

Estimating the Economic Impact of the Sydney Olympic Games

by

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This paper employs a multiregional computable general equilibrium (CGE) model to examine the effects on the New South Wales and Australian economies of the 2000 Olympics. The Olympics are modelled over a 12-year period from 1994 to 2005, divided into three phases: (i) the Pre-Event phase, 1994 to 1999; (ii) the Event Year, 2000; and (iii) the Post-Event phase, 2001-2005.

Construction of the Olympics venues and associated infrastructure is modelled as occurring in the first phase, while the operation of the Games (including ticketing) and Games tourism (i.e. visits by spectators, Games participants, etc.) is assumed to occur largely in the second phase. Induced tourism is modelled as occurring in all three phases. This latter (international visitor) effect relates to expected increased visitations to Sydney and other Australian destinations generated by heightened awareness of Australia via Olympics media coverage.

The simulations are conducted under the assumption that the Games have a neutral effect in the long run on the budget of the Government of New South Wales (the Australian State hosting the 2000 Olympics) and on Australia's balance of trade. For instance, the State Government finances the Olympics construction partly by crowding out other capital works, and partly from short-term debt that is paid off, by the end of the Event year, with Games revenues and with additional tax revenue flowing from the boost the Olympics has on the State's tax base. The labour market is assumed to be slack in the Event year, but in the Pre-Event year increased labour demand is assumed to lead partly to an increase in real wages. Additional capital stock is put in place in the Pre-Games period, but it is assumed that industry capital stocks are fixed in the Event year. The Olympics capital stock is fully used in the Event year and in other industries fixed capital stocks leads to increased rates of return, and thus temporarily higher prices.

The results of the simulations indicate that the Sydney Olympics should have a significant positive effect on the New South Wales and Australian economies. The present value of the impact on real GDP and real household consumption for Australia over the three phases of the Olympics is \$6.1 billion (Australian dollars) and \$2.7 billion respectively. However, virtually all of this gain occurs within New South Wales, with only a very small net effect on the other five state economies. Also while the effects are large in dollar terms, in percentage change terms the increases in New South Wales Gross State Product and real household consumption are only 0.36 and 0.22 per cent respectively in an average year of the twelve-year Olympics period.

1. Introduction

In recent years there has been increased competition among cities, regions and countries to host hallmark events. Most highly prized of these events is the Olympic Games. While the attractions of hosting the Games are many, Governments in recent times have begun to place more emphasis on the economic advantages.

The economic advantages of the Olympics and other hallmark events are seen by many commentators to come from the stimulus they give to business, particularly in the host city. Sponsorship by governments of hallmark events, even when they are run at a loss, is often justified by the claim that the events produce economic benefits for the region in which they are hosted, and that these benefits are not reflected by the financial viability of the event itself.

It has now become a matter of course for any region bidding for an Olympic Games, and for many other major sporting events, to prepare an economic impact statement. The study which preceded the Sydney bid, KPMG (1993), found the 2000 Olympics would add over \$7 billion to Australian GDP in total over the period 1991 to 2004¹ and more than 11,000 jobs nationally in an average year of the 14-year period. The KPMG study used the most common method of evaluating the regional economic consequences of hallmark events, namely single-region input-output analysis. This method was also used in impact studies of previous Olympic Games; for example, the study by Humphreys and Plummer (1992) of the Atlanta Olympics. While this method has the advantage of being well established and simple, it is subject to some major limitations. In essence the method fails to take into account various constraints on the economy, such as supply constraints, government budgetary constraints and balance of payments constraints. These limitations tend to yield exaggerated estimates of beneficial indirect effects, particularly at the national level.

In this paper we use an alternative modelling method to gauge the economic impact of the Olympics, namely a multiregional computable general equilibrium model. A description of the actual model, entitled MMRF (Monash Multiregional Forecasting), can be found in Naqvi and Peter (1996). MMRF is at the cutting edge of computer economic models which can

¹ In undiscounted 1991 dollars.

analyse the regional impact of economic events. It overcomes the major limitations of previous methods and provides information on a very much larger range of economic variables.

It is for the above reasons that computable general equilibrium (CGE) models have become the major tool for policy modelling in Australia over the last two decades. Such models have been used to analyse a number of major projects, including: the proposed Very Fast Train (Madden and Dixon, 1990), the Multifunction Polis (Dixon, Horridge and Johnson, 1992), Australia's road investments (Allen Consulting Group, 1993) and the Melbourne Western Ring Road (Naqvi and Peter, 1996).

Giesecke and Madden (1996) demonstrated the applicability of multiregional CGE models to the analysis of hallmark events. Since then this methodology has been extended and employed in two studies of the economic impact of hallmark events: the Sydney Olympics (Madden and Crowe, 1997) and the proposed 2002 World Expo (Giesecke and Madden, 1997). In this paper we update the simulations reported in Madden and Crowe (1997) by using later estimates of the Olympics budgets. Due to space considerations we report results for only a single scenario, while our previous report contained sensitivity analysis.

2. Defining the Olympics

The first task in modelling the total economic effects of the Sydney Olympics is to establish that event's direct impact. This requires an assessment of the value of capital works associated with the Olympics, the cost of running the event, Olympics revenue, and the like. This is a first step, prior to using the computer economic model to estimate the indirect effects.

In Section 3.1 we will look at the construction and operating budgets of the Olympics. Our task will be to isolate those revenues and expenditures which we estimate would not have arisen in the absence of the Olympic Games having been awarded to Sydney. In the case of operating revenues and expenses, identifying Olympic-related items is a straightforward task as all budget items should be associated with running the event. However, it is a much more difficult task to decide which items in the Olympics capital budget should be included. Some infrastructure and sporting facilities may well have been constructed at any rate, although the

Olympics may have acted to bring forward such expenditure, and/or change the nature or extent of the project.

There are also likely to be other direct effects. The most notable is the “international visitor effect”, by which there is an expected increase in visitations to Sydney and other Australian destinations generated by heightened international awareness of Australia via Olympics media coverage. Also to be taken into account are those foreigners visiting to engage in Olympics-related activities (i.e. spectators). Another type of visitor effect to be accounted for are domestic travellers visiting Sydney to attend the Games in the year 2000.

The problem in defining the Olympics is largely confined to deciding what capital works should be included in Olympics construction. However, a major problem in arriving at the direct effects of the Olympics is estimating their dollar amount. This is not a difficult task in the case of those effects which are covered by an Olympics budget. Whether the budgeted figures turn out to be correct will only be known in retrospect, but the published figures can reasonably be considered as the best estimate available. However, for other direct effects which can be identified the problem of estimating a dollar value is much more difficult. For Olympics-induced international tourism, studies estimating visitor nights and daily visitor expenditure are available. However, there are as yet no guides as to the size of any Olympic-induced increases in demand for Australian exports of non-Olympic items or any effects on Australian productivity, even to the extent of whether or not they might be non-trivial.

3. The Direct Effects

3.1 *The Olympics Budget*

The Olympics budget can be broken down into two halves. That dealing with the capital works relating to the construction of Olympics facilities and infrastructure, and that dealing with the operating revenue and costs of conducting the event in the year 2000.

The capital works budget itself has two components: that related to the part of the construction which is publicly funded, and that related to those projects which are being privately funded. The former budget component is outlined in NSW Treasury Budget Paper No. 2, Section 6.1 (1997/98). It shows a total estimated cost for publicly-funded Olympic and Paralympic

construction works of \$2.1 billion (1997-98 dollars). This figure excludes the Aquatic Centre, which although it was part of the Olympic Bid, is generally agreed to be a project which would have proceeded in the absence of the bid.

In this paper, the conceptual questions of what should be included and what should be excluded as Olympic construction expenditure are not examined. The approach is to accept most of the items listed as Olympic construction in the Budget papers with the exception of some easily-argued exclusions. The vast bulk of the exclusions were connected with Homebush Bay developments which would have proceeded in the absence of the Olympics. These included the relocation of the Royal Agricultural Show Grounds from Moore Park to Homebush Bay at a cost of \$388 million, and estimated expenditure of around \$225 million for the re-development of Homebush Bay.² Also works which were largely completed prior to 1994, such as the International Rowing facility (commenced in 1988) and remediation of the Olympic site (excluding the village site) were partly excluded, with only that expenditure incurred after the start of 1994 being counted. Thus only \$1.45 billion (in 1997-98 dollars), or a little over two-thirds of the budgeted publicly-funded Olympics capital works, are assumed in this paper to have arisen primarily from Sydney hosting the 2000 Olympics.

In the case of privately-funded Olympic construction expenditure all items listed in OCA (1996) were included. These items were the Olympic Stadium, Athletes' Village, International Sector, Media & Technical Officials' Village and the Multi-Use Indoor Arena. Excluding the Government's contribution, the value of these items were \$1,248.9 million (in 1996-97 dollars). The values are taken from OCA (1996). There have been some adjustment to these figures with the awarding of contracts and a figure of a little under \$1.4 billion in 1997-98 dollars is the estimate I use here.

The estimation of Olympic construction outlined above considers only capital works listed in published Olympics budgets. This may have the effect of excluding certain construction for which the Olympics may have been partly a motivating force. However, the proportion of any such expenditures which should properly be assigned to the Olympics are difficult to estimate,

² The former was excluded from Olympic construction because the Show Grounds relocation would seem to be largely unconnected with the Olympic Games, while the latter was already under way before the Olympic Bid and did not seem to be dependent on the Olympics for its existence.

although they are probably quite small in comparison to the Olympic-budgeted items. The main effect of the Olympics on these other construction items is likely to be to influence their timing, and possibly their extent. It should be held in mind that some of the included budgeted items might have a portion of non-Olympics motivation. The approach I have taken of considering budget items seems to be the cleanest and most defensible one.

It should be noticed that the construction of accommodation and other facilities to cater for Olympics-induced visitors is not included in the estimate of direct effects. This is because the MMRF model computes this sort of construction expenditure as an indirect effect.

The expenditure and revenue figures for organising and staging of the 2000 Olympic Games are available from the budget of the Sydney Organising Committee for the Olympic Games (SOCOG). The latest (May 1997) budget shows an operating cost of \$2,289 million and operating revenue of \$2,332 million. In addition to the estimated surplus of about \$43 million, the expenditure items contains an amount of almost \$370 million to be transferred to the NSW Government consisting of rental of venues, construction reimbursements and services, including security.

The version of the MMRF model used for this paper includes an Olympics industry in its data base. The *pattern* of sales and expenditure were carefully estimated on the basis of budget items shown in Auditor-General (1994) and the *level* of sales and expenditure are based on the latest SOCOG budget (SOCOG). This ignored some changes in the pattern of sales in particular, but it provided a new estimate which was sufficient for the present exercise.

Details of the pattern of inputs and outputs for the model's Olympic industry can be found in Appendix B.1 of Madden and Crowe (1997).

3.2. *Olympics Tourism*

Two broad types of increased travel expenditure arising directly from the Olympics were estimated:

- 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-Event visitors (such as officials, sponsors, athletes, spectators, etc.);
- Games visitors;
- induced tourism, resulting from Sydney's Olympic profile.

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. Pre-Event and Games visitor numbers were estimated largely based on assumptions made by KPMG (1993). Estimates were made for total number of visitor nights for spectators, athletes, officials, media, sponsors and the Olympic family. Average daily expenditure figures for spectators were estimated using information from the Tourism Forecasting Council's 'Forecast' publication, while for other visitor classes the KPMG study was used.

The number of induced international tourists were estimated by applying a profile of percentage increases in base tourism to the Australian Tourism Commission's Marketing Targets which would have applied in the absence of the Sydney Olympics. The estimated profile of percentage increases was taken from KPMG (1993). This profile suggested that in 1994 induced tourism would be one per cent of the base figure for international tourism to Australia in that year. This would build up to a peak of 5 per cent in 1998, before falling away from 2002 onwards. Expenditure estimates were then made on the basis of Tourism Forecasting Council figures for average length of stay and daily expenditure. The distribution of visitor nights between states was estimated by adjusting the regional pattern of visitor nights reported in ABS (1994) to reflect the greater international focus on Sydney.³

³ Queensland and the ACT visitor's shares were also increased at the expense of the more distant states.

International visitor expenditure turned out to be the largest of the direct effects estimated to result from the Olympics. It comprised around 45 per cent of all estimated Olympics direct expenditure. Figures for the estimated expenditure by Olympic-related international tourists is shown in Table 1.

Table 1
Olympics-Related International Tourist
Expenditure in 1995-96 millions of dollars

	<i>Indirect Tourists</i>	<i>Olympic Visitors</i>
Pre-Event (average year)	281.6	2.0
Event Year	513.9	146.9
Post-Event (average year)	413.4	0

Additional net interstate travel is assumed to arise from the Olympics only in the Event year. Expenditure by interstate visitors travelling to NSW to be spectators at the Games was based on Bureau of Industry Economics tourism survey data. Expenditure items included pre-trip and post-trip expenditure in the state of origin, while expenditure in the destination state of NSW included amongst other things, the purchase of Olympic tickets. Over a third of the almost \$650 million (in 1995-96 prices) it was estimated interstate Olympic visitors would spend in the year 2000 were 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 cost of travel from that state.

It was decided to model the impact of the direct expenditure in three phases:

- the Pre-Event phase, 1994 to 1999;
- the Event Year, 2000; and
- the Post-Event phase, 2001-2005.

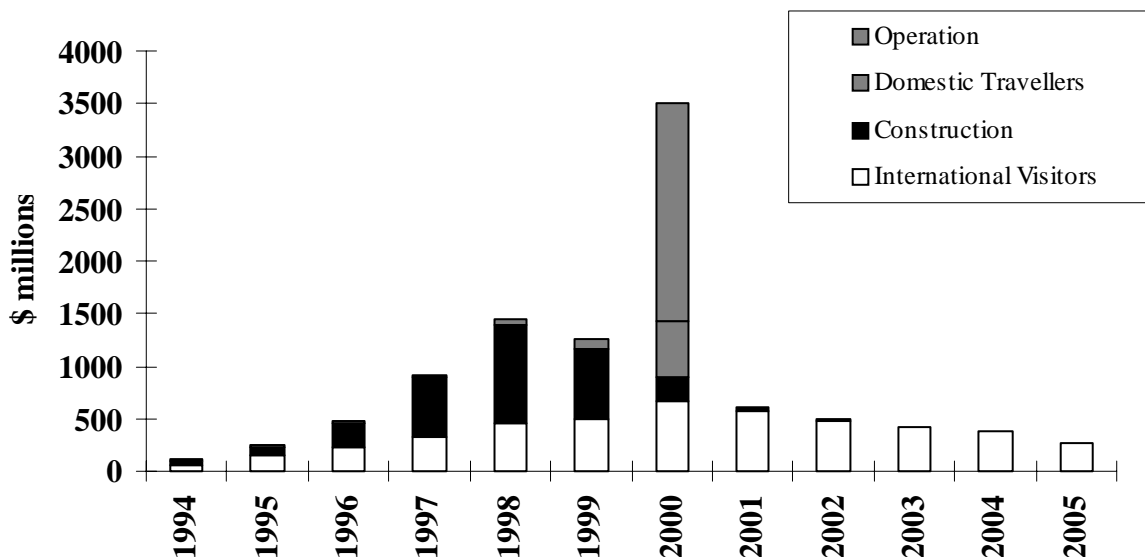
It can be seen from Figure 1 that the only type of expenditure to be confined to a single phase is that for domestic travellers. However, ninety per cent of construction expenditure is expected to occur in the Pre-Event phase and over ninety per cent of operating expenditure is estimated to occur in the Games year (much of it in the two-weeks of the Event itself). For the purpose of making the analysis as clear-cut as possible, we model the construction

expenditure as though it all occurred in the first phase and the operating expenditure as though it all occurred in the second phase. International visitors were modelled as making expenditure in all three phases.

4. The Phases of the Olympics

Figure 1 shows the pattern of direct expenditure over the period 1994 to 2005. Not surprisingly, expenditure is concentrated in the year 2000, with just over a third of Olympics direct expenditure being in that year.

Figure 1
Olympics-related Direct Expenditure



5. The Simulations

5.1 Pre-Event Simulation

The results from MMRF simulations are not only determined by the nature and size of the direct expenditure increases fed into the model, but also by various assumptions about the economic environment in which the expenditure increases occur.

The key assumptions of the Pre-Event simulation environment are examined first.

As the Pre-Event phase stretches over six years it was assumed, as is conventional when the scenario being modelled extends over such a time period, that there is sufficient time by the

end of the phase that both the boost to Australian employment arising from the Olympic construction and increased visitors from overseas will have dissipated via adjustments in the real wage; and, that all desired movements in the capital stock will have occurred.

Simulations are referred to here as depicting an average year of the Pre-Event phase without any consideration being given to the time-path of adjustment. One would expect the period of adjustment to the Pre-Event effects to be reasonably short as a result of producers being able to anticipate major construction expenditures and the predicted inbound tourism expansion. Some allowance is made in setting the environment for the simulation for some delay in wage adjustment, as discussed below.

The important assumptions characterising the Pre-Event simulation environment are:

- The Pre-Event 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.
- No change in the participation rate or Australia's population growth rate. These two assumptions, together with the previous assumption, imply that the potential for changes in national unemployment are severely circumscribed.
- Direct and indirect activities have no effect on interstate wage differentials: persons move between states to remove any initial disturbance to differentials.
- No change in the real rate of return on capital. Together with the above labour market assumptions, this assumption determines the change in the national capital stock.
- The rate of technical change is unaffected by the Pre-Event activities.
- Governments (with the exception of the NSW Government, dealt with below) keep their real borrowing requirements constant by allowing tax rates to vary.
- 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.

The justification for the last assumption is that the Pre-Event 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. While this assumption can be debated, simulations undertaken under an alternative assumption where the balance-of-trade constraint

is relaxed in the Pre-Event phase, but where the ensuing external deficit is repaid in the Post-Event phase, show only a trivial difference in the overall impact of the Games. The assumption does, however, affect the timing of various results.

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 either 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. One reason for allowing the Pre-Event phase to have some effect on employment levels as well as the real wage in an average year of the Games is as follows. While it may be true that the effect on employment may have dissipated well before the end of the Pre-Event phase, any early employment effects should be taken into account when calculating the average effect for the phase. It is assumed that Olympic construction will have no effect on the real wage for the first two years of the phase 1994/95 and 1995/96 with real wages beginning to increase from then on, finally negating the initial Olympics-induced increase in employment at the national level.

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. In light of the arguments, it was decided to constrain the rise in the national real wage in an average year of the Pre-Event phase to only seventy-five per cent of that which would keep the rate of unemployment fixed.

Turning to the assumptions regarding the NSW Government's financing of the publicly-funded portion of Olympic construction, it is assumed that almost 45 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 plus the associated accumulated interest will be repaid by the operating profit earned in the Event year, the remaining debt is completely repaid by the end of the Event phase from additional government revenue resulting from Olympics induced economic activity.

The remainder of the publicly-funded construction costs are financed through a reduction in NSW capital expenditure (45 per cent of the costs) and some reduction in current expenditure (10 per cent of costs) compared with what otherwise would have been the case. The financing assumptions are such that by the conclusion of the Event phase NSW taxes and government debt are no higher or lower than they would have been had the Games not taken place.

5.2 *Event Year Simulation*

The Games year is simulated essentially in short-run mode. This is normally characterised by fixed capital stocks and a slack labour market. The choice of a short-run economic environment for modelling Games activities, can be justified principally due to the short (two weeks) time period in which much of the expenditure occurs. While account is taken of the Olympics capital stock put in place during the Pre-Event phase by allowing for additional capital in that industry, it is assumed that the Event phase is 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 Event year simulation are:

- Fixed capital stocks in all non-Olympic industries, with rates of return on the capital in these industries adjusting to reflect changes in their demands for capital services;
- Nominal wages are fixed, with aggregate employment changing in line with the change in labour demand;
- Governments keep all tax rates constant, with changes in revenue and expenditure impacting on their borrowing requirements;
- The trade balance is allowed to vary in line with changes in domestic savings and investment.

An exception to the use of a short-run environment for the Event year was made in the modelling of international tourism. By the time of the Event year, industries will have had six years to adjust to Olympics-induced increases in international tourism demand. As a consequence, only the increase in international tourism demand *above its Pre-Event level* under the short-run scenario is modelled. 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.

5.3 *Post-Event Simulation*

The Post-Event simulations are conducted under a similar assumed economic environment to that for the Pre-Event simulations, but with some important differences. These are:

- The unemployment rate is completely unaffected by the Post-Event phase, with all labour-market adjustment at the national level falling on the real wage.
- 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.

6. Results

6.1 *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 5. 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.

6.2 *Pre-Event Results*

The macro-economic effects of the Pre-Event phase are shown in Table 2.

The Pre-Event phase involves a boost to Australia's aggregate demand of almost \$750 million 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 over 0.15 per cent of base-case GDP⁴ and as can be seen from Table 2, this is almost equal to the total effect that the Pre-Event phase is projected to have on Australian Gross Domestic Product (GDP).

The projected increase in GDP for the Pre-Event phase is entirely a measure of the assumed success of Pre-Event 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-Event 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-Event Olympics activities is slightly less than the activities it would crowd out. Under such assumptions the real wage would be projected to increase by 0.049 per cent. It can be seen from Table 2 that the real wage is projected to be only 0.037 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.

Table 2:
Effects of Pre-Event Phase on Macro-economic Variables

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
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⁴ Nominal GDP in 1995-96 was approximately \$485 billion, NSW nominal GSP for the same period was approximately \$170 billion (ABS).

Real GDP	0.437	0.168
Employment	0.475	0.187
Capital Stock	0.393	0.149
Real Consumption	0.336	0.108
Real Investment	1.451	0.559
Real Government Deficit (\$b)	0.071	-0.334
Australian export volume	n.a.	0.155
Australian import volume	n.a.	0.214
Australian trade balance (\$b)	n.a.	0.000
Consumer Price Index	0.056	0.057
National Real Wage	0.037	0.037

n.a. indicates not applicable.

Looking at the national results, 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 0.56 per cent is well above the real GDP increase of 0.17 per cent, with two thirds of the investment increase being Olympic investment. Real private consumption is estimated to increase by just 0.11 per cent, indicating a significant switch from consumption expenditure to investment at the national level.⁵ 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-Event phase. The estimated slight fall in aggregate (non-Olympics) real government expenditure is due to the NSW Government directing some of its expenditure to Olympics investment.⁶

An important feature of the simulation's assumed economic environment is that Pre-Event expenditure is domestically financed. While relaxing this assumption would add less than 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 over 80 per cent greater under a scenario where foreign financing were allowed. This increase would be significantly offset by a deterioration in the balance of trade.⁷

As expected, the economic impact of the Pre-Event phase is much greater in percentage change terms on NSW Gross State Product (GSP) than on the country as a whole. Most of the

⁵ This switch from consumption to investment expenditure is due to the assumed balance of trade constraint which ensures that Pre-Event activity is financed from domestic sources including foregone consumption.

⁶ Changes in government expenditure are not reported in Table 4.1.

⁷ 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).

projected increase in Australian GDP of 0.17 per cent, or about \$815 million, is comprised of the projected increase in NSW GSP of 0.44 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.

Table 3
Effects of Pre-Event Phase on New South Wales
and Australian Output by Industry

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
1. Rural	0.060	-0.001
2. Mining	0.027	-0.072
3. Manufacturing	0.260	0.120
4. Public Utilities	0.342	0.120
5. Construction	1.622	0.581
6. Domestic Trade	0.398	0.137
7. Transport & Communication	0.517	0.337
8. Finance	0.382	0.145
9. Housing	0.357	0.176
10. Public Services	0.202	0.090
11. Community Services	0.274	0.080
12. Personal Services	0.599	0.317

Table 3 shows the effects of the Pre-Event phase on individual industries. Olympic construction will have strong stimulatory effects on the Construction industry. In an average year of the Pre-Event phase, the NSW Construction industry is expected to be about 1.6 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 1.45 per cent in New South Wales, due to the construction-intensity of Olympic investment.

Table 3 shows that the impact on the national Construction industry is much greater than on other industries, with an estimated expansion of 0.58 per cent. The Transport and Communication industry is the second most positively affected national industry in the phase - a consequence of it being the largest component in the budget of international tourists. Transport and Communication is also affected by the performance of the traded-goods sectors, to which it supplies margins. Personal Services is the second most positively affected NSW industry as it is a major supplier of services to international tourists. At the national level the worst performing industries are Mining and Rural which suffer from an increase in real wage

costs. These cost increases can not easily be passed on by these two industries in their price sensitive export markets.

Turning to the effects of the Pre-Event phase on broad occupational groups, it can be seen from Table 4 that there is an increase in demand for each of the eight major skill categories. 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 0.168 per cent. The only occupational group to show a significantly greater estimated change is Tradespersons which is projected to expand nationally by 0.28 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 0.19 per cent (see Table 2). 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 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 in other industries.

Table 4
Effects of Pre-Event Phase on Employment by Broad Occupation

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
1. Managers and Administrators	0.445	0.169
2. Professionals	0.359	0.127
3. Para-professionals	0.418	0.150
4. Tradespersons	0.736	0.282
5. Clerks	0.420	0.173
6. Salespersons & Personal Service Workers	0.416	0.173
7. Plant & Machinery Operators & Drivers	0.453	0.216
8. Labourers	0.497	0.196

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 to be less than 0.80 per cent higher in an average Pre-Event 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.⁸ 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. Hence it would seem that the projected increase in demand for Tradespersons of 0.28 per cent generated by Pre-Event 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 shortages for some more narrowly-defined skills within the broad Tradespersons group. Work is being undertaken to introduce skill classes at the 283 ASCO⁹ unit group level into MMRF in order to investigate this matter. It is unlikely, however, that such investigations would 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-Event phase on that unit-group in New South Wales would at most be only 1.6 per cent in an average year.¹⁰ 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-Event phase.

⁸ CoPS, Monash University, unpublished internal document.

⁹ ASCO stands for Australian Standard Classification of Occupations.

¹⁰ This is because even at a much finer disaggregation of occupational classes, one would normally 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. 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 1.6 per cent in demand for a unit group in an average year might translate into a very much higher increase in a peak year.

6.3 *Event Year Results*

The macro-economic effects of the Olympic Games on economic activity in the year 2000-01 are shown in Table 5. The effects on output by industry are shown in Table 6, and the employment effects by industry and by occupation are provided in Table 7.

Given the assumption of slack labour in the short term, the Olympic Games provides a substantial stimulus to the Australian economy in the Event year. Table 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. This result is largely due to very substantial restrictions on the expansion of non-Olympics capital stocks during the Event year.¹¹ 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.

As 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 Event 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.

¹¹ 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-Event phase. Capital is assumed to have been continually adjusting to this level of induced tourism throughout the Pre-Event and Games periods.

Table 5
Effects of Event Year on Macro-economic Variables

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
Real GDP	1.156	0.307
Employment	1.344	0.484
Capital Stock ^(a)	1.334	0.399
Real Consumption	0.430	0.196
Real Investment	0.131	0.025
Real Deficit (\$billion)	-0.175	-0.345
Australian export volume	n.a.	1.603
Australian import volume	n.a.	0.763
Aust trade balance (\$billion)	n.a.	0.807
Consumer Price Index	0.694	0.380
National Real Wage	-0.234	-0.234

(a) Includes all Olympics capital stock.

n.a. indicates not applicable.

Examining the GDP and employment results in Table 5, it can be seen that Australian employment is projected to expand during the Event year by over half as much again as 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 by around one-sixth more than GDP. This results from both the Olympics industry taking up the capital already put in place during the Pre-Event 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 Event 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 Event year, these increased exports result in a \$0.81 billion improvement in the trade balance. There is a muted increase in domestic absorption. Real investment nationally is estimated to increase by less than 0.03 per cent reflecting an assumption that the temporary Event year boom is not a stimulus for increased investment. Real consumption expands by only 0.20 per cent, 0.11 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 not much more than two, compared with a similar ratio for GDP of almost four. The strong stimulus to the NSW economy increases prices in that State much more than for the economy as a whole. The CPI is projected to be 0.53 per cent higher than otherwise would be the case in New South Wales, but only 0.38 per cent higher across the nation. This acts to constrain the increase in NSW real consumption.

The output by industry results presented in Table 6 show that three industries are projected to expand significantly more than the others at the national level. They are Personal Services (1.48 per cent increase in output), Transport and Communication (1.26 per cent) and Construction (0.88 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 Event year, while about a quarter of the Olympics industry's costs comprise expenditure on NSW Construction.¹² Transport and Communication benefits for both reasons, since transport is a major tourist purchase and communications is an important input into the Olympics industry.

Table 6
Effects of Event Year Phase on New South Wales
and Australian Output by Industry

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
1. Rural	-0.055	-0.102
2. Mining	-0.659	-0.404
3. Manufacturing	0.169	0.054
4. Public Utilities	0.813	0.161
5. Construction	2.591	0.879
6. Domestic Trade	0.785	0.120
7. Transport & Communication	1.602	1.259
8. Finance	0.602	0.152
9. Housing	0.131	0.042
10. Public Services	0.365	0.179
11. Community Services	0.642	0.117
12. Personal Services	3.497	1.484

The only industries that are negatively affected are the Mining and Rural industries. While the actual Games activities are assumed to have no impact on overseas exports, growing

¹² Most of the Games period construction activity involves 'fitting out' previously constructed facilities. Fit-out costs are classified as operational costs rather than capital expenditure. This is consistent with costings published in Auditor-General (1994).

international tourism demand continuing into the Event year puts upward pressure on prices, adversely affecting the real exchange rate and hence reducing Mining and Rural exports.

Table 7
Effects of Event Year on Employment by Broad Occupation

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
1. Managers and Administrators	1.489	0.507
2. Professionals	1.212	0.354
3. Para-professionals	1.373	0.447
4. Tradespersons	1.664	0.577
5. Clerks	1.183	0.447
6. Salespersons & Personal Service Workers	1.416	0.505
7. Plant & Machinery Operators & Drivers	1.202	0.658
8. Labourers	1.200	0.444

Table 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 7 annual estimates. However, the very brevity 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 the Event-year assumption of no change in the nominal hourly wage.

6.4 Post-Event Results

The macroeconomic effects of the Post-Event phase are shown in Table 8, while the effects on industry output and employment are shown in Table 9.

While there is only a small projected increase in national GDP, New South Wales, which is the main destination for the induced international tourists, is projected to experience an increase in real GDP of a little over 0.15 per cent.

It can be seen that, while induced tourism increases Australia's exports, supply constraints on the economy result in an increase in the price level which acts to crowd-out other exports. This explains the negative impacts on the Rural and Mining industries.

Table 8
Effects of Post-Event Phase on
Macro-economic Variables

<i>Percentage Change</i>	<i>NSW</i>	<i>Australia</i>
Real GDP	0.152	0.009
Employment	0.127	0.005
Capital Stock	0.197	0.007
Real Consumption	0.165	0.051
Real Investment	0.183	0.035
Real Deficit	0.000	-0.058
Australian export volume	n.a.	-0.011
Australian import volume	n.a.	0.205
Aust trade balance (\$billion)	n.a.	0.000
Consumer Price Index	0.256	0.265
National Real Wage	0.085	0.085

Table 9
Effects of Post-Event Phase on New South Wales and
Australian Output and Employment by Industry

<i>Percentage Change</i>		<i>Output</i>		<i>Employment</i>	
		<i>NSW</i>	<i>Australia</i>	<i>NSW</i>	<i>Australia</i>
1.	Rural	-0.202	-0.260	-0.338	-0.409
2.	Mining	-0.954	-0.693	-1.200	-1.052
3.	Manufacturing	0.034	-0.052	0.005	-0.071
4.	Public Utilities	0.143	0.004	0.097	-0.019
5.	Construction	0.177	0.029	0.170	0.025
6.	Domestic Trade	0.197	0.058	0.192	0.058
7.	Transport & Communication	0.419	0.298	0.447	0.338
8.	Finance	0.146	-0.014	0.113	-0.025
9.	Housing	0.187	0.071	0.000	0.000
10.	Public Services	0.104	0.024	0.096	0.021
11.	Community Services	0.138	0.010	0.133	0.007
12.	Personal Services	0.537	0.340	0.616	0.418

7. Conclusions

The results of the simulations presented in this study indicate that the Olympics should have a significant positive impact on the New South Wales and national economies. The present value of the impact on real GDP and real household consumption for Australia over the three phases of the Olympics is \$6.1 billion and \$2.7 billion respectively.

New South Wales is responsible for nearly all the increased real consumption nationally. In terms of the increase in activity the present value of the increase in New South Wales gross state product is \$6.9 billion, greater than the figure for the nation as a whole.

However, the above should not be interpreted as meaning that New South Wales is the only winner from the Olympics. There should be a small increase in per capita consumption in the other states. New South Wales should have a slightly larger population as some extra workers are attracted to that State by Olympic jobs. The major economic gains to residents of other States is likely to be in terms of consumer surplus to those attending to Games.¹³

¹³ 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.

Within New South Wales, there should be few losers from the Olympics at the broad level. Exceptions are the Rural and Mining industries, particularly the latter, which may find that the relatively small increase in prices brought about by Olympics-induced tourism results in it experiencing some contraction in activity in the Post-Event phase. It is a familiar occurrence that any boom in one sector of the economy will in the long run pull resources towards that sector and away from others. Growth in Australia's tourist exports, while good for Australian real consumption, can normally be expected to have some negative impact on other traded-goods industries.

In this paper we have looked at only one scenario for the Olympics. There are many alternative scenarios which can be considered. Madden and Crowe (1997) undertook Olympic simulations under a number of different scenarios but space considerations leads us to report just a single scenario here. In general, most feasible scenarios do not alter the broad thrust of the results presented here. If the Olympics lead to a small increase in Australian labour productivity, as has been suggested by some, the estimated present value of the benefits of the Olympics in terms of GDP and real consumption would increase slightly. On the other hand if the increase in labour demand generated in the Pre-Event phase is translated entirely into a rise in real wages, with no aggregate national employment impact, the present value of the Olympics nationally would be largely confined to that arising from the increase in activity which is projected to occur in the Event year.

It should be noted that this paper concerns itself with the impact of the Olympic Games on standard macroeconomic, industry and occupational variables. No attempt is made to assess the impact of the Olympics on economic welfare. That would involve a full-scale cost-benefit analysis covering such matters as the consumer surplus obtained by Australian spectators at the Games, the increase in the utility of Australian residents from elevated national pride accompanying a home Olympics, the long-term benefits from improved sporting facilities constructed for the Olympics, any losses from deferred non-Olympics capital works and possible environmental costs and congestion associated with the staging of the event.

It also is worth noting that while a present value of the Olympics of \$6.1 billion in GDP and \$2.7 billion in real consumption are very large, this still only amounts to 0.11 per cent and 0.08 per cent of the present value of estimated GDP and real consumption respectively over

the 12 years of the Olympics phases. The corresponding percentages for NSW are 0.36 and 0.22. In the end, the Olympics are much more a sporting event than an economic event.

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