Prospects for Australian Regions

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Introduction

The Monash Multi-Regional Forecasting-Green (MMRF-Green) model is a dynamic, multi-sectoral, multi-regional model of Australia. It is very detailed, distinguishing up to 40 industries, 8 states/territories and 56 sub-state regions (see Figure 1). Each solution of the model produces a picture of the Australian economy at this level of detail for a particular year. The model can also produce a sequence of annual solutions.

Traditionally, computable general equilibrium (CGE) models like MMRF-Green have been used to answer 'what if' questions such as: how different would an economy look in a specified year if a policy change, or some other disturbance, had occurred in some preceding year? Typically there has been no emphasis on forecasting how the economy would look or on tracing the economy's adjustment path from the time of a shock to the year of interest.

In recent years, the MONASH CGE model has been used to make realistic forecasts for the economy at a high level of detail over periods of policy relevance (say up to 10 years).[1] The forecasting methodology developed for MONASH has now been applied to MMRF-Green to make forecasts for the state/territory economies. The starting point for the MMRF-Green forecasts is a set of scenarios for the macro economy of each state/territory supplied by a specialist forecasting agency, currently Access Economics. Expert forecasts for major export commodities and a detailed scenario on changes in technologies and household preferences are also used. The role of MMRF-Green is to forecast a microeconomic picture consistent with the state-based macroeconomic scenarios.

These forecasts have two main purposes:

1. They provide information to organisations that have to make decisions requiring them to take views about the likely future structures of regional economies. Prime examples are multi-industry, multi-regional businesses concerned with the allocation of their resources, educational and training authorities concerned with anticipating chances in the regional labour force, and governments concerned with regional development public infrastructure.

2. They provide a realistic base case from which to calculate the answers to the traditional 'what if' questions. Recent examples are our studies of carbon permit trading (Adams, Horridge and Parmenter, 2000a, 2000b).

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1 MONASH is a large-scale CGE model of the Australian economy built and maintained at the Centre of Policy Studies. MONASH is fully documented in Dixon and Rimmer (2000). Some examples of recent MONASH forecasts, and a description of the forecasting methodology, can be found in Adams and Parmenter (2000).

Figure 1: Sub-state Regions Identified in MMRF-Green
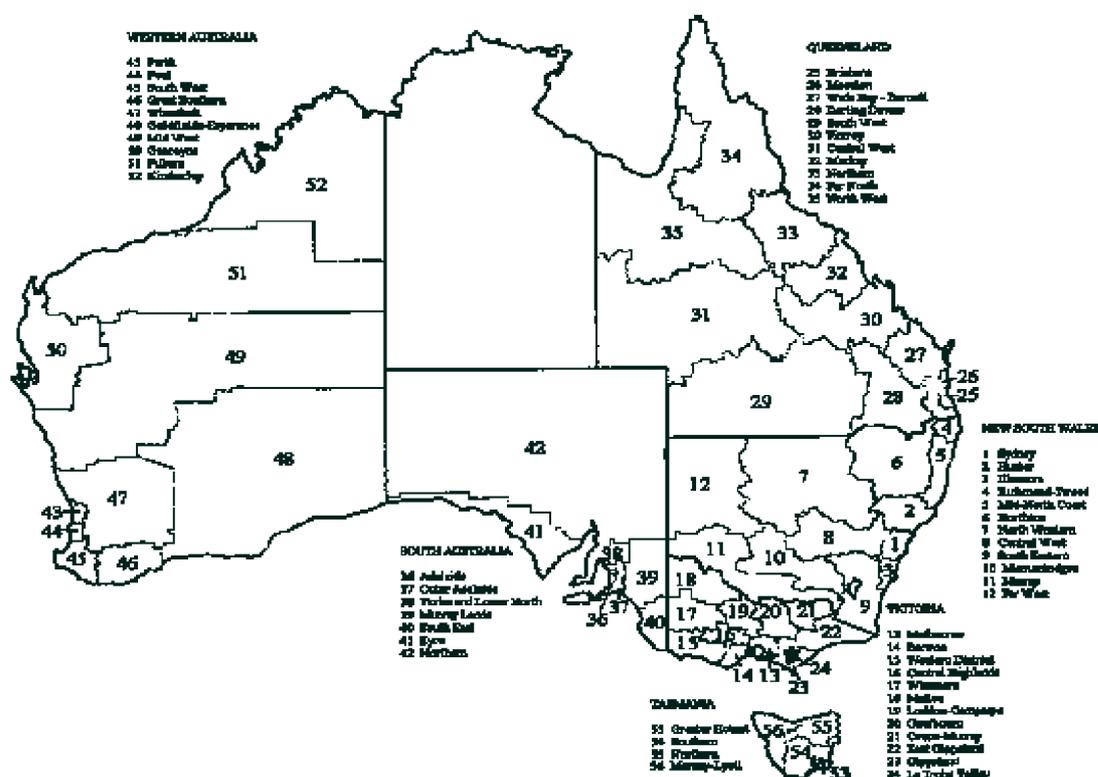
Table 1:   Macroeconomic Forecasts (average annual growth rates, 1996-97 to 2007-08)

	Variable		NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
1.	Real private consumption		3.2	2.6	4.4	2.1	4.6	1.8	3.4	3.7	3.3
2.	Real investment		3.3	2.0	4.0	1.0	4.5	-0.4	1.7	1.7	3.0
3.	Real public consumption	— total	3.2	2.8	4.1	2.4	4.3	2.2	3.4	3.4	3.3
4.		— regional	3.2	2.6	4.4	2.1	4.6	1.8	3.4	3.7	3.3
5.		— federal	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
6.	International export volumes		5.9	8.2	5.5	7.4	5.1	6.7	5.7	10.2	6.3
7.	International import volumes		6.0	6.5	7.3	6.2	6.9	5.2	6.0	5.4	6.5
8.	Real GDP/GSP		3.1	2.9	3.7	2.5	4.0	2.0	3.2	3.5	3.2
9.	Aggregate employment		1.3	1.1	1.8	0.7	2.0	0.3	2.2	2.3	1.4
10.	Aggregate capital stock		4.4	4.0	4.2	3.6	4.4	2.4	3.9	4.3	4.2
11.	Consumer real wage		-1.3	1.0	-1.3	0.7	0.2	1.4	4.9	-2.7	0.5
12.	Producer real wage		-1.4	0.2	5.2	6.7	-1.6	1.0	2.0	0.3	0.3
13.	CPI		2.6	1.7	3.4	2.3	2.9	2.6	1.6	1.4	2.5
14.	Terms of trade		0.3	0.3	0.3	0.3	0.3	0.3	-0.5	6.3	-0.2

Figure 2: Sub-state Regions Ranked by Average Growth in Real Value Added, 1996-97 to 2007-08
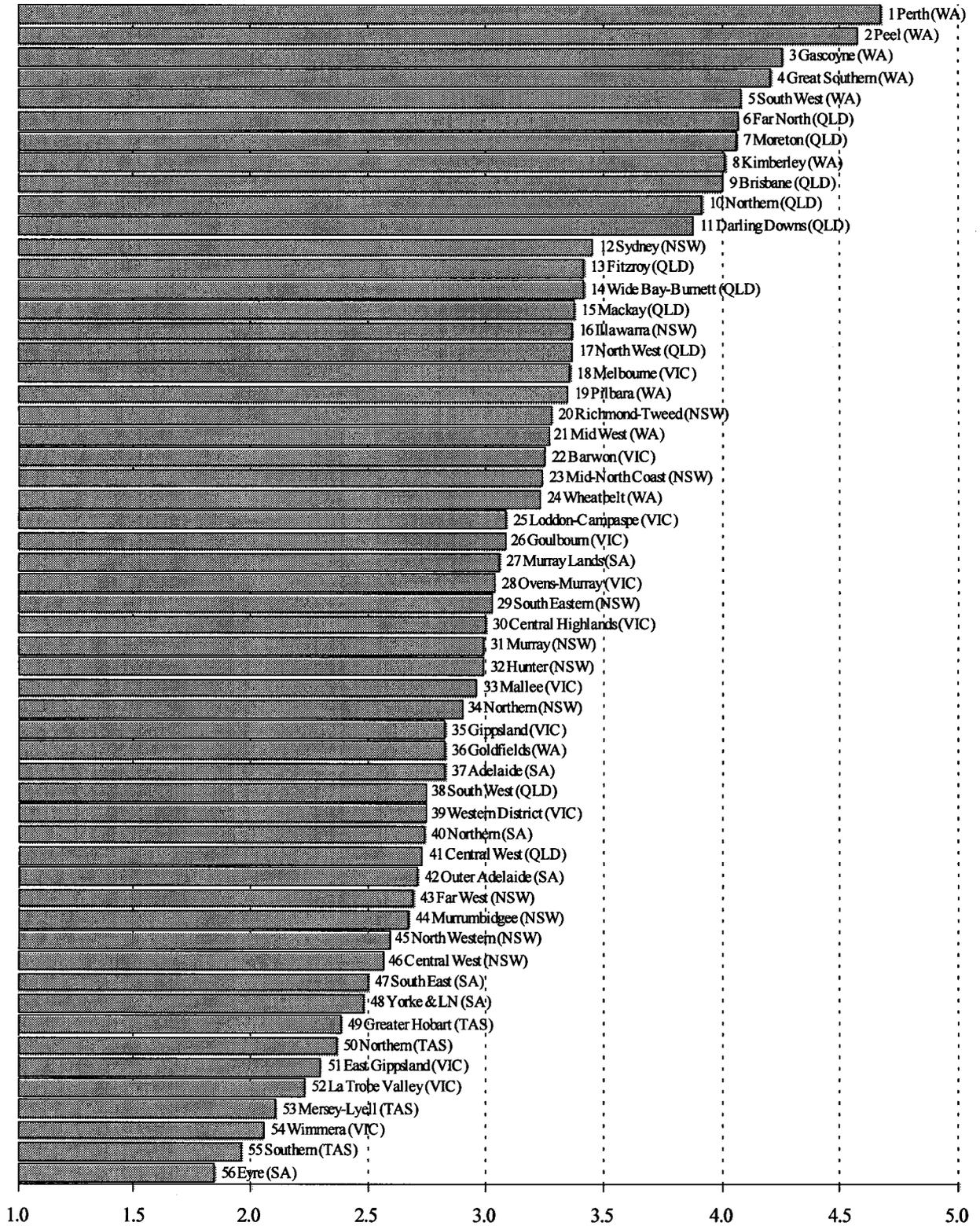
Forecasting Methodology

In forecasting with MMRF-Green, we impose on the model a large volume of information from specialist external forecasting agencies. The model is then used to trace out the implications of those external forecasts.

In generating the forecasts reported in this paper, we use:

- state/territory macroeconomic forecasts from Access Economics and state Treasury departments;

- national-level forecasts of inbound tourism numbers from the Tourism Forecasting Council (TFC) and forecasts of real foreign-tourist expenditure by region from Access Economics;

- national-level assumptions for changes in industry production technologies and in household preferences from CoPS; and

- forecasts for the quantities of agricultural and mineral exports, and estimates of capital expenditure on major minerals and energy projects from the Australian Bureau of Agricultural and Resource Economics (ABARE).

Forecasts for 1996-97 to 2007-08

Projections for Sub-state Regions

The MMRF-Green model is able to make growth forecasts for 56 regions and the results are presented in Figure 2. The figure shows that Queensland and Western Australia have the regions with the strongest growth prospects while regions in South Australia and Tasmania face the lowest growth rates. Regions in New South Wales and Victoria have a mix of high growth and low growth positions but generally occupy middle positions.

The main inputs to these regional forecasts are:

- our forecasts at the state level of industry growth rates;

- data on the industrial composition of each region's aggregate value added;

- forecasts for agricultural production in the broadacre agricultural regions; and

- trend forecasts of the interregional movements of retired people.

External Variables

Macroeconomic Inputs (Table 1)

Table 1 shows our forecasts for selected macroeconomic variables in terms of average annual growth rates over the period 1996-97 to 2007-08. All of these forecasts are either directly imposed or are implied by external inputs.

Real GDP is assumed to grow at an average annual rate of 3.2 per cent (row 8). The states/territories with the best growth potential are Western Australia (4.0 per cent per annum annual growth in real GSP) and Queensland (3.7 per cent). The states with the worst growth potential are Tasmania (2.0 per cent) and South Australia (2.5 per cent). In general, the forecast growth rates are in line with the long-run growth potential for each economy. Note, however that for Queensland and Western Australia the forecast growth rates are below the average rates of the last five years, while for Tasmania and South Australia forecast growth is higher than recent experience. Factors such as the Asian financial crisis, the prospect of a prolonged period of slow growth in Japan and a forecast slowdown in the US economy, make it unlikely that the foreign-export-oriented states like Queensland and Western Australia can sustain their recent strong performance. On the other hand, some of the negative factors underlying the recent poor performance of Tasmania and South Australia, such as declining population growth and the stagnation of some foreign-import-competing industries, will be reversed allowing a pick up in growth for these states.

Over recent years, real private consumption has grown faster than real Gross State Product (GSP) in most regions. However, this trend is not expected to continue.

We expect that real consumption will grow roughly in line with real GSP in each region over the forecast period.

Growth in real investment (row 2) at the national level is forecast to be a fairly modest 3.0 per cent. This reflects initial conditions. 1996-97 was a very strong year for investment, and only modest investment growth is required to maintain the historically normal economy-wide investment/capital ratio of 3.0 per cent. Forecast differences across regions reflect a combination of different initial conditions, different industrial compositions and specific assumptions about large projects such as the Comalco aluminium plant in Queensland.

Over the past fifteen years real international exports (row 6) and real international imports (row 7) have grown rapidly relative to real value added (row 8) in each region. This reflects several factors: declining transport costs; improvements in communications; reductions in protection in Australia and in our major trading partners; and technological changes favouring the use of import-intensive goods such as computers and communication equipment. All these factors are expected to continue through the forecast period, leading to further increases in the ratios of the volume of international trade to real value added. However, these increases will be comparatively moderate due, in part, to the short-term negative impacts of the Asian crisis.

Employment (row 9) in each region is assumed to grow at rates that are consistent with long-run productivity trends. For Australia as a whole, long-run productivity growth is set at 1.8 per cent. For the states/territories we assume long-run growth rates in productivity in line with the national average.

In some cases, we depart from the Access story. For example, we assume that foreign-import growth will be stronger in all states/territories than Access is forecasting for the years 1999-2000 to 2001-02. This results from the check that our microeconomic model puts on the macroeconomic forecasts. When we impose the macroeconomic forecasts, MMRF-Green must produce a micro-economic story that is consistent with the macroeconomics. Import growth in MMRF-Green is explained primarily by

growth in the level and structure of domestic demand and by relative price movements. For example, if investment growth is strong, our model wants to project strong import growth because investment is an import-intensive activity. Similarly, the model will want to project strong import growth if the real exchange rate appreciates, because this lowers the prices of imports relative to the prices of locally produced goods. In the forecasting simulations, any tension between the standard MMRF-Green mechanisms and the exogenous forecasts for foreign imports is reconciled by allowing twists in domestic purchasers' import/domestic preferences. But we are careful to ensure that these twists are plausible relative to historical experience.

We judge that the twists required to accommodate the low import growth forecast by Access for the years 1999-2000 to 2001-02 were implausible. Hence, we made upward adjustments, assuming that import growth would be as slow as is compatible with the largest twist in preferences against imports that we thought plausible.

Assumptions for Changes in Technology and Tastes (Table 2)

Table 2 shows our assumptions for changes in the preferences of households and for changes in the production technologies of industries. These are applied uniformly across regions. The numbers are based, in part, on extrapolated trends calculated from a MONASH simulation for the period 1986-87 to 1996-97.

Our assumptions for household tastes are summarised in the first column of numbers in Table 2. A positive (negative) number indicates that we are assuming the household usage of the relevant commodity will increase (decrease) relative to the movements that are implied in the forecasts by changes in household aggregate expenditure and by changes in relative prices. For example, we assume that consumption of *Financial and business services* will increase at a rate 1.1 per cent a year faster than can be explained on the basis of changes in prices and changes in the average budget of households.

The second column of numbers in Table 2 shows our initial assumptions for the average annual rates

of change in the usage of commodities as intermediate inputs per unit of production in industries, and as inputs per unit of capital creation. Negative numbers indicate that technological change is commodity-saving. Positive numbers indicate that it is commodity-using. For example, we assume initially that in each year industries will increase their usage of *Communication services* by 5.0 per cent more than their outputs.

The exogenous shocks to produced-input technologies impose a cost/saving on the industries that use the inputs. For example, industries that utilise communication services will suffer a cost increase when forced to use 5.0 per cent more of those services per unit of output. To offset these cost effects, we make a simultaneous uniform adjustment to the technology coefficients applying to all the user's inputs (produced and primary) so that there is no net effect on the user's costs.

Table 2: Industry Technology and Household Taste Assumptions (average annual percentage changes)

Industry	Household preferences[a]	Technology:	
		Intermediate input-using[b]	Primary -factor using[c]
Agriculture	0.8	0.1	-2.3
Forestry	-0.9	1.7	0.0
Iron ore	-1.3	-0.3	-4.1
Non-iron ore	-0.3	-1.8	-2.4
Black coal	-3.7	0.0	0.0
Crude oil	-1.3	0.0	0.0
Natural gas	1.0	0.5	0.0
Brown coal	-1.3	0.0	0.0
Food, beverages and tobacco	0.7	0.2	-1.3
Textiles, clothing and footwear	0.2	-0.4	-1.7
Wood and paper products	1.4	0.1	-0.2
Chemical products excl. Petrol	4.9	2.8	-0.1
Petroleum products	-2.7	-0.5	0.0
Non-metal construction materials excl. Cement	-1.4	0.6	-1.1
Cement	0.2	-1.2	-0.4
Iron and steel	5.2	2.3	-1.4
Alumina and aluminium	6.7	3.0	-2.5
Other metal products	-1.6	2.0	-0.1
Motor vehicles and parts	1.0	2.0	-0.4
Other manufacturing	2.0	-3.5	-1.8
Electricity generation and supply	0.3	-0.3	-3.1
Urban gas distribution	0.3	0.6	-2.7
Water and sewerage services	-0.5	-0.2	-2.4
Construction services	6.3	1.8	0.0
Wholesale trade, retail trade, accommodation	-3.1	-1.8	0.0
Road transport services	-1.6	0.5	-0.8
Other transport services	-0.2	-0.2	-2.2
Communication services	0.0	5.0	-4.5
Financial and business services	1.1	3.2	-1.8
Dwelling ownership	0.0	0.0	0.3
Public services	-1.3	0.0	-0.4
Other services	0.6	1.6	0.0

(a) Annual rate of shift of consumption function.
(b) Annual rate of change of use of the commodity identified on the left-hand panel per unit of output of industries using the commodity.
(c) Annual rate of change of use of all primary factors (labour, capital and agricultural land) per unit of production of the industry identified on the left.

Table 3: Assumptions for Exports, Production and Real Investment in Agricultural, Minerals and Energy Industries: MMRF-Green*

Variable	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Export volumes:								
Agriculture	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Iron ore	na.	na.	na.	na.	2.9	na.	na.	na.
Non-iron ore	2.9	2.9	2.9	2.9	2.9	na.	na.	na.
Black coal	2.9	na.	2.9	na.	na.	na.	na.	na.
Crude oil	0.0	-0.5	-0.9	-1.4	0.8	na.	1.9	na.
Natural gas	na.	na.	na.	na.	3.8	na.	na.	na.
Petroleum products	-0.2	0.3	-0.3	0.9	0.7	na.	na.	na.
Alumina and aluminium	3.4	3.4	5.1	3.4	3.4	na.	na.	na.
Production:								
Agriculture	na.	na.	na.	na.	na.	na.	na.	na.
Iron ore	na.	na.	na.	na.	na.	na.	na.	na.
Non-iron ore	na.	na.	na.	na.	na.	na.	na.	na.
Black coal	na.	na.	na.	na.	na.	na.	na.	na.
Crude oil	na.	-0.5	na.	na.	0.8	na.	1.0	na.
Natural gas	1.6	2.4	7.6	-2.7	4.0	0.0	13.1	na.
Petroleum products	1.1	1.5	1.9	0.5	2.2	-0.1	2.3	na.
Alumina and aluminium	3.6	3.4	6.5	na.	4.1	3.5	3.5	na.
Real Investment:								
Agriculture	na.	na.	na.	na.	na.	na.	na.	na.
Iron ore	na.	na.	na.	na.	na.	na.	na.	na.
Non-iron ore	na.	na.	na.	na.	na.	na.	na.	na.
Black coal	-0.6	na.	1.1	-4.3	na.	na.	na.	na.
Crude oil	na.	-1.3	-1.5	-2.8	0.6	na.	2.5	na.
Natural gas	na.	1.3	-2.6	-2.6	2.5	na.	11.2	5.4
Petroleum products	na.	na.	na.	na.	na.	na.	na.	na.
Alumina and aluminium	1.1	0.7	8.2	0.4	2.2	0.2	-2.1	2.8

na. indicates that growth in the relevant variable/industry was endogenously determined in all years of the forecast period.

Our initial assumptions for each industry concerning average annual changes in primary-factor usage per unit of output are shown in the final column of Table 2. Primary-factor inputs in MMRF-Green comprise labour, capital and agricultural land. For example, our initial assumption for *Electricity generation* is that output will increase on average by 3.1 per cent a year relative to the industry's overall usage of primary factors.

Assumptions for Exports, Agricultural Production and Capital Expenditure (Table 3)

Table 3 shows selected forecasts for the quantities of agricultural and mineral exports and for real gross investment in the agricultural, mining and non-electricity energy sectors. Only those forecasts based on exogenously imposed inputs are listed.

The forecasts shown for 'Export volumes' reflect ABARE projections to 2004-05, and exogenously imposed long-term trends for the years 2004-05 to 2007-08. The forecasts for 'Production' reflect ABARE estimates.

The numbers for 'Real Investment' are a selection of our base-case forecasts for real gross investment in the mining and energy industries. These numbers are, in the main, endogenous output from MMRF-Green. However, in some years between 1999-00 and 2007-08, the endogenous determination of investment is turned off for some of the industries in some of the regions and investment is exogenously set in light of data on expenditure on new projects provided by ABARE. For example in the period 2000-01 to 2007-08, investment in the Queensland aluminium industry is exogenous and set to reflect the construction of the Gladstone Alumina plant. Over this period, allowance is also made for the construction and start up of the Papua New Guinea-Queensland natural gas pipeline.

Projections for Industry Output (Table 4)

Table 4 gives base forecasts for the 37 industries distinguished in the model. At the Australia-wide level, *Communication services* (industry 33) is the fastest growing industry. This reflects our assumption that changes in technology through the projection period will favour intermediate usage of these services strongly (column 2 of Table 2) and that rapid productivity growth (column 3 of Table 2) will reduce their price relative to consumer prices in general. Similar factors explain the relatively strong growth forecast for *Financial and business services* (industry 34).

Another fast growing industry is *Electricity generation - gas* (industry 23). It has especially strong growth prospects in Queensland and New South Wales, reflecting announced and planned construction of new plants.

Table 4: Industry Output (average annual growth rates, 1996-97 to 2007-08)

Industry	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
1. Agriculture	2.0	2.1	3.0	2.4	3.0	1.9	1.5	1.8	2.4
2. Forestry	3.0	3.2	3.7	3.2	4.5	2.0	7.2	5.2	3.2
3. Iron ore	2.5	2.0	1.7	3.0	2.7	1.5	1.4	1.3	2.6
4. Non-iron ore	2.1	0.0	2.7	0.3	2.4	2.6	1.4	0.7	2.1
5. Black coal	2.7	2.6	2.8	-0.2	2.8	1.3	1.0	0.9	2.8
6. Crude oil	0.0	-0.5	0.0	0.0	0.8	0.0	1.0	0.0	-0.2
7. Natural gas	1.6	2.4	7.6	-2.7	4.0	0.0	13.1	0.0	3.0
8. Brown coal	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5
9. Food, beverages and tobacco	2.2	3.0	3.9	3.6	3.8	1.4	5.6	5.4	3.1
10. Textiles, clothing and footwear	0.7	2.5	1.2	1.7	3.6	0.4	5.9	6.7	1.8
11. Wood and paper products	1.2	2.2	1.6	2.7	3.4	0.0	7.3	5.6	1.9
12. Chemical products excl. Petrol	3.0	3.8	3.5	5.3	6.1	3.1	10.0	8.4	3.8
13. Petroleum products	1.1	1.5	1.9	0.5	2.2	-0.1	2.3	2.3	1.4
14. Non-metal construction materials excl. Cement	2.6	2.5	3.1	2.1	3.9	0.4	4.3	3.9	2.8
15. Cement	0.7	1.1	1.4	0.7	1.8	-0.1	3.4	3.0	1.2
16. Iron and steel	3.4	4.9	3.6	5.6	5.2	4.0	14.5	10.7	4.0
17. Alumina and aluminium	3.6	3.4	6.5	0.0	4.1	3.5	3.5	0.0	4.3
18. Other metal products	4.1	5.7	4.7	5.5	7.1	2.4	7.1	6.8	5.2
19. Motor vehicles and parts	0.7	2.8	2.2	3.8	5.0	0.1	14.3	7.6	2.8
20. Other manufacturing	2.7	2.8	2.1	2.1	4.0	1.3	5.6	4.6	2.7
21. Electricity generation – black coal	1.6	0.0	1.6	-1.0	2.0	0.0	0.0	0.0	1.6
22. Electricity generation – brown coal	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	1.9
23. Electricity generation – gas	6.2	3.2	11.8	3.9	3.7	0.0	4.1	0.0	4.4
24. Electricity generation – petroleum products	-1.9	-6.1	-0.9	-4.7	4.6	-2.4	2.0	0.0	3.7
25. Electricity generation – other (mainly hydro)	2.8	2.6	3.4	2.9	5.5	0.9	0.0	0.0	2.1
26. Electricity supply	2.0	2.0	2.6	1.6	3.0	0.8	3.3	3.0	2.2
27. Urban gas distribution	3.0	3.0	4.6	2.4	5.2	1.5	3.9	3.7	3.2
28. Water and sewerage services	2.8	2.8	3.1	2.1	3.7	1.5	3.5	3.8	2.8
29. Construction services	3.4	2.6	4.0	1.4	4.7	0.4	2.4	2.2	3.3
30. Wholesale trade, retail trade, accommodation	1.8	1.7	3.1	1.3	3.2	1.7	2.3	2.0	2.1
31. Road transport services	3.0	3.1	3.8	3.1	4.3	2.2	3.7	3.1	3.3
32. Other transport services	3.0	4.9	4.6	4.5	4.7	8.4	7.4	9.0	4.2
33. Communication services	8.5	8.7	8.7	7.8	9.1	7.1	8.6	7.6	8.5
34. Financial and business services	5.3	5.1	5.9	4.8	6.5	4.4	6.7	6.5	5.4
35. Dwelling ownership	3.3	3.7	2.9	2.2	3.3	1.5	3.6	4.6	3.2
36. Public services	2.8	2.3	3.9	2.1	4.3	1.7	3.5	3.6	2.9
37. Other services	3.6	3.2	4.5	3.0	5.0	3.2	4.2	3.6	3.7

Strong growth in gas-fired electricity restricts growth prospects for other types of electricity generation, especially *Electricity generation – black coal* (industry 21) in Queensland and South Australia. In all regions, forecast growth of *Electricity supply* (industry 26) lags behind forecast GSP growth. This reflects assumptions about electricity-saving technical change that are imposed on the forecasts.

Other industries with relatively strong growth forecasts include *Other transport services* (industry 32) and *Other metal products* (industry 18). These industries participate heavily in the strong growth forecast for international tourism and manufactured exports. In addition, changes in technology are assumed to favour intermediate usage of *Other metal products* (column 2 of Table 2).

Forecasts for *Agriculture* (industry 1), the mining industries (industries 3 to 8), *Petroleum products* (13) and *Alumina and aluminium* (17) are, in the main, based on extrapolations of the current views of the ABARE (see Table 3). These include slow growth for *Crude oil* in Victoria, reflecting the run down of the Bass Straight reserves (Table 3). The prospects for *Brown Coal* reflect those of brown-coal electricity generation with an allowance for greater efficiency of fuel use in power generation.

The manufacturing industries with the weakest growth prospects (other than petroleum) are *Textiles, clothing and footwear (TCF)* (industry 10), *Wood and Paper products* (industry 11) and *Cement* (industry 15). The TCF industries are restricted by import competition, as are the wood and paper industries. Cement is restricted by adverse shifts in technology in the construction sector.

Most of the remaining industries have close to average growth prospects.[2] Two offsetting forces - strong export growth and increasing import competition, affect *Food, beverages and tobacco* (industry 9). The same forces strongly influence the prospects of *Chemical products (excl petrol)* (industry 12), *Motor vehicles and parts* (19) and *Other manufacturing* (20). The prospects of *Non-metal construction materials excl Cement* (industry 14) are governed by those for *Construction services* (industry 29). These, in turn, reflect our macro

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2 Recall from Table 1 that the average annual rate of GDP growth is 3.2 per cent.

assumptions for investment (Table 1). *Wholesale, retail trade and accommodation* (industry 30) sells widely throughout the economy. Its growth rate, though, is slightly below that of GDP because of adverse taste and technology shifts against its products (Table 2). *Dwelling ownership* (industry 35), *Public services* (36) and *Other services* (37) are very consumption oriented. Accordingly, their prospects are explained by appropriate weighted averages of the growth rates assumed for private and public consumption (Table 1). Strong reliance on public consumption explains the relatively poor prospects for *Public services*.

For most industries, especially services, regional differences in growth forecasts mirror regional differences in the GSP forecasts in Table 1. Hence, growth tends to be relatively strong in Western Australia and Queensland and relatively weak in Tasmania and South Australia.

Actual Projections for Sub-state Regions

Relative to the state GSP forecasts, Gross Regional Product (GRP) forecasts cover a wider band. This is largely because there are greater differences between the industrial mixes of the sub-state regions than between the industrial mixes of the states. At the top of the regional rankings (Figure 2) are Perth (Western Australia) and Peel (Western Australia), with forecast average annual growth rates of 4.7 and 4.6 per cent. The economic activity of these regions is heavily concentrated in service industries, which have especially strong growth prospects in Western Australia (see Table 4). At the opposite end of the rankings is Eyre (SA), with an average annual growth rate of 1.8 per cent. This region has a heavy concentration (around 30 per cent) in slow-growing wheat-sheep agriculture.

Mining and agricultural concen-trations explain the extreme rankings of several regions within each state. In Western Australia, which has an average growth rate of 4.0 per cent, Goldfields, Wheatbelt, Mid West and Pilbara have relatively poor prospects. Goldfields owes its low position to weak prospects for gold mining. Relatively poor prospects for broadacre agriculture in Western Australia explain the weak prospects for Wheatbelt and Mid West. The Pilbara's low position is due, in part, to relatively poor prospects for oil and iron ore production.

The presence of mining does not prevent a region from doing relatively well compared to other regions in the same state, nor does its absence prevent a region from doing relatively poorly. Similarly, the absence of agriculture does not prevent a region from having a relatively low growth ranking, nor does its presence prevent a relatively high ranking. An example of a relatively highly ranked, non-mining region is Moreton (Qld) (which includes the Gold Coast tourism area). It is a strongly growing region because of tourism and population movements.

Examples of relatively lowly ranked mining regions are East Gippsland (Vic), due to dwindling Bass Strait oil and gas supplies, and Mersey-Lyell (Tas), due to declining production from the local non-ferrous mine. An example of an agricultural region with relatively good prospects is Far North (Qld). The share of *Agriculture* in its aggregate value added is 10 per cent, compared with a Queensland share of less than 7 per cent. However the concentration of its activities in tourism and in the faster growing parts of agriculture (fruit and vegetables) is sufficient to give the region a high growth ranking within its state.

Mining and agriculture play almost no role in the economies of Australia's capital cities. As is apparent from Figure 2, these city regions achieve upper rankings compared with the non-urban regions in each state. As already noted, Perth ranks number 1 of all regions. Brisbane ranks number 9, with a growth potential almost equal to the fastest growing region in Queensland (Far North). Sydney (ranked 9), Melbourne (18), Adelaide (37) and Hobart (49) are the highest ranked regions in their states. Among the strengths of the capital cities are over-representations of fast growing service industries such as finance, insurance and communications.

To help us understand the results for real GRP, I can break down the difference between each sub-state region's growth rate and the corresponding state growth rate into the contributions attributable to each sector. In Table 5, I show such a decomposition for regions in Western Australia and Tasmania.

Western Australia Sub-state Regions

The regions with the top growth ranking in Western Australia are Perth and Peel. The regions with the weakest prospects are Wheatbelt, Goldfields-Esperance, and Mid West. The most obvious strengths of Perth are the absence of slow-growing agricultural and mining industries, and an over-representation of fast growing service industries (especially *Financial and business services*). Peel has a similar advantage to Perth in terms of under-representations of agriculture and mining. However, unlike Perth, Peel has an under-representation of financial and business service industries, which accounts for the large negative contribution made by that sector. Another weakness of Peel is an over-representation of black coal electricity generation, which has comparatively weak growth prospects.

Now consider the bottom ranked region in Western Australia, Goldfields-Esperance. It is over-represented in slow growing agriculture and mining, and is under-represented in most of the fast-growing service industries. For some industries, the forecast growth rate for Goldfields-Esperance is below the industry's forecast growth rate in Western Australia. This reflects population drift away from Kalgoorlie and towards Perth, and explains, for example, the large negative contributions made by *Trade, accommodation* and by *Dwelling ownership* (Table 5).

The major weakness of the Wheatbelt region is an over-representation in slow-growing agriculture.

Table 5: Industry Contributions to Deviations in Real Gross Regional Product Growth Rates: WA and TAS regions

	Industry	Perth	Peel	South West	Great South West	Wheatbelt	Gold-fields-Esperance	Mid West	Gascoyne	Pilbara	Kimberley	Greater Hobart	Southern	Northern	Mersey-Lyell
1	Agriculture	0.1858	0.1994	-0.0516	0.0797	-0.5300	-0.1545	-0.3928	0.0226	0.0240	0.0172	0.0233	-0.0425	-0.0047	-0.0083
2	Forestry	0.0008	-0.0020	0.0010	0.0012	-0.0003	0.0002	-0.0003	-0.0006	0.0003	0.0000	0.0064	-0.0127	-0.0028	-0.0009
3	Iron ore	0.0394	0.0516	-0.0053	-0.0214	0.0091	0.0121	0.0105	-0.0351	-0.3033	-0.0012	0.0023	0.0014	0.0024	-0.0041
4	Non-iron ore	0.1296	0.1346	0.0125	-0.0963	0.0136	-0.6996	-0.0930	-0.0590	-0.0029	-0.0020	0.0225	0.0305	0.0358	-0.0528
5	Black coal	0.0087	-0.0346	0.0124	-0.0047	0.0016	-0.0029	0.0023	-0.0078	0.0022	-0.0003	0.0021	0.0013	-0.0057	0.0011
6	Crude oil	-0.0013	0.0296	-0.0022	-0.0142	0.0041	0.0042	0.0042	-0.0209	-0.0344	-0.0009	0.0000	0.0000	0.0000	0.0000
7	Natural gas	-0.0012	0.0224	-0.0017	-0.0107	0.0032	0.0034	0.0033	-0.0158	-0.0244	-0.0007	0.0000	0.0000	0.0000	0.0000
8	Brown coal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	Food, beverages and tobacco	0.0017	-0.0057	0.0030	0.0125	-0.0005	0.0031	0.0015	-0.0042	0.0042	-0.0003	0.0031	0.0000	0.0027	-0.0051
10	Textiles, clothing and footwear	-0.0018	0.0062	-0.0005	0.0013	0.0013	0.0016	0.0016	-0.0055	0.0016	-0.0002	-0.0015	0.0023	0.0022	-0.0009
11	Wood and paper products	-0.0075	0.0012	0.0045	-0.0137	0.0097	0.0121	0.0095	-0.0298	0.0125	-0.0014	0.0374	0.0075	-0.0136	-0.0323
12	Chemical products excl. Petrol	0.0020	0.0219	-0.0089	0.0115	-0.0129	0.0020	-0.0069	0.0179	-0.0148	0.0022	0.0018	0.0000	-0.0013	-0.0007
13	Petroleum products	-0.0008	0.0020	-0.0001	-0.0017	0.0008	0.0009	0.0008	-0.0027	-0.0002	-0.0001	0.0001	0.0001	0.0002	0.0001
14	Non-metal construction excl. Cement	-0.0014	0.0044	-0.0002	-0.0015	0.0011	0.0013	0.0003	0.0000	0.0007	-0.0002	-0.0031	0.0003	0.0009	0.0021
15	Cement	-0.0020	0.0065	-0.0007	-0.0027	0.0013	0.0010	0.0009	-0.0026	0.0013	-0.0002	0.0078	0.0048	0.0079	-0.0139
16	Iron and steel	-0.0064	-0.0084	0.0009	0.0035	-0.0017	-0.0020	-0.0017	0.0057	-0.0016	0.0002	-0.0149	-0.0092	-0.0161	-0.0082
17	Alumina and aluminium	0.0077	0.0101	0.0148	-0.0042	0.0021	0.0024	0.0020	-0.0069	0.0020	-0.0003	0.0060	0.0037	-0.0166	0.0033
18	Other metal products	0.0373	0.2042	0.0210	0.0602	-0.0348	-0.0207	-0.0311	0.0907	-0.0318	0.0047	-0.0004	-0.0016	0.0034	-0.0012
19	Motor vehicles and parts	0.0011	-0.0046	0.0004	-0.0019	-0.0008	-0.0013	-0.0010	0.0031	-0.0011	0.0001	0.0096	0.0067	-0.0260	0.0045
20	Other manufacturing	-0.0020	0.0069	-0.0006	-0.0029	0.0014	0.0015	0.0013	-0.0036	-0.0009	-0.0002	-0.0010	0.0031	0.0028	-0.0018
21	Electricity generation – black coal	0.0175	-0.1303	0.0214	-0.0095	0.0047	0.0054	0.0047	-0.0156	-0.0051	-0.0006	0.0000	0.0000	0.0000	0.0000
22	Electricity generation – brown coal	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Electricity generation – gas	0.0060	0.0078	-0.0008	-0.0032	-0.0113	-0.0060	-0.0078	-0.0053	-0.0154	-0.0002	0.0000	0.0000	0.0000	0.0000
24	Electricity generation – petrol prods	0.0001	-0.0011	0.0001	-0.0003	0.0000	0.0000	0.0001	-0.0007	-0.0002 0	.0000	0.0000	0.0000	0.0000	0.0000
25	Electricity generation – other	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0286	-0.0658	0.0270	-0.0255
26	Electricity supply	0.0014	0.0051	0.0027	0.0017	0.0008	0.0012	-0.0005	0.0057	0.0001	0.0000	-0.0053	-0.0061	0.0049	0.0038
27	Urban gas distribution	0.0007	-0.0010	0.0002	0.0011	-0.0006	-0.0005	-0.0003	0.0009	0.0000	0.0001	0.0008	0.0005	0.0009	0.0005
28	Water and sewerage services	0.0007	-0.0024	-0.0005	0.0022	-0.0021	0.0011	-0.0005	0.0032	-0.0005	0.0004	-0.0025	0.0067	-0.0008	0.0008
29	Construction services	0.0045	0.0449	0.0036	0.0094	-0.0103	-0.0011	-0.0017	-0.0032	-0.0011	0.0004	-0.0168	0.0069	0.0116	0.0043
30	Trade, accommodation	0.0326	0.0885	-0.0087	-0.0199	-0.0141	-0.1163	-0.0633	0.0410	-0.0628	0.0001	0.0336	-0.0119	0.0100	-0.0268
31	Road transport services	0.0002	0.0000	-0.0001	-0.0003	-0.0001	-0.0007	-0.0003	0.0003	-0.0001	0.0000	0.0006	-0.0002	-0.0003	-0.0004
32	Other transport services	0.0002	-0.0047	0.0012	0.0030	0.0009	0.0015	0.0006	-0.0030	0.0022	-0.0002	-0.1009	-0.1286	0.1094	0.0741
33	Communication services	0.0319	-0.0343	0.0164	0.0295	-0.0154	-0.0193	-0.0165	0.0356	-0.0252	0.0023	0.0377	-0.0165	-0.0141	-0.0207
34	Financial and business services	0.1518	-0.2042	0.0578	0.1919	-0.1112	-0.0903	-0.0867	0.2429	-0.1031	0.0116	0.0870	-0.0889	-0.0262	-0.0368
35	Dwelling ownership	0.0479	0.1749	0.0066	0.0298	-0.0579	-0.0949	-0.0524	0.0189	-0.0585	0.0005	0.0167	-0.0057	-0.0015	-0.0168
36	Public services	-0.0012	0.0012	-0.0022	-0.0030	0.0001	0.0017	-0.0003	0.0014	0.0016	0.0015	-0.0519	0.0291	0.0245	0.0242
37	Other services	0.0037	-0.0019	0.0018	0.0009	-0.0038	-0.0028	-0.0024	0.0059	-0.0033	-0.0005	0.0072	-0.0030	-0.0013	-0.0048
	Total deviations (GRP growth - GSP growth)	*0.6879*	*0.5883*	*0.0980*	*0.2274*	*-0.7519*	*-1.1561*	*-0.7160*	*0.2738*	*-0.6380*	*0.0316*	*0.1364*	*-0.2878*	*0.1155*	*-0.1433*

Almost 30 per cent of value added in this region is generated by wheat-sheep agriculture. In our regional calculation, we have assumed that this form of agricultural production grows significantly slower than agricultural production generally in Western Australia. This reflects the comparatively poor medium-term prospects for wool and grains production.

Of the other regions in Western Australia, the Mid West and the Pilbara have the poorest prospects (Table 5). The main negatives for the Mid West are over-representations of relatively slow growing *Agriculture* and *Non-iron ore*. The Pilbara suffers from an over-representation of slow-growing *Iron Ore*. All other regions have prospects slightly better than average. Kimberley's economy benefits from comparatively good prospects assumed for its agricultural industries, particularly those centred on the Ord river scheme. The Gascoyne and Great Southern regions benefit from being under-represented in slow-growing agriculture and mining and over-represented in comparatively fast-growing service industries. The South West has a mix of industries similar to the Western Australia-wide mix. Accordingly, most of the sectoral contributions to its growth deviation are small.

Tasmania Sub-state Regions

Greater Hobart and Northern have above average prospects in Tasmania, while Southern and Mersey-Lyell have below average prospects. The strengths of Greater Hobart are an over-representation of comparatively fast-growing service industries, especially *Communication services* and *Financial and business services,* and an under-representation of agriculture and mining. Offsetting these is the disadvantage from having an under-representation in the rapidly growing *Other transport services*. This industry covers water transport services, air transport services and other transport services. It has especially strong growth prospects in Tasmania, reflecting our forecast of strong growth in trade between Tasmania and the mainland. Another large disadvantage for Hobart is an over-representation of *Public services*, which have comparatively poor prospects.

The main strength of the Northern economy is its over-concentration in *Other transport services*. Another strength is an under-representation of slow growing *Electricity generation - other* (hydro).

Notable weaknesses of the Mersey-Lyell economy are an over-representation of *Wood and Paper products*, which is comparatively slow growing in Tasmania, and the poor prospects for *Non-iron ore* production in that region. For many industries, the forecast growth rate for Mersey-Lyell is below the industry's forecast growth rate for Tasmania, reflecting population drift away from that region to Hobart and the mainland. This explains the negative contributions for many of the service sectors.

Adverse population movements also explain the negative contributions made by service sectors to Southern's growth differential. Other weaknesses of Southern include an over-representation of hydro electricity generation and an under-representation of *Other transport services*.

Conclusions

In this paper, I have reviewed the method for producing detailed forecasts of the industrial and regional structures of the economy using the MMRF-Green model. The forecasts include inputs from specialist forecasters and from experts in commodity markets. They also include detailed scenarios on changes in industry technologies and household tastes, without which realistic *structural* forecasts would be impossible.

The role of MMRF-Green is to translate these inputs into forecasts for variables that are relevant to organisations with responsibilities that require them to take views about the future regional structure of the economy. We think that detailed regional forecasts will be of interest to a wide range of groups, including

- financial institutions concerned with lending to businesses and investment advice;
- multi-industry, multi-regional businesses concerned with the allocation of their resources;
- educational and training authorities concerned with anticipating changes in the regional allocation of the labour force;
- employer and employee groups concerned with reaching agreements compatible with satisfactory profits and employment opportunities in their industries and regions; and
- governments concerned with the development of Australia's public infrastructure.
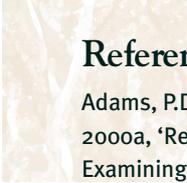
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