other states. This contrasts with the more realistic approach of the NSW Treasury/ CREA study where returns to labour and capital are projected to increase in New South Wales as a result of the Olympics and thus draw extra resources to that state in order to meet the extra international and interstate demand for NSW goods and services. The extent to which this will offset the increase in demand in the other states via input-output linkages with NSW industries and consumers, will depend on various macroeconomic assumptions, particularly those for the labour market.

Construction estimates were based on quantity surveyors' cost reports and the candidature file budget. The report does not state the total value of construction activity associated with the Games. The list of venues and infrastructure projects, however, includes several items that are not included in the CREA/NSW Treasury analysis. An indication of the total construction costs of the Games modelled by KPMG can be obtained by referring to the Audit Office Report (1994). This suggests total Olympics capital costs of approximately $1.4 billion were modelled by KPMG, including private sector funding and excluding the Athletics and Aquatic centres.

KPMG estimate that the total operating expenditure associated with running the Games is $750 million, spread across a wide range of industries. The total includes $92 million in contingencies and a $46 million contribution to the AOC to be spent on sport in Australia.

Visitors are categorised by origin (international, interstate and intrastate) and by timeframe (pre-Games, Games specific and post-Games). Aggregate expenditure figures are not quoted. However assumptions of visitor numbers and expenditure allow aggregates to be constructed. Total international pre-Games expenditure including official visitors, spectators and induced tourists comes to just under $1 billion. Total Games period international expenditure is calculated to be approximately $0.5 billion with total post-Games visitor expenditure of $1.3 billion.

On the basis of the KPMG assumptions, total international visitor expenditure over the Olympics period is in the vicinity of $2.8 billion. Additional interstate and intrastate visitor expenditure is analysed for the purpose of state and regional economic impacts respectively. Based on these calculations and estimates the total direct expenditure associated with KPMG's analysis of the Games is in the order of $5 billion (undiscounted over a 14 year period). The national economic impact of $7.3 billion implies an average input-output multiplier of approximately 1.5.

A.2 NIEIR - The Melbourne 1996 Olympics, An Economic Evaluation

The National Institute of Economic and Industry Research examined the expected economic impact of an Olympic Games in Melbourne in 1996 (see NIEIR, 1990). That report found that the Melbourne Olympics could have added $14.4 billion (undiscounted) over 15 years (peaking in 1996) and increased employment of 230,000 jobs (person years) over the same period. A key finding of this report is that by the year 2004, the economy has virtually returned to its base case level. That is, the Games have virtually no impact on long-run GDP. At the state level, NIEIR found that the additional economic activity would be concentrated in the host state, Victoria, which gains additional GDP of $4.6 billion (undiscounted to year 2000) and no other states would be made worse off by the Games. Additional employment is also concentrated in Victoria which gains 216,000 additional jobs (person years).

NIEIR used a 'Keynesian' version of their IMP Model to analyse the impact of the Games. The model assumes that the only binding constraint operating in the economy is the balance of payments. If the economy receives foreign reserves equal to $100 million, the constraint is no longer binding and the economy expands through unrestrained multipliers until $100 million of imports have been drawn into the economy at which time the constraint becomes binding again. There are assumed to be no binding supply-side constraints on labour, capital or land. This combination of assumptions results in the model producing large output increases in response to increased exports such as tourism and telecommunications.

Total capital expenditure including sports facilities, commercial projects and infrastructure associated with the Melbourne Games was estimated to be $1.7 billion (1989-90 dollars). Operating expenditure was estimated by NIEIR to be $412 million. Total international tourism and Olympic visitor expenditure was estimated at $2.6 billion giving total direct expenditure of $4.7 billion. The total economic impact of $14.4 billion implies a multiplier of approximately 3.

It is difficult to provide a critique of the IMP Model as there are few published details relating to its structure. The multiplier of 3 in the NIEIR study compares with a multiplier of close to 1 for the MMRF Model utilised for the current study, and therefore there must be substantial differences in assumptions about the way in which the economy works between the two models. It is noteworthy that the unconstrained input-output model utilised by KPMG is estimated to have had a multiplier of only 1.5. Therefore it is the view of the authors of the current study that the NIEIR estimates do not make sufficient allowance for constraints in the economy, and are implausibly large.

A.3 Other Studies

Several other studies have looked at the economic impact of previous Olympic Games (see Wilcox 1994, COOB'92 1992 and SIC 1988), most of these having used input-output or multiplier analysis. In some cases these reports have used a very broad definition of 'Olympic activity' which has at times included any investment (private and public) and tourism activity (international, inter-regional and intra-regional) that happened to occur around the time of the Games. To the best of our knowledge, there has been no analysis of the economic impact of an Olympic Games using the computable general equilibrium framework.

A.4 Other Evidence from Past Olympic Games

A.4.1 The Montreal and Los Angeles Experiences

The potential downside from the holding of the Olympics are illustrated by the experience of Montreal in 1976. After the huge losses at Montreal few cities wanted to suffer two decades of debt. The 1976 Montreal Olympics lead to debts of upto $C1 billion which the taxpayers of Montreal are still paying off. Nevertheless, the International Olympic Committee have pointed out that the Montreal Games, without the site costs, made a cash profit of $C116 million. Montreal embarked on a massive capital works program associated with, but essentially peripheral to, the Olympic Games. The IOC maintain that Montreal was not asked to make the massive capital expenditure that left the city with a long-term financial burden. Therefore it is important to qualify statements about the losses associated with the Montreal Games.

Perceptions of the Montreal experience had the effect of dissuading many from seeking to hold the Olympics in the subsequent years. Nevertheless, that is no longer the case. The major factor causing this change was the demonstration by the Los Angeles Games in 1984 that it was possible for the Games to make a profit. Amongst other things the Los Angeles Games proved that the television exposure afforded the Games and the revenues that go with it were potentially very lucrative, and that judicious private sector involvement can reduce the risks to governments sponsoring the event.

The American television networks have dictated the value of the Olympics as a television event. In 1972 US television paid US$25 million for the rights to the Montreal Games. The figure jumped to US$85 million for the Moscow Games. The United States' ABC network paid a record US$225 million for the television rights to the 1984 Los Angeles Games.

However, the 1988 Seoul Games demonstrated the limits on the amounts that the American networks were willing to pay for the Games television rights. The South Koreans initially announced that the price for the US television rights to the Games would be US$1 billion. This was an unrealistic expectation, with the Americans in the end only paying only US$300 million for the rights.

A.4.2 Learning from Others

There are useful lessons to be learned from the experience of other countries in hosting the Olympic Games, not least a tendency to be unduly optimistic regarding the direct visitor related impacts.

An important observation from the literature on Olympic Games impacts is that Olympics visitors have different expenditure patterns to general tourists. While in general, tourists tend to spend money on the entertainment industry, which raises significant government tax revenue through items such as alcohol and gambling, this is much less the case for Olympics and other special event visitors. This point was borne out again at the recent Atlanta Games, discussed in more detail below.

For several previous Olympic Games, predictions for the number of international visitors have been overly ambitious. The number of actual international visitors to the 1964 Tokyo Games was 70,000 - approximately half of the number predicted. The predictions for Munich and Montreal were 1.8 million and 1.5 million visitors respectively. There are no actual figures available but these estimates are believed to have been excessive. The Moscow games attracted only 30,000 international visitors

and the actual visitor numbers for the Los Angeles games of 400,000 were well below the prediction of 625,000.

For the 1964 Tokyo Games, Japan experienced less tourists in the Games year, than in the previous year. Many stayed away because of fear of over-crowding. Travel agents bulk purchased hotel space which they could not on-sell. Visitors spent less on hospitality and entertainment than expected.

Even though the Los Angeles Games were the first to return a surplus, only 75 per cent of available Los Angeles Games tickets were sold and less were used. Free tickets to officials accounted for 7 per cent of total ticket sales. Ticket usage in the first week of the Games was much lower than in the second week. The majority of visitors to the Los Angeles Games did not stay in hotels or motels but rather stayed with friends and family. The average visitor stay was just 6 days, well below the Games duration of 16 days.

Initial estimates of the visitor accommodation requirement for the Los Angeles Games were very accurate. However, the hospitality industry chose to disregard the estimates anticipating greater accommodation demand. During the 16 days of competition there was only a 27 per cent increase in room-sale revenue. The 'Olympic Family' took up 14,200 hotel rooms in the downtown Los Angeles region. Restaurant business during the Games was below normal as TV programming influenced eating habits. Many locals preferred to watch Olympics TV broadcasts than eat out and others avoided restaurants for fear of overcrowding. Olympic visitors did not frequent restaurants preferring to 'watch TV and eat junk food'.

Many potential Los Angeles visitors chose to postpone or cancel trips during the Games period for fear of crowds, pollution, traffic and crime. Many locals chose to leave Los Angeles and rent out their homes to visitors.

A.4.3 The 1996 Atlanta Olympic Games

It appears that the outcomes experienced by Atlanta for the 1996 Games were similar in many respects to those for Los Angeles. The windfall that many business operators anticipated did not eventuate. There has been considerable anecdotal evidence of empty restaurants, dramatic price cutting for parking lots, along with well publicised stories about congestion and related traffic problems.

A recent report on the post-Olympic outlook for the Georgia State economy (Ratajczak, 1996) identifies significant expenditure switching by locals away from local entertainment and hospitality towards the Olympics, this changed the composition of economic output rather than increasing its level. In particular it is suggested that the tightness of the labour market prevented Georgia from gaining as much from the Olympics as might otherwise have been the case. It was necessary to import labour from other states creating a 'leakage' from the Georgian economy. While there is the prospect of a considerable flattening of activity in the post-Games period, this is consistent with an underlying slowdown that was taking place anyway and was temporarily averted by the Olympics. Ratajczak does not anticipate a post-Olympics recession and expects the Georgia economy to continue to outperform the national average over the next two years.

According to Ratajczak, some of the expected direct impacts for Atlanta were not realised. For example, while only 35 per cent of visitors were expected to stay with friends and family, it is

estimated that the actual proportion was nearly 70 per cent. Less than one third of Olympic tickets were expected to be used by residents of Georgia, with the actual proportion being nearly 45 per cent, hence the expenditure switching referred to above. None of the expected increases in visitor related activity prior to the Games eventuated, with conventioneers diverting from Atlanta. Therefore, after making appropriate adjustments to estimates of the expected economic impacts prior to the Games, the rough estimate of the total impacts of the Games is slightly more than US$4 billion for Georgia and considerably less for the USA, with $3 billion of that impact occurring in 1996.

Ratajczak also makes the important point that because of the fairly concentrated 1996 Olympics impact, there will be a big fall-off in the rate of growth of GSP in 1997. The greater the extent of the benefits generated in the Olympic Games year, the greater the fall-off will have to be in the following year.

Appendix B: Introduction of New Industries

In order to simulate the impact of an event the size of the Sydney Olympics it was necessary to make several major changes to the MMRF model. These changes included the addition of three new industries:

- The Olympics Industry
- International Tourism Industry
- NSW Interstate Tourism Industry

For each new industry it was necessary to specify detailed cost and revenue structures.

B.1 The Olympics Industry Database

B.1.1 Olympics Industry Costs

To create the NSW Olympics industry cost column in the MMRF data base it was necessary to determine the industry's:

- Intermediate inputs, by regional source
- Direct labour costs
- Returns to capital/NSW Government

The estimates for operating expenditure, provided in the Audit Office's *Performance Audit Report, Sydney Olympics 2000* (Auditor-General, 1994), were used as the primary basis for establishing the cost structure of the Olympics industry. The Audit Report costs were broken down into the following eleven categories:

1) Media Costs

2) Olympic Organisation

3) Transport

4) Security

5) Medical

6) Catering

7) Administration and Personnel

8) Advertising and Promotion

9) Events, Ceremonies and Programs

10) Other and Contingency

11) Construction Reimbursement

Some of the larger expenditure items were further broken down into sub-categories.

The compilation of disaggregated Olympic industry costs was undertaken as a three-step process. Each step is outlined in the following paragraphs.

The first step was to disaggregate certain Audit Report (sub-) category totals on the basis of estimates and assumptions regarding operating expenditure used in KPMG (1993). Note that KPMG expenditure estimates were never used directly in the data base, rather, where applicable, the KPMG expenditure shares were used to disaggregate Audit Report control totals.

The second step involved further disaggregation of costs in order that every item could be classified as a set of purchases *by* the NSW Olympics industry *from* a MMRF industry in an MMRF region. For example, the Audit Office's Media cost category includes the sub-category, 'additional computers/photocopiers' for which an estimated amount of $20.0 million was listed. This was assumed to be made up of a $16.5 million purchase from the (foreign) Transport and Communication industry plus a $3.5 million sale from the (NSW) Wholesale and Retail Trade industry, by way of retail mark-up activities. A procedure of this sort was carried out for all of the expenditure (sub)categories identified in the Audit Report.

The final step was to convert all cost figures from 1992 dollars to 1990-91 dollars so as to be consistent with the existing MMRF data base. Total Olympic expenditure for all of the 11 cost categories amounted to $1,294 million in 1990-91 dollars, compared with $1,372 million in 1992 prices. In Section 3.2.3 total Games costs of $1,463 million are expressed in 1995-96 dollars.

In Table B.1 estimated Olympic industry expenditure by commodity and regional source is shown for each of 10 expenditure categories. These are the Audit Office categories with (4) Security and (5) Medical combined into a single category. All amounts shown in the table are in 1990-91 dollars.

The expenditure category, Events, Ceremonies and Programs is the largest single cost item at $405.5 million, followed by Media Costs at $252.7 million, and Other Contingency at $219.7 million. Construction Reimbursement represents payments of $170.7 million made by Olympic organisers to the NSW Government for hire of the Olympic facilities for the two-week period. This payment was combined with other returns to capital and payments to the NSW Government (e.g. SOCOG rent payments) to form the single item 'returns to NSW State Government'. As can be seen from Table B.1 the total for this item is $288.7 million. This amount was assigned to NSW Government returns and in the model returned to Australian citizens in order to repay debt (and interest) incurred during the Olympics construction period.[55] (Back to contents page)

[55] In simulations in which construction had been paid from overseas borrowings, the Australia citizens were assumed to pass the loan repayments on to foreigners.

Table B.1: Olympic Operating Costs by Type of Input and Source

$1990-91	*Media Costs*	*Olympics Organis-ation*	*Tran-sport*	*Security Medical*	*Catering*	*Admin. Personnel*	*Adverti-sing Promotion*	*Events & Ceremony*	*Other & Contin-gency.*	*Construction Reimbursement*	*Total $mil*
Manufacturing - NSW	-	1.89	-	2.36	-	-	-	11.77	8.62	-	24.6
Construction - NSW	71.66	-	6.60	-	5.14	-	-	223.48	24.52	-	331.4
Domestic Trade - NSW	5.02	-	-	-	-	-	-	-	8.02	-	13.0
Trans.& Comm. - NSW	22.87	8.49	20.74	-	-	-	-	3.04	27.82	-	83.0
Finance - NSW	-	-	-	10.37	-	-	37.72	3.77	61.72	-	113.6
Community Serv. - NSW	-	0.94	-	15.09	-	-	-		-	-	16.0
Personal Serv. - NSW	-	6.60		2.83	6.17	55.76	-	35.99	1.03	15.87	108.4
Manufacturing - Vic	-	-	-	1.41	-	-	-	3.66	2.83	-	7.9
Transp. & Comm. - Vic	14.21	-	2.83	-	-	-	-		-	-	17.0
Finance - Vic	-	-	-	5.66	-	-	-	-	-	-	5.7
Transp. & Comm. - Qld	8.13	-	1.89	-	-	-	-		-	-	10.0
Finance - Qld	-	-	-	4.71	-	-	-	-	-	-	4.7
Transp. & Comm. - SA	3.13	-	-	-	-	-	-	-	-	-	3.1

Manufacturing - WA	-	-	-	-	-	-	-	0.47	-	-	0.5
Transp. & Comm. - WA	1.31	-	-	-	-	-	-	-	-	-	1.3
Transp. & Comm. - Tas	0.20	-	-	-	-	-	-	-	-	-	0.2
Transp. & Comm. - ACT	0.65	-	-	-	-	-	-	-	-	-	0.7
Manufacturing - O/S	-	-	-	0.94	-	-	-	5.52	30.7	-	37.2
Transp. & Comm. - O/S	64.73	-	27.35	-	-	-	-	2.83	25.0	1	134.0
Finance - O/S	-	-	-	4.71		-	-	-	8.49	-	13.2
Personal Serv. - O/S	-	-	-	-	-	-	-	2.83	-	-	2.8
Labour	50.28	0.94	2.83	2.83	-	8.36	-	8.38	3.09	-	76.7
NSW Gov't Returns	10.52	-	-	-	-	-	-	89.58	17.92	170.67	288.7
Total	**252.7**	**18.9**	**62.2**	**50.9**	**11.3**	**64.1**	**37.7**	**405.5**	**219.7**	**170.7**	**1293.7**

As can be seen from Table B.1 there is a single figure of $76.7 million for the total direct labour requirements for the Olympics industry. The MMRF data base distinguishes eight different labour occupational classes and it was thus necessary to define a profile for the type of labour required by the Olympics industry. It was assumed that the Olympics labour profile could be considered similar to a combination of the profiles of the Transport and Communication industry and the Public Services industry.

Thus a weighted average of the Transport and Communication industry's labour shares and the Public Service industry labour shares was computed in order to derive a set of estimated labour shares for the Olympics industry. The weights used were 68 per cent for Transport and Communication and 32 per cent for Public Services.

The estimated Olympics labour cost shares were then used to distribute the $76.7 million in Olympics labour costs between the eight types of labour. The Olympics industry's estimated labour costs and shares for each occupational category are given in the Table B.2, below.

Table B.2 Olympic Industry Labour Costs by Occupational Category

Skill Class	*$1990-91 million*	*Share (%)*
1. Managers/Administration	27.57	35.6
2. Professionals	19.60	25.7
3. Para-Professionals	12.16	15.8
4. Tradespersons	6.39	8.4
5. Clerks	7.27	9.5
6. Sales/Personal Services	1.65	2.2
7. Plant and Machinery Operators	0.78	1.1
8. Labourers	1.29	1.8
Total	**76.71**	**100.0**

B.1.2 Olympics Industry Sales

As noted in Section 3.3, the Olympic Games are expected to generate revenue of $1,486 million in 1995-96 dollars, or $1,360 million in 1990-91 dollars. Revenue items were divided into three broad categories:

(1) Television rights and The Olympic Program (TOP) sponsorship

(2) Ticket sales and coin marketing royalties

(3) Local sponsorship and licensing fees.

Olympics revenue is generated by making 'sales' from the NSW Olympics industry to households (domestic and foreign) and private firms (domestic and foreign). The distribution of sales between regions and overseas is given for each item below. All revenue items are expressed in 1990-91 dollars and are consistent with Auditor-General (1994) estimates for category totals.

B.1.2.1 Television Rights and TOP Sponsorship

Television rights were assumed to be sold entirely to overseas broadcasters. That is, TV rights are represented as a $657.2 million export sale.[56]

[56] While in one sense this assumption may appear inaccurate since it ignores Channel 7's purchase of domestic TV rights, from a modelling point of view it is valid. If the Games had not been held in Sydney, an Australian TV channel is likely to have purchased rights from another country, thus the Channel 7 purchase can be seen as an increase in *net* exports compared with the Games not being held in Australia.

TOP is a world-wide sponsorship arrangement involving some of the world's largest corporations. It has been assumed that all of these firms will be non-Australian. That is, the $120.7 million in TOP sponsorship is treated as an overseas export.

B.1.2.2 Ticket Sales and Coin Marketing Royalties

Auditor-General (1994) estimated ticket sales would be worth equivalent to $187.6 million in 1990-91 prices. Twenty per cent of tickets are assumed to be sold to foreign spectators with the remaining 80 per cent (i.e. 5.6 million tickets) sold to New South Wales households and interstate visitors. [57] Domestic ticket sales were distributed according to adjusted regional population shares; i.e. the share of each state and territory were adjusted to give NSW a disproportionately large share of ticket sales.

[57] The figure for 20 per cent of ticket sales being to spectators from overseas was provided by the Sydney Organising Committee for the Olympic Games (SOCOG).

Commemorative coins are assumed to be sold to Australian and foreign households according to exactly the same distribution as ticket sales. The value of ticket and coin sales by region is given in Table B.3 below.

Table B.3: Distribution of Ticket and Coin Sales

Sales Revenue	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*O/S*	*Total*
Share (%)	31.6	21.7	15.1	5.0	3.6	1.3	0.4	1.3	20.0	100.0
Tickets ($90/91 m)	59.2	40.8	28.3	7.4	6.8	2.5	0.7	2.5	37.5	187.6
Coins ($90/91 m)	7.7	5.3	3.7	1.2	0.9	0.3	0.1	0.3	4.9	24.5
Total	**66.9**	**46.1**	**31.9**	**10.6**	**7.7**	**2.8**	**0.8**	**2.8**	**42.5**	**212.2**

In New South Wales, tickets are sold directly to households. In all other states, however, tickets are sold to households *via* the NSW Interstate Tourism industry in that state. For instance, Olympic tickets are sold to the NSW Interstate Tourism industry in Victoria, which then re-sell the tickets (together with other interstate tourism commodities such as Transport and Communication and Personal Services) to Victorian households.

B.1.2.3 Local Sponsorship and Licensing Fees

Olympic sponsorship (other than TOP) was assumed to be sold only to domestic firms. Local sponsorship sales were distributed between regions according to each region's share of national GDP. The industry and regional distributions are given in Table B2.3 below. The industry shares were loosely based on the national finance industry data in the MMRF database. Regional shares were based on adjusted population shares.

Table B.4 : Local Sponsorship Sales

Industry	*Share (Per cent)*	*Region*	*Share (Per cent)*
Agriculture	0	New South Wales	34.1
Mining	5	Victoria	26.1
Manufacturing	15	Queensland	16.3
Public Utilities	0	South Australia	7.3
Construction	5	Western Australia	11.0
Domestic Trade	25	Tasmania	2.1
Transport and Communication	20	ACT	1.1
Finance	20	Northern Territory	2.0
Dwellings	0	Overseas	0.0
Public Services	0		
Community Services	0		
Personal Services	10		
Non-Competing Imports	0		
Olympics	0		

It can be seen from Table B.4 that NSW industries are estimated to purchase 34 per cent of total Olympic sponsorship. Five per cent of this amount is sold to the Mining industry, 15 per cent to the Manufacturing industry, 5 per cent to the Construction industry, 25 per cent to domestic trade and so on.

Licences fees are sold to domestic industries in the same way as local sponsorship. The expenditures were aggregated and distributed according to the method outlined above. The result was a regional/industry sales distribution set out in Table B.5 below. (Figures are in $90-91 million.)

Table B.5: Distribution of Local Sponsorship Sales by Industry and Region

Industry	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Total*
Mining	5.5	4.2	2.6	1.2	1.8	0.3	0.2	0.3	16.2
Manufacturing	16.5	12.6	7.9	3.5	5.4	1.0	0.5	1.0	48.5
Construction	5.5	4.2	1.6	1.2	1.8	0.3	0.2	0.3	16.2
Domestic Trade	27.6	21.1	13.2	5.9	8.9	1.7	0.9	1.6	80.9
Transport & Communication	22.1	16.9	10.6	4.7	7.1	1.4	0.7	1.3	64.7
Finance	22.1	16.9	10.6	4.7	7.1	1.4	0.7	1.3	64.7
Personal Services	11.0	8.4	5.3	2.4	3.6	0.7	0.4	0.7	32.3
Total ($90/91 m)	**110.3**	**84.3**	**52.8**	**23.6**	**35.7**	**6.8**	**3.5**	**6.6**	**323.4**

B.2 The International Tourism Industry

The standard version of MMRF does not explicitly recognise an international tourism industry. International tourism expenditure is included in the database as exports of personal services (hotel accommodation, restaurants and entertainment services), transport and communication (air travel, coach travel, taxis, hire cars, local phone calls and mail services) and manufacturing (equipment, clothes and souvenirs).

In the modified version of MMRF, the new international tourism industry purchases goods and services from industries such as manufacturing, transport and communication and personal services to produce an international tourism commodity, which is then exported to international customers.

Estimation of the composition of the international tourism industry was based on the expenditure patterns of international tourists which were taken from surveys used in Adams and Parmenter (1991) which gave a breakdown of international tourist expenditure by 34 industries. Expenditure was further broken down into domestic products and imports for each industry. It was possible to use the Adams and Parmenter data, but only at the national level as their data did not contain a regional dimension. Their data is significantly more disaggregated than the MMRF classification, so it first had to be aggregated to the appropriate classification.

The resulting data shows international tourist expenditure by industries recognised by MMRF and is given in Table B.6 below.

Table B.6: International Tourist Expenditure

MMRF sectors	*Local ($90/91 m)*	*Imports ($90/91 m)*	*Total ($90/91 m)*
Manufacturing	699.2	188.7	887.9
Domestic Trade	448.7	0.0	448.7
Transport & Comm.	2450.5	78.2	2528.7
Finance	13.9	0.3	14.2
Personal Services	1204.5	7.5	1212.1
Total	**4816.9**	**274.7**	**5091.6**

A regional dimension was added to the data by making a series of assumptions. International tourist expenditure on manufactured goods is assumed to follow the same regional distribution as manufacturing output in general. That is, international tourists in say, Queensland, have no preference for goods manufactured in Queensland. The proportion of Queensland made manufactured goods purchased by international tourists in Queensland (or any other state) was assumed to be equal to Queensland's share of total manufacturing output (approximately 12 per cent). Transport and communication expenditure was distributed across regions in the same way, that is according to each region's share of total transport and communication output.

All other expenditure was assumed to take place in the tourist's destination region. For example, international tourists in New South Wales were assumed to spend on domestic trade, finance and personal services in New South Wales only. Therefore, total international tourism expenditure on domestic trade, finance and personal services (as given in Table B.6 above) is distributed across regions according to each region's share of international visitor nights.[58] (

[58] ABS (1994) see also Table C.4

The Adams and Parmenter data combined with the regional assumptions outlined above were enough to fully specify the purchases made by the International Tourism industry in each region from all other industries in other regions and overseas. Table B.7 below shows the total purchases by the International Tourism industries from each region.

Table B.7: International Tourism Expenditure by Industry
$90/91 million

Industry	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*OS*	*Total*
Manufacturing	241.6	225.4	85.7	66.1	58.5	16.9	2.5	2.2	188.7	887.8
Domestic Trade	161.5	80.8	107.7	22.4	49.4	9.0	9.0	9.0	0.0	448.7
Transport & Comm.	846.9	790.1	300.4	231.8	205.1	59.3	8.8	7.8	78.2	2528.5
Finance	5.0	2.5	3.3	0.7	1.5	0.3	0.3	0.3	0.3	14.2
Personal Services	433.6	216.8	289.1	60.2	132.5	24.1	24.1	24.1	7.5	1212.1
Total	**1688.7**	**1315.6**	**786.3**	**381.3**	**447.0**	**109.6**	**44.7**	**43.4**	**274.7**	**5091.3**

It should be noted that Table B.7 shows the source region of purchased commodities and not the region in which the purchases were made. However, in the case of domestic trade, finance and personal services the source and destination regions are the same by assumption.

Once the intermediate purchases of the international tourism industry had been specified it was necessary to specify sales of international tourism. This was a relatively simple task as it was assumed that all international tourism is exported. That is, international tourism is not sold to other domestic industries nor is it sold to domestic households (an interstate tourism industry was specified for this purpose; see Section B.3). In the MMRF database total export sales of international tourism are distributed across each region according to each region's share of visitor nights.

Table B.8: International Tourism Exports by Region

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Total*
Share (per cent)	36.0	18.0	24.0	5.0	11.0	2.0	2.0	2.0	100.0
Export sales $90/91 m	1832.9	916.5	1222.0	254.6	560.1	101.8	101.8	101.8	5091.3

In total, the eight International Tourism industries were estimated to purchase just over $5 billion worth of goods and services from various domestic and international industries, and then export $5 billion worth of international tourism products to foreign visitors.

While the modifications to the MMRF data base are balanced in that purchases by, and sales by, the International Tourism industry are equal, further adjustments were required to avoid double counting of tourism exports. Tourism activity was already counted in the original data base as various exports of transport and communication, personal services and manufacturing. To balance the database it was necessary to deduct approximately $5 billion from export sales of industries such as Manufacturing, Transport and Communication and Personal Services as these export activities had now been explicitly captured by the International Tourism industry.

B.3 Interstate Tourism

Creating an industry for interstate tourism was a similar task to creating the International Tourism industry. However there were several important distinctions. To fully model interstate tourism in MMRF would be an enormous job as it would require adding 64 new industries to the model as the spending patterns of tourists vary depending on the region they are coming from (8) and the region they are going to (8). An interstate tourist spends money in his or her home state, the amount and composition of which varies across states, and in the state that he or she is visiting.

Modelling only interstate tourism to New South Wales reduces the number of additional industries required from 64 to 8. In each region a new industry called NSW Interstate Tourism is added to the database, this industry purchases tourism related services from both New South Wales and from its own region, and then sells the product to local households. For example the NSW Interstate Tourism industry in Victoria purchases hotel services from New South Wales as well as transport services from Victoria and retail services from both states. The NSW Interstate Tourism commodity is then sold to Victorian households only. The NSW Interstate Tourism industry in New South Wales represents *intrastate* travel. However this form of tourism has not been modelled.

The main data source was BIE (1984) which provided limited information on interstate tourism expenditure in each state. The expenditure figures for each state were made up of expenditure by locals going to another state and expenditure by visitors from interstate. The expenditure items identified in BIE (1984) did not match the MMRF industry classification. The mapping of the BIE classifications to the MMRF classification is given in Table B.9, below.

Table B.9: Mapping BIE Data to MMRF Database

BIE	*MMRF*
petrol and oil	100% manufacturing
plane	100% transport and communication
other transport	100% transport and communication
accommodation	100% personal services
restaurants and cafes	100% personal services
other trip expenditure	33% personal services, 33% domestic trade, 33% manufacturing
pre-trip expenditure	50% manufacturing, 50% domestic trade
post-trip expenditure	50% manufacturing, 50% domestic trade

The BIE data had to be adjusted to take into account that the interstate tourist coming to New South Wales would be attending the Games rather than taking a 'normal' interstate trip. Accordingly, expenditure on accommodation was reduced in light of previous Olympic studies indicating that many Olympic visitors choose to stay with friends and relatives rather than in commercial accommodation. [59] Also, 'other trip expenditure' was reduced and partly replaced by Olympics

expenditure such as tickets and souvenirs. A summary of the NSW interstate tourism data is given in Table B.10 below.

[59] See Appendix A.

Table B.10: NSW Interstate Tourism Expenditure by Source Region and Industry

Industries	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Total*
Manufacturing - national	45.2	21.5	11.8	19.6	3.6	1.9	1.8	105.4
Domestic Trade - NSW	14.5	7.7	4.1	5.3	1.1	0.6	1.0	34.3
Transport & Communicat. - national	33.9	36.9	12.3	58.3	9.6	4.0	0.1	155.1
Personal Services - NSW	47.0	25.2	13.5	17.3	3.7	1.9	3.2	111.6
Domestic Trade - origin	13.0	4.6	2.6	7.0	1.2	0.6	0.0	28.9
Transport & Communicat.- origin	11.3	12.3	4.1	19.4	3.2	1.3	0.0	51.7
Olympics - NSW	46.1	32.0	10.6	7.7	2.8	0.8	2.5	101.7
Total - $90/91 m	**210.9**	**140.2**	**59.1**	**134.5**	**25.3**	**11.0**	**8.7**	**589.8**

The total value of the NSW Interstate Tourism industries is just under $600 million. This figure is based on 700,000 interstate visitors during the Games period, [60] spending approximately $850 per trip (or $53 per day for 16 days). The regional labels in Table B.10, above, represent the home state of a NSW visitor. The industry labels indicate the type of commodity purchased and the source region of that commodity.

[60] This figure is based on an expected visitors estimate of 800,000 published in the AFR (1996), the corresponding Atlanta estimate was 1,700,000.

Note that $342.6 million of the total NSW interstate tourism expenditure of $589.9 million, is spent on 'New South Wales commodities'. This figure is made up of non-tradeable commodities such as retail services, personal services and Olympics, with a value of $248.5 million (these items must be purchased in the destination region), plus New South Wales' share of 'national commodities' such as manufacturing and transport and communication, with a value of $94.1 million (these items can be purchased in all regions). Expenditure in the visitor's region of origin (pre- and post-trip) on retail and transport and communication commodities account for $80.7 million, while $166.5 million is spent on 'national commodities' from outside New South Wales.

In each region the NSW Interstate Tourism industry sells its commodity to local households only. That is, South Australians wishing to visit New South Wales purchase the interstate tourism commodity from the South Australian NSW Interstate Tourism industry. No interstate tourism services are exported.

The NSW Interstate Tourism industries are similar to the Olympics industry in that they are introduced as 'embryonic' industries. The total value of the sales (and purchases) of the NSW Interstate Tourism industries is nearly $600 million. However, the total values entered in the modified MMRF database is only $60,000 (scaled down by a factor of 10,000). The industry is transformed to its actual size by shocking demand for NSW Interstate Tourism by a factor of 10,000. This method has the advantage of making further database adjustments unnecessary. (The MMRF database is now out of balance by an amount of $60,000 however this small imbalance has no significant effect on the operation of the model.)

Appendix C: International Visitor Expenditure

C.1 Classification of International Visitors

The international visitor expenditure estimates presented in Table 3.3 are based on forecasts regarding the number of people that visit Australia as a result of the Games, the length of their stay in each region and their daily expenditure.

Olympic visitors are classified into 3 categories:

i) Pre-Games visitors

ii) Games visitors

iii) Induced tourists

Pre-Games visitors and Games visitors are those who visit Australia specifically for the Games. These include the Olympic Family, media, sponsors, athletes, officials and spectators. These visits are heavily concentrated in the Games period though they also visit in the Pre-Games period.

Induced tourists are visitors who are assumed to come to Australia as a result of increased international awareness of Australia as a tourist destination. Induced tourists are assumed to visit in all 3 simulation periods (Pre-Games period, Games year and Post-Games period).

C.2 Pre-Games and Games visitors

The estimates for Pre-Games and Games visitors are largely based on the assumptions made in KPMG (1993). The KPMG study considers the following types of visitors: the Olympic family, media, sponsors, athletes and officials. Estimates of the *number of visitors*, the *length of stay* (at the Games) and *average daily expenditure* are given for each type of visitor, in each simulation period.

Estimates for spectators are also given in the KPMG report. For the purposes of this study, the difference between spectators and other Games and Pre-Games visitors is that, after attending the Games, the spectators are assumed to visit other parts of Australia, following the same expenditure patterns as 'normal' tourists. [61] The average daily expenditure figure for spectators used in the KPMG study ($92 per day) has not been used in this report. Rather, the more conservative figure from the Tourism Forecasting Council's 'Forecast' publication ($81 per day) was deflated to 1990-91 prices so as to be consistent with the MMRF database giving a figure of $79 per day, which was used for Spectators and Induced Tourists. In the absence of any more recent estimates, daily spending estimates for all other classes of international visitors are taken from the KPMG study.

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[61] Previous studies and anecdotal evidence suggest that Olympic visitors spend considerably less than ‘normal tourists’ (See Appendix A.4). Nevertheless, the assumption is defensible on the grounds that i) the daily expenditure estimate is conservative and ii) the contribution of international Olympic visitor spending is small in comparison to induced international tourist spending.

Multiplying the number of visitors, by the length of stay, by the average daily expenditure gives the value of expenditure by each type of Pre-Games and Games visitors. Summing across the visitor types gives total Pre-Games and Games visitor expenditure. The Pre-Games and Games visitor assumptions are given in Tables C.1 and C.2, below.

Table C.1: Pre-Games Olympic Visitors

Pre-Games Visitors		*night*		*expn*	*annual*	*annual*	*annual*
	no.	*Olym*	*other*	*daily $*	*Olym $m*	*other $m*	*total $m*
Olympic Family	3705	5	0	102	0.316	0	0.316
Media	1625	5	0	111	0.150	0	0.150
Sponsors	480	5	0	122	0.049	0	0.049
Athletes / Officials	12000	7	0	37	0.516	0	0.516
Spectators	2600	12	11	79	0.409	0.374	0.783
Total	**20410**				**$1.439**	**$0.374**	**$1.814**

The Pre-Games annual expenditures are divided by six years to give an indication of the Pre-Games visitor expenditure in an average year in the Pre-Games period. Over $1.8 million is expected to be spent each year in Australia by Pre-Games visitors.

Table C.2: Olympic Games Visitors

Games Visitors		*nights*		*expn*	*annual*	*annual*	*annual*
	no.	*Olym*	*other*	*daily $*	*Olym $m*	*other $m*	*total $m*
Olympic Family	6500	16	0	102	10.633	0	10.633
Media	11750	16	0	111	20.877	0	20.877
Sponsors	3300	16	0	122	6.423	0	6.423
Athlete / official	14200	16	0	37	8.373	0	8.373
Spectators	48750	12	11	79	45.957	42.127	88.085
Total	**84500**				**$92.264**	**$42.127**	**$134.391**

It can be seen in Table C.2 above that almost 60 per cent of Olympic Games visitors are spectators.

C.3 Induced Tourist Expenditure

Induced tourism expenditure must also be considered. That is, the expenditure of tourists who visit Australia because of the publicity generated by the Games. These tourists are in addition to the tourists that would be expected under 'normal conditions' if Sydney were not hosting the 2000 Games.

In order to quantify the expenditure of induced tourists it is necessary to estimate the expected *number* of induced tourists, their *length of the stay in each region* and their *average daily expenditure*. Visitor number and length of stay estimates are derived from various sources and presented in Table C.3, below. The average daily expenditure estimate of $79 per day, outlined in appendix C.2, is used again here.

Table C.3: Induced International Tourists

Induced tourism					
year	*base*	*Percent increase*	*Tourists (persons)*	*nights / tourists*	*visitor nights (thousands)*
1994	3354000	1	33540	22	737.9
1995	3771000	2	75420	22	1659.2
1996	4220000	3	126600	21	2658.6
1997	4676000	4	187040	20	3740.8
1998	5179000	5	258950	20	5179.0
1999	5699000	5	284950	20	5699.0
2000	6299000	5	314950	19	5984.1
2001	6761000	5	338050	19	6423.0
2002	7219000	4	288760	19	5486.4
2003	7581000	3	227430	19	4321.1
2004	7960050	2	159201	19	3024.8

The 'base' forecasts in Table C.3 are the Australian Tourism Commission's 'Marketing Targets'. They are assumed to represent the national tourism profile that would have occurred without the Games. Although there are several other sources of tourism forecasts, the ATC marketing targets were chosen based on their prediction accuracy for the 1994 and 1995 years. The figures in the next column represent the percentage increase in the base tourism forecasts that can be attributed to the Games. This profile is taken from the KPMG study. Multiplying these two sets of figures gives the number of induced tourists in each forecast year.

TFC's 'Forecast' publication provides forecasts of the average length of stay by international visitors. Their forecasts show a gradual decline in length of stay over the 1994-2004 period from 22 nights to 19 nights. The decline is due to a greater proportion of Asian visitors who's average length of stay is relatively short.

Multiplying the number of visitors and average nights stayed gives total 'visitor-nights' in Australia by Games induced tourists. The distribution of visitor-nights between the states and territories is based on data in ABS (1994). Table C.4, below, show the ABS's distribution of international visitor nights from 1991 as well as the adjusted distribution that was assumed for this report.

Table C.4: Distribution of Visitor Nights

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*
ABS	36.0%	18.0%	24.0%	5.0%	11.0%	2.0%	3.0%	2.0%
Adjusted	55.0%	12.0%	22.0%	2.0%	5.0%	1.0%	1.5%	1.5%

The adjustments reflect the expected increase in the Sydney and New South Wales' share of the tourism market. By concentrating the international focus on Sydney the Games are assumed to increase New South Wales' tourism market share (and to a lesser extent ACT and Queensland's) at the expense of Victoria, South Australia, Western Australia and Tasmania. The adjusted share figures apply only to the induced international tourists, the distribution of 'base case' tourists is assumed unchanged. This distribution is assumed to apply for all induced tourists as well as for the 'tourist' component of Games spectators' stay.

From these assumptions total international visitor expenditure (by region and by period) estimates are calculated and presented in Table C.5 below.

Table C.5: Total International Visitor Expenditure - 1990-91 $m [62]

Expenditure $m	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	*Total*
Pre-Games	116.3	25.1	46.1	4.2	10.5	2.1	3.1	3.1	210.6
Games year	272.2	44.7	82.0	7.5	18.6	3.7	5.6	5.6	439.9
Post-Games	138.5	30.2	55.4	5.0	12.6	2.5	3.8	3.8	251.9

[62] The figures in Table C.5 do not correspond to the figures in Table 3.3 as the former are in 1990-91 prices, and have been deflated to represent the same proportion of the 1990-91 economy. The Table 3.3 figures are in 1995-96 dollars.

These figures include expenditure by induced tourists as well as Pre-Games and Games visitors. (Pre-Games and Games spectators are assumed to spend 12 nights as spectators in Sydney and a total of 11 further nights as tourists.) The figures have been condensed from annual estimates into a single average year estimate for each simulation period. The figures have also been deflated by real GDP so that the expenditure estimates represent the correct proportion of the 1990-91 base year economy.

Table C.6 shows the international tourism shocks imposed on the MMRF model for each simulation time period. The shocks represent expenditure figures in Table C.5 as a percentage of the International Tourism exports in the MMRF database, calculated in Appendix B.2.

Table C.6 International Visitor Expenditure Simulation Shocks

Shocks %	*NSW*	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*
Pre-Games	6.35	2.74	3.77	1.64	1.87	2.05	3.08	3.08
Games year	6.93	1.46	2.01	0.87	1.00	1.09	1.64	1.64
Post-Games	7.56	3.30	4.53	1.98	2.25	2.47	3.70	3.70
MMRF Data-base exports - 90-91 $m	1,833	916	1,222	255	560	102	102	102

The Games year simulation actually involves both the Pre-Games and Games year international tourism shocks. The Pre-Games shock (simulated under long-run conditions) represents the level of international tourism to which the economy has already adjusted, the Games year shock (simulated under short-run conditions) represents additional international tourism in the Games year above the pre-Games level. The results of both simulations are them aggregated giving Games period international tourism results.

Appendix D: The Olympics and the Economy

D.1 Introduction

The Olympic Games can be categorised as a *special event* along with other sporting events like the Australian Grand Prix, the Commonwealth Games, and non-sporting events like the World Expo, and the Bicentenary. The common characteristic of special events is that they are temporary and sometimes of a short duration, and often of a one-off nature. This means that the 'shock' to the economy associated with special events is by definition a temporary shock, in contrast to (say) a technology related shock which may be ongoing. Given the competition between the Australian States and sometimes between nations to attract *footloose* special events (with the term *footloose* implying that some discretion is available over their location), a literature has been developing dealing with their economic impacts. This literature identifies some common economic characteristics of special events, summarised briefly in this appendix. As an ongoing expansion of an economy amounts to growth, consideration is also given to growth theory in this appendix. Finally, a brief discussion of the functioning of the labour market is also included in this appendix, because of its importance to the estimates obtained in this study.

D.2 The Olympics as a Demand Shock

In a macro-economic sense, the economic activity associated with the Olympic Games can be characterised as a demand shock - with an increased demand for tourism exports, television picture exports, and Olympics related capital, etc. Some aspects of the demand shock related to the actual operation of the Games are clearly temporary and of a very short duration. The tourism related shocks are of longer duration, as has been detailed in this report. Furthermore, the capital related to sporting facilities that has been created for the Olympics and the permanent accommodation of the Olympic Village will continue to provide a stream of services over a long period of time. In general, the durability of the flow on impacts of these shocks will be related to the durability of the shocks.

Undertaking an assessment of the economic impact of the Olympics requires that those demand shocks induced by the Olympics are clearly isolated. In essence, this requires postulating a 'base case' state of the world that describes what would have happened had the Olympics not been awarded to Sydney. In particular, some of the infrastructure that is being built for the Olympics may have been built in any case. The main impact of the Olympics may be either to bring forward expenditure that would otherwise have occurred later, and/or to lead to some changes in the scale or nature of a particular facility. As the base case is unobservable, there is scope for debate about the size of the direct Olympics impacts, and this adds a degree of uncertainty to estimates of the flow on impacts.

The impact of the Olympics on the provision of non-Olympic infrastructure is particularly difficult to determine. For example, some expected improvements to transport infrastructure appear to be precipitated by the Olympics, but are also desirable in their own right. What would have happened in the absence of the Olympics?

Given that government funding is required for the development of Olympic related facilities, it is inevitably the case that the pattern and composition of government expenditure would have been different in the absence of the Games. In practice this is very difficult to establish and quantify. In particular, given the commitment of the NSW Government to eliminating budget deficits and

reducing State debt (NSW Government, 1995), Olympics related construction activity is likely to have displaced or deferred some other capital expenditure. However, it is not possible to specify in detail what may otherwise have taken place. There are therefore likely to be distributional impacts, as one of the likely consequences would be to switch funding between regions, and industry sectors.

At a macro-economic level, there is some likelihood of capital expenditure related to the Olympics crowding-out other forms of capital expenditure. This is because Commonwealth government monetary policy imposes a balance of trade constraint. The transmission mechanism for crowding-out is through Olympics demand raising interest rates, and killing off the most marginal interest sensitive investments in the remainder of the economy. It is also the case that private sector funding of facilities could (to some extent) crowd out other activity in the economy through essentially the same mechanism. These processes are captured in the MMRF Model utilised in this study. The impact of relaxing the balance of trade constraint assumption is considered in various simulation scenarios.

In estimating the numbers of visitors to Sydney induced by the Olympics, it has to be recognised that some of these visitors may be changing the timing of a visit, rather than making a visit that would not otherwise have taken place. For many visitors it will be the case have switched their preferences towards Sydney (or New South Wales or Australia broadly), away from some alternative location. Therefore, the tourism gain to Sydney (or any other destination) will be at the expense of somewhere else, which in some cases will be alternative destinations in Australia. In particular, in respect of interstate visitors to Sydney for the Games, there will be a substantial degree of expenditure switching away from their home States.

In general, a lot of the expenditure associated with the Olympics undertaken by Australian residents will necessarily be switched from other activities (unless it is funded by borrowing from foreigners in which case the costs of servicing the debt will impact on domestic expenditure). This phenomenon was very evident at previous Olympic Games including Atlanta, where other forms of entertainment (restaurants, cinemas, theatres, etc) found it very difficult to compete with the Olympics and suffered reduced demand even though there were many visitors present from outside their locality. It is also likely that some visitors will view attendance at the Olympics as a once in a lifetime opportunity, and will draw on savings (or borrow) to purchase tickets, rather than reduce other consumption expenditure. However, there could be some additional expenditure from residents as a consequence of Olympics induced employment and increases in incomes. These indirect effects are captured by the MMRF model.

D.3 The Games and Growth

The impact on economic growth of a major event such as the Olympic Games is unknown. Opinions range from the optimistic view that 2000 Olympic Games will be a catalyst for innovation and investment leading to a permanent increase in the economy's growth rate, to the view that the Games will have no lasting impact on economic growth.

The debate is, in effect, between the neo-classical growth theorists and the new endogenous growth theorists. A major point of conjecture is the role played by technology in determining growth and the determinants of technological progress.

D.3.1 The Neo-classical Growth Model

The standard neo-classical model (see Solow 1956, Swan 1956) assumes that output is a function of two inputs; labour and capital, with each factor paid a return that is equal to its marginal product. Labour supply is given by the population, which is determined exogenously and the capital stock is determined by investment, which is a fixed proportion of output. Given these assumptions, output, investment and the stock of capital all increase at the same long-run growth rate.

Labour supply growth will result in aggregate output growth but will not result in growth in per capita output. The inclusion of technological progress as a determinant of growth allows for increases in long-run per capita growth. *Both labour supply growth and technological progress are assumed to be determined exogenously.*

Several important features flow from this model:

- Sustained growth in per capita output is not possible without exogenous technological change. Increases in labour productivity can increase output but such increases are also driven by technological change.
- An increase in the savings rate will increase the *level* of per capita income. However, saving represents a cost to society in terms of foregone consumption. Therefore, increasing savings will increase growth but not necessarily welfare. [63]
- Growth is a function of the savings rate as *all* savings are assumed to be invested. If the savings rate increases so too will investment, the capital stock and per capita output. However, such a change will increase the capital-labour ratio, reducing the returns to capital, causing investment and growth to return to the long-run growth rate.
- Governments can do little to influence the long-run growth rate. Rather they can act to improve the efficiency of the economy, correct market failures and improve resource allocation. The effect of these actions is to raise output to a higher *level* rather than increase the long-run *growth rate*, which requires technological progress.

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[63] The optimal savings rate can be shown to be the rate at which the reduction in per capita consumption due to the next dollar of savings is exactly offset by the discounted increase in per capita consumption which the greater level of output makes possible. This is known as 'The Golden Rule of Accumulation'. (see BIE 1992).

Three acknowledged limitations of the standard neo-classical model are addressed below:

- The Convergence Hypothesis
  The neo-classical model leads to a long-run convergence in levels of per capita income. The main element of the convergence result is diminishing returns to capital. Countries with low capital-labour ratios have high marginal products of capital and therefore grow faster.

  The hypothesis is not supported by the empirical observations of (i) significant variation in growth rates across countries with similar capital stocks, and (ii) a divergence in productivity and per capita incomes between advanced and developing economies.

- All Growth is Determined Exogenously
  Although technological progress is identified as a determinant of economic growth, it is assumed to be independent of any form of economic activity including government assistance and increased investment. No attempt is made to explain how or why technological progress occurs.

  The only explanation the standard neo-classical model is able to offer for (i) the exceptionally high world growth rates of the 1950s and 1960s and (ii) the slow down in world growth since the mid-1970s, is exogenous technological shocks.
- Changes in Investment Levels are Irrelevant
  In the neo-classical model, changes in the level of investment have no effect on the long-run growth rate. Once the long-run growth rate is reached, an increase in investment will lower the return on capital, returning the economy to its long-run growth rate. An increase in investment may increase the *level* of output but not the *growth rate*.

  The empirical correlation between rates of investment and rates of growth suggests a greater role for investment in explaining growth. Changes in growth and investment as a result of government policy further support this.

D.3.2 Endogenous Growth Models

Unlike neo-classical models, endogenous growth models attempt to incorporate technological progress into the model rather than treat it exogenously (see Romer 1986, 1990, BIE 1992). The features that distinguish endogenous growth models from neo-classical models are:

- *Knowledge* is a public good as the use of knowledge by one firm does not reduce the knowledge available to other firms and in many cases it is difficult to charge a price for the transfer of knowledge.
- *Investment in Research and Innovation* will be sub-optimal unless governments can encourage innovation by protecting intellectual property rights with patent and copyright laws. Given insufficient intellectual property rights, producers require some monopoly power to create the incentive to innovate. The inability to sell costly production technology on a market results in too few resources being dedicated to the production of technology.
- *Imperfect competition* in the form of economies of scale in production encourages firms to expand output but the presence of product variety in the preference functions of consumers limits market power. The incentive to invest in innovative technology stems from monopolistic gains from being the first to introduce an innovation.
- *Learning-by-doing* results in cost reducing knowledge being acquired as production expands, therefore the greater the production, the lower the average production cost. While these advantages remain within the firm, rivals will be incapable of effectively competing.

D.3.3 Regional and Demand Side Growth Theories

While the neo-classical and endogenous growth theories focus on the role of the supply side of the economy, there are demand-side theories of economic growth that have much in common with regional growth theories. The process of *cumulative causation* is of some importance (see Armstrong and Taylor 1993), emphasising the role of economies of scale. An expansion of a region's exports will in turn lead to agglomeration economies as new firms and labour are attracted to the region. This

could result in reduced costs in the regional economy and the enhancement of the competitiveness of the traded goods sector. Exports are also assigned a special role in the *export base* theory of regional growth (see Nijkamp 1986). The Olympics could be analysed in this context, with perhaps particular emphasis on the Metropolitan Sydney regional economy.

D.3.4 Concluding Remarks on Growth Theories

The growing literature on new growth models casts a shadow over the acceptance of the neo-classical assumption that a major event such as the Olympic Games will have no impact on the rate of technological progression. If, as suggested by the new growth theories, economic agents learn-by-doing, then undertaking a task as enormous as an Olympics Games may provide a significant learning opportunity that increases technological progression, and hence economic growth.

Given the difficulties associated with empirically testing the new growth models, it is not yet possible to say whether these models can adequately explain the growth process, and hence whether they can play a role in developing policy. While we cannot reject the hypothesis that technological change is determined endogenously, uncertainty about the magnitude of changes in technological progression makes quantifying the impact due to an event like the Games extremely difficult. Nevertheless we do allow for an arbitrary small amount of technological change arising from the Olympics in our most likely scenario. The sensitivity of this assumption is examined by considering alternative scenarios where the Games result in either a larger or smaller (nil in fact) increase in technological change.

D.4 The Labour Market

The estimates of the Olympics impacts in this report are quite sensitive to assumptions related to the labour market. It will be useful to provide some clarification as to why this is the case.

The model used in this study is a comparative static model. This means that the impacts of the Olympics have been estimated in isolation of other developments in the economy (with one or two exceptions). In particular, the model does not produce forecasts for the economy for particular points in time, and does not take into account the business cycle.

In practice, the impacts of the Olympics will be overlaid on all the other influences on the economy. As alluded to in the Executive Summary, if the period during which the Games take place coincides with a peak in economic activity, it may appear to some that the Olympics is responsible for that peak. In actual fact, the estimates in this report suggest that the magnitudes of the economic impacts related to the Olympics in themselves are not sufficiently large to create a peak where one would not have otherwise taken place. Nevertheless, the additional activity associated with the Olympics could at the margin create some significant pressures on resources if coincident with a strong peak (with some inflationary consequences), or alternatively could help mitigate some of the costs of a recession if coincident with an economic downturn. Therefore the actual impacts of the Games will be influenced by the state of the economy even though that has not been explicitly allowed for in this study.

The observation that unemployment is currently high gives the impression that an increase in demand is desirable, and therefore that demands for labour associated with the Olympics will be met without creating significant problems elsewhere. However, such an observation ignores the extent to which current unemployment is a consequence of structural rather than cyclical factors. As noted in the

previous paragraph, demands associated with the Olympics on top of an existing cyclical peak may add to inflationary pressures, including pressure on wages. The extent to which there is scope for the Olympics to increase employment without wage and price inflation depends on the *natural rate* of unemployment. [64] The natural rate is a consequence of supply side factors, in particular the flexibility of the labour market.

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[64] The natural rate of unemployment is often referred to as the NAIRU, the Non-Accelerating Inflation Rate of Unemployment - the rate to which unemployment can be reduced without putting upward pressure on the inflation rate.

An inflexible labour market is characterised by real wage rigidities, in particular in a downward direction. This tends to raise the equilibrium rate of unemployment, because the market has to adjust through quantities (employment) rather than prices (real wages) in response to negative demand shocks. As the labour market becomes more flexible, the equilibrium rate of unemployment should fall. This implies greater scope for employment to increase as well as real wages in response to a positive demand shock, such as that associated with the Olympics. In the long term, unless the Olympics helps to improve the supply side of the economy and hence lower the natural rate of unemployment, all of the adjustment will be through higher real wages.

In the current study, it has been recognised that governments are pursuing policies aimed at increasing the flexibility of the labour market, which should lead to a lowering in the natural rate of unemployment over time. Therefore in the modelling work, the adjustments in the labour market to Olympics related demands have been allowed to take place through various combinations of real wage and employment changes.

The aggregate output that the economy is capable of producing in the long term depends on the productive capacity of the economy, which in turn depends on both the primary resources available to the economy and the processes available for converting those resources into outputs. Therefore, in order to increase output in the long term, it is necessary to increase the inputs either through the acquisition of more primary resources - labour, capital, or land - or through improvements in production processes - ie. increased productivity. Output can be increased in the short term by more intensive use of existing resources including underemployed or unemployed resources.