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Forecasting Changes in Income Distribution: an Applied General Equilibrium Approach

by

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The Centre of Policy Studies (COPS) is a research centre at Monash University devoted to quantitative analysis of issues relevant to Australian economic policy. The Impact Project is a cooperative venture between the Australian Federal Government and Monash University, La Trobe University, and the Australian National University. During the three years January 1993 to December 1995 COPS and Impact will operate as a single unit at Monash University with the task of constructing a new economy-wide policy model to be known as *MONASH*. This initiative is supported by the Industry Commission on behalf of the Commonwealth Government, and by several other sponsors. The views expressed herein do not necessarily represent those of any sponsor or government.

ABSTRACT

Forecasts of changes in income distribution that rely entirely on modelling changes in the personal characteristics of individuals, as is typically the case in microsimulation studies, have a limited capacity to take into account developments that affect individuals only indirectly through the operation of markets. Most individuals receive most of their income in the form of factor payments (i.e., wages and profits). Hence a distributional forecast will be improved if it is informed by a well constructed forecast of changes in factor markets and their associated commodity markets. This paper is primarily concerned with the development of techniques for applying an existing set of detailed economic forecasts for the Australian economy to the question of distribution. The centrepiece of the forcasting system is a large dynamic applied general equilibrium model, the MONASH model. Via the markets incorporated in the MONASH model, a range of otherwise intractable information is brought to bear on a forecast of income changes over the period 1990-91 to 1996-97. The range includes detailed scenarios on macroeconomic developments in both the world and domestic economies, changes in the foreign demand for Australia's exports, changes in the world prices of all internationally traded goods, changes in protection, changes in indirect taxes and primary factor saving technical change. To generate the income forecasts, projections of changes in factor prices and factor employment levels from the MONASH model are interfaced with micro data from the 1990 Australian income suvey. The key to the interface is an allocation of the ownership of the relevant factors among the individuals identified in the survey. Results are reported for sixty income groups differentiated by region and size of income.

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1. Introduction

Changes in the incomes of individuals or groups of individuals over time depend on changes in their personal characteristics (such as age and marital status) and changes in the characteristics (such as wage rates and employment levels) of the economy of which they form a part. The forecasting of changes in these two general categories has tended to be undertaken independently, the first by analysts trained in demography and the second by analysts trained in economics. However, in recent times, demographers have begun to link their dynamic microsimulation models with simple macroeconomic models, and economists have begun to employ microsimulation techniques to enhance the range of their forecasting models in the area of distribution. This paper describes a contribution to the development of such an integrated forecasting capacity, beginning with a well established forecasting system for the Australian economy.[1]

A forecast of changes in the distribution of income can be regarded as consisting of the construction and linking together of four major components:

- a forecast of changes in factor incomes (i.e., wages and profits) over time;
- a description of the distribution of factor incomes between individuals to give personal incomes at a particular point of time;
- a description of the redistribution of personal incomes between individuals at a particular point of time, particulary via the tax/benefit system; and
- a forecast of changes in the individuals' ownership of factors, tax liabilities and eligibility for benefits over time.

The first of these components is the province of economic modelling, and a wide variety of relevant models are already in existence. We shall rely on the extensive set of economic forecasts for the period 1990-91 to 1996-97 recently released by the Centre of Policy Studies at Monash University in association with the commercial forecasting agency Syntec Economic Services. The forecasts are derived, in part, by solving a large dynamic applied

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* A previous version of this paper was presented to the International Association for Research in Income and Wealth, Special Conference on Microsimulation and Public Policy, Canberra, December 1993.

1 For a recent Australian example of an integrated distributional model beginning from the demographic side, see Antcliff (1993).

general equilibrium (AGE) model of the Australian economy, the MONASH model. As far as distributional analysis is concerned, an important feature of the AGE approach is that it explicitly models the determination of factor incomes on an industry basis. In the case of MONASH, the level of disaggregation is quite high, with 112 industries being identified in each of six regions. This industry dimension matters firstly because different individuals earn their factor incomes in different industries, so variations in factor incomes across industries translate into variations in personal incomes. Less obviously, the industry disaggregation allows *a priori* structural information to be built into the forecasts, information which by its nature has a differential impact on industries and hence on personal incomes. This kind of influence on distribution would go unaccounted for in an aggregate macroeconomic model.

The second and third components are associated with static microsimulation models and are based on unit record data from a sample survey recording the amounts of income individuals obtained from a range of sources in a particular year. Such models have been used extensively to analyse the impact or "morning after" effect of changes in the tax/benefit system. By assumption, the changes do not affect factor incomes so there is no need to employ an economic model. So popular have the static microsimulation models become that, by sheer weight of analyses, distribution is threatening to turn into a branch of tax policy. The difficulty with analysing changes in other government policies, changes that would appear on the surface to be no less important or interesting, is that their effect on personal incomes is mediated by their effect on factor incomes. While suitable economic models are available for analysing the latter, methods for linking them with microsimulation models are not well developed.

The same considerations apply to forecasting as to policy analysis, and the primary concern of the present paper is the establishment of appropriate linkages between the economic and microsimulation models. The key ingredient is not so much a good description of income sources of individuals as a good description of their ownership of the factors of production (or, more correctly, the employed factors). Information on ownership is not generally included in an income survey and hence it must be inferred from the survey data and other sources.

The fourth component is associated with dynamic microsimulation models. The demographic techniques characteristic of the genre are particularly well suited for handling changes in income that result from an individual's position in the life cycle. Examples are changes in one's eligibilty for various government benefits, changes in one's full-time wage rate as work experience is accumulated, and changes in one's labour force participation as children are born and raised. Given the focus of the paper, only the most rudimentary attention is paid to the demographic ageing of the population over the forecast period. However, it is envisaged that the methods developed here will be adapted to link the MONASH model with a properly specified dynamic microsimulation model in due course.

Two other limitations of the present study are worth noting. The first concerns the role of financial assets, which can be divided conceptually into bonds (which earn interest), equities (which earn dividends and capital gains) and cash (which earns nothing)[2]. A comprehensive treatment would require the incorportation of markets for financial assets in the MONASH model, and the specification of the savings behaviour and asset portfolios of all the individuals in the income survey. Our treatment is much simpler than this and ignores capital gains altogether, i.e., the effect on distribution of the difference between corporate retained earnings and dividend payments in each year is ignored. The other limitation concerns implicit incomes such as rent on owner-occupied housing, interest on life and superannuation funds, and payment in kind for household production. With the exception of the first, these income sources are also ignored. However, the MONASH modelling framework is quite flexible and more sophisticated treatments could be adopted at a later date[3].

In the balance of the paper, the economic forecasts are discussed in somewhat more detail in section 2, both in terms of methodology and results. The same kind of discussion is then repeated for the distributional forecasts in section 3. Section 4 contains concluding remarks.

2. The Economic Forecasts

2.1 Methodology

The MONASH model is a development of the well known ORANI model (Dixon et al., 1982) which has been widely used for policy analysis in Australia by economists located in the universities, the government and the private sector.[4] The original version of ORANI was only suitable for comparative-static analysis, but the more recent ORANI-F version (Horridge et al., 1993) includes enough accumulation relations to allow the average annual growth rates of macroeconomic and structural variables to be forecast over the medium run (Adams et al., 1991 and 1992). In MONASH, the dynamic specification has been refined so that year-by-year time paths for the variables are now provided (Adams et al., 1993). The MONASH model is the centrepiece of a forecasting system that currently proceeds in four stages.

The fundamental data requirement for an applied general equilibrium model is an input-out table. In Australia, input-output tables are produced by the Australian Bureau of Statistics (ABS) with a lag of about five years. Hence the first stage in the forecasting process is to update the latest available input-output data to the base year for the forecast (from 1986-87 to 1990-91, in the present case) via an ORANI simulation. The method (Dixon and McDonald, 1993) results in updated data which are consistent with all relevant published data about the structure of the economy in 1990-91.

The second stage begins with the determination of the values of the exogenous variables of the MONASH model over the forecast period. Forecasts for most exogenous macreconomic

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2 Note that, in our stylized representation of the forecasting process, dividends and capital gains comprise that part of profits retained by corporate enterprises, and interest payments and receipts comprise a redistribution of personal incomes.

3 For example, Lim and Meagher (1988) have added markets for financial assets to an antecedent of the MONASH model.

4 Reviews of applications of the ORANI model can be found in Parmenter and Meagher (1985), Powell and Lawson (1989), Vincent (1989) and Powell (1991).

variables are provided by Syntec Economic Services (1993). Syntec believes there will be a slow recovery in the world economy, with inreased activity in the United States eventually stimulating recovery in Japan and Europe. As demand picks up, the prices of primary commodities will gradually strengthen, leading to an improvement in Australia's terms of trade and an average GDP growth of about 2.5 per cent per annum. The share of international trade in economic activity is forecast to increase sharply, with aggregate imports and aggregate exports both growing at nearly three times the rate of GDP.

For the exogenous structural variables, the main sources of information are the Australian Bureau of Agricultural and Resource Economics, the Bureau of Tourism Research and the Industry Commission. According to forecasts by these institutions, industries in the transport and recreation sectors will benefit from continued strong growth in international tourism, while heavily protected industries (particularly automotive vehicles, textiles, clothing and footwear) will suffer from the Australian government's ongoing program of phased reductions in barriers against manufactured imports.

To complete the second stage, the implications of these exogenous forecasts for a range of structural variables are computed using the MONASH model. The endogenous variables include outputs by commodity and industry, employment and capital formation by industry, and all components of domestic usage (i.e., usage by firms, households,and the government) by commodity for imports and domestically produced goods.

At stage three, the ORANI regional equation system ORES[5] is used to convert economy-wide forecasts into regional forecasts for the Australian States. In this calculation, a commodity is classified as national if it is traded extensively across State boundaries, or as local if each State satisfies most of its own demand for the commodity. For national commodities, ORES allocates the Australia-wide output growth rate to each State. For local commodities, ORES imposes regional-balance constraints which generate regional income multipliers. This treatment implies that, if a State is specialized in the production of national commodities with relatively rapid output growth rates, the producers of local commodities in that State will experience growth rates above the Australia-wide average.

The final stage of the forecasting process converts growth rates in employment by industry at the national and regional levels into growth rates in employment by occupation. The forecasts are produced at the major, minor and unit group levels of the Australian Standard Classification of Occupations, the last of which identifies 283 different occupations. The database for the occupational disaggregation facility is a cross classification of employment by industry, occupation and State compiled from the 1986 Census of Population and Housing.

2.2 Results

Table 1 shows results of the forecasting process for a selection of variables relevant for the calculation of changes in the distribution of income. Athough the process generates forecasts separately for each year between 1990/91 and 1996/87, only average annual rates of growth will be considered in this paper. The results have also been heavily aggregated

[5] The ORES model is described in Dixon et al., 1982, Chapter 6.

Table 1. MONASH Forecasts: Average Annual Growth Rates, 1990-91 to 1996-97, Per Cent

Variable	New South Wales	Victoria	Queens -land	South Australia	Western Australia	Tas- mania	Australia
Output by industry:							
1 Agriculture, forestry, fishing and hunting	1.59	1.85	2.01	1.72	1.62	1.40	1.75
2 Mining	3.84	3.65	3.78	3.68	3.13	3.57	3.55
3 Manufacturing	1.29	0.92	1.73	1.13	1.78	1.35	1.25
4 Public utilities	2.43	2.33	2.51	2.36	2.47	2.42	2.42
5 Construction	0.42	0.53	1.16	-0.48	1.33	0.04	0.58
6 Wholesale and retail trade	2.89	2.71	3.06	2.77	3.04	2.77	2.87
7 Transport, storage and communication	3.31	3.14	3.39	3.10	3.43	3.36	3.27
8 Finance, property business services	2.60	2.29	2.83	2.40	2.78	2.56	2.56
9 Ownership of dwellings	2.37	2.10	2.60	2.28	2.34	2.25	2.32
10 Public administration and defence	2.80	2.80	2.80	2.80	2.78	2.76	2.80
11 Community services	3.13	2.06	3.18	2.08	3.12	3.13	2.75
12 Recreation, personal and other services	3.25	3.00	3.38	3.05	3.22	3.19	3.18
13 All industries	2.45	2.22	2.72	2.16	2.63	2.39	2.46
Employment by industry:							
1 Agriculture, forestry, fishing and hunting	0.44	1.02	1.23	0.76	0.46	0.41	0.78
2 Mining	4.28	2.02	3.54	1.27	0.67	0.47	2.44
3 Manufacturing	0.06	-0.50	0.53	-0.01	0.74	-0.22	-0.04
4 Public utilities	1.37	1.24	1.43	1.27	1.39	1.36	1.34
5 Construction	-0.53	-0.40	0.26	-1.49	0.47	-0.92	-0.35
6 Wholesale and retail trade	1.48	1.31	1.65	1.37	1.62	1.37	1.47
7 Transport, storage and communication	2.15	2.00	2.25	1.98	2.31	2.37	2.14
8 Finance, property business services	-0.01	-0.31	0.23	-0.19	0.22	-0.02	-0.04
9 Ownership of dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 Public administration and defence	1.89	1.89	1.89	1.89	1.89	1.88	1.89
11 Community services	2.23	1.14	2.28	1.17	2.22	2.23	1.84
12 Recreation, personal and other services	2.71	2.46	2.82	2.50	2.65	2.63	2.63
13 All industries	1.16	0.73	1.48	0.87	1.37	1.16	1.09

... continued overleaf

Table 1 continued

Variable	New South Wales	Victoria	Queens-land	South Australia	Western Australia	Tas-mania	Australia
Gross operating surplus by industry:							
1 Agriculture, forestry, fishing and hunting	3.94	4.47	4.81	4.40	4.27	3.89	4.36
2 Mining	6.33	6.11	7.44	6.06	5.40	5.54	6.28
3 Manufacturing	3.24	4.85	5.71	5.05	5.05	4.54	4.43
4 Public utilities	5.82	6.46	6.74	6.47	6.38	6.40	6.31
5 Construction	2.35	3.08	3.73	2.24	3.58	2.55	2.93
6 Wholesale and retail trade	2.98	4.88	5.42	4.87	4.54	4.50	4.22
7 Transport, storage and communication	5.25	6.12	6.50	6.08	6.07	6.12	5.84
8 Finance, property business services	3.38	4.16	4.76	4.23	4.31	4.12	3.88
9 Ownership of dwellings	4.68	4.41	4.91	4.59	4.64	4.56	4.62
10 Public administration and defence	7.44	7.44	7.44	7.44	7.44	7.44	7.44
11 Community services	4.00	4.80	5.79	4.79	5.10	5.18	4.65
12 Recreation, personal and other services	4.11	5.95	6.51	5.94	5.56	5.65	5.30
13 All industries	3.99	4.87	5.59	4.80	4.87	4.63	4.66
Employment by occupation:							
1 Managers and administrators	1.00	0.94	1.34	0.84	1.08	0.88	1.03
2 Professionals	1.55	0.80	1.77	1.01	1.66	1.60	1.32
3 Para-professionals	1.72	1.08	1.87	1.11	1.69	1.92	1.53
4 Tradespersons	0.70	0.37	1.16	0.60	1.17	0.65	0.73
5 Clerks	0.98	0.68	1.39	0.79	1.16	1.15	0.98
6 Salespersons and personal service workers	1.55	1.02	1.67	1.27	1.60	1.54	1.41
7 Plant and machine operators, and drivers	1.14	0.53	1.42	0.81	1.40	0.86	1.02
8 Labourers and related workers	1.05	0.59	1.53	0.74	1.42	0.95	1.03
9 All occupations	1.16	0.73	1.48	0.87	1.37	1.16	1.09
Other variables:							
Nominal wage rate							3.66
Consumer price index							2.96

across industries and occupations to bring the classifications into line with those employed in the income survey. This involves a significant loss in distributional information, but it is one that cannot be avoided with the current mismatch between the levels of detail in the survey and in the other data sources used by the MONASH model. In the ORES regional classification, and hence in Table 1, the Australian Capital Territory is included with New South Wales and the Northern Territory is included with South Australia.

Consider first the economy-wide forecasts of output by industry. According to the table, the output of the *Mining* industry in Australia is forecast to grow at an average rate of 3.55 per cent per annum over the forecast period. This is the largest growth rate of all the industries shown and is 1.09 percentage points more than the growth in GDP. The *Mining* industry is distinguished by the large share of its output exported to foreign countries and its good growth prospects derive from the forecast increase in international trade as a share of GDP. Two other industries , namely *Transport, storage and communication* and *Recreation, personal and other services*, have growth rates of more than 3 per cent per annum. The first benefits from substantial linkages with international trade (both imorts and exports in this case), while the second owes its favoured position to the strong growth forecast for international tourism. The prognosis for *Construction*, which has the slowest growth, is crucially affected by excess stocks of commercial buildings that accumulated in Australia's major cities during the 1980's. It is worth noting here that *Residential construction* is forecast to grow at the quite healthy rate of 3.27 per cent per annum but, as far as the distributional analysis is concerned, this potentially important distinction between the two types of construction activity is lost in the industry aggregation. The *Manufacturing* industry does relatively poorly because it suffers most from the planned reductions in protection.

Now consider the relative output growth rates across the regions. Queensland and Western Australia do well because they are relatively specialized in national industries which grow rapidly, especially *Mining*. Victoria and South Australia, on the other hand, are relatively specialized in the slow growing *Manufacturing* industry and have correspondingly poor prospects. Recall that local industries are stimulated in regions with rapidly growing national industries. As a result of this multiplier effect, all industries in Queensland (at least at the level of aggegation shown in Table 1) have growth rates greater than or equal to the national average. Similarly most industries in Victoria and South Australia grow more slowly than the national average.

The second panel in Table 1 shows forecasts of employment growth by industry. The output and employment forecasts are related by production functions which determine the increase in output associated with given increases in inputs (capital or labour) and a given rate of technical progress. In the present forecasts, factor saving technical change of one per cent per annum is assumed. Hence, when output growth rates are converted into employment growth rates, the first one per cent is absorbed by technical change and the latter rates tend to be less than the former. The change in capital inputs depends critically on whether an industry was under- or over-capitalized in the base period, i.e., on whether the rate of return in the industry was above or below the average across industries. An industry with a relatively high rate of return attracts investment and enjoys a relatively high rate of capital growth. For a given rate of output growth and technical change, this implies a relatively low rate of employment growth. Conversely, an industry which is relatively over-capitalized in the base period will tend to have a relatively high rate of growth in employment. It is these differences in the degree of capitalization that are primarily responsible for the differences in the industry rankings for output and employment growth.

The third panel shows the forecast changes in gross operating surplus (GOS), an industry's GOS being the product of its capital input and its gross rate of profit[6]. These changes are generally larger than the output growth rates because they are expressed in nominal, rather than real, terms. The rate of inflation incorporated in the GOS forecasts is approximately equal to the forecast for the consumer price index given at the bottom of the table.

The forecasts of employment by occupation shown in the fourth panel are obtained by first converting the MONASH employment forecasts for 112 industries into forecasts for 283 occupations region-by-region using Census data, and then aggregating across occupations. Averaging occurs at both stages of the process with, to take the case of Victoria as an example, the range of the forecasts being reduced first from (-7.91 : +7.74) to (-6.69 : +3.44) and then to (+0.37 : +1.08). The narrowness of the final range again illustrates the limitations imposed on distributional analysis by the classifications of industries and occupations adopted in the income survey.

The final panel of Table 1 shows forecasts for the nominal wage rate and the consumer price index. Given the highly centralized system of wage fixation that has traditionally existed in Australia, the MONASH model currently assumes any variations over time in relative industry-specific and/or region-specific average wage rates may be safely ignored in comparison with variations in the economy-wide average wage rate. Recently there has been some pressure for a shift enterprise bargaining which, if it comes to fruition, may require a change in this modelling strategy. For the time being, however, all nominal wage rates are taken to move together and hence only a single forecast is required.

3. The Distributional Forecasts

3.1 Methodology

The distributional forecasts rely primarily on data from the 1990 Survey of Income and Housing Costs and Amenities (or IHS data, for short), which shows the amounts of income received from various sources in 1989-90 by about thirty thousand persons. The income sources fall into five broad categories: wages and salaries, income from unincorporated enterprises, property income, government benefits and other income. Using population weights published as part of the survey , the individual income profiles can be combined to form profiles for various broad income groups of interest. In this paper we consider sixty such groups differentiated by size of income and region of residence. In defining the groups, income recipients are first classified into deciles and then, for each decile in turn, into six State regional groups· Following Kakwani (1986), income deciles are defined on

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6 In practice, part of GOS represents the wages of owner-operators. In the simulations reported here, wages are imputed to owner-operators in rural, construction, retail trade, transport, insurance and health industries and modelled as a return to labour rather than as a return to capital.

equivalent adult incomes which are derived from net (i.e., post tax) incomes as follows. The number N_E of equivalent adults in an income unit[7] is given by

$$N_E = 1.0 + 0.7(N_1 - 1) + 0.7N_2 + 0.4N_3 ,$$

where N_1 is the number of adults, N_2 is the number of dependent children aged 18 to 20, and N_3 is the number of dependent children aged less than 18. All adults in the income unit are then allocated an income equal to their combined net incomes in the survey year divided by N_E.

The distributional model draws on the MONASH forecasts in Table 1 to compute the implied growth rates in the incomes of the selected groups. The composition of a group remains unchanged during the forecast period, and its income is not affected by the ageing of its members. While population growth occurs, there is no change in its demographic makeup; the population is assumed to simply expand. As an exception to this rule, the working age population grows slightly slower than the total population, and the supply of labour and the supply of capital in unincorporated enterprises are taken to move with the former rather than the latter. In the remainder of this subsection, the methods used to determine the income growth rates are discussed for each of the five broad categories of income in turn.

(a) Wages, salaries and supplements

For labour incomes, the computation involves seven steps.

(i) Among the 30,444 respondents to the income survey, 10,849 did not work at all during 1989-90. All persons belonging to the latter group, including 461 who collected some unemployment benefits during the year, are assumed to remain outside the employed labour force during the forecast period.

(ii) The respondents who did work at some time during 1989-90 are divided first into seven groups according to their region of residence. The last of these groups, representing residents of the Northern Territory and the Australian Capital Territory, is excluded from the distributional calculation as the regions concerned are not separately identified in the ORES model[8]. Each of the remaining regional groups is then divided into 90 subgroups differentiated by size of income and occupation, the latter choice reflecting the view that occupation is more important than industry in determining a person's employment opportunities. Let

$$L_{msg} \quad (m = 1,..,9 ; s = 1,..,6 ; g = 1,..,10)$$

represent the number of persons with occupation m who reside in region s and have an income in decile g.

7 An income unit consists of parents and their dependent children or a single person.

8 In Table 1, the Northern Territory is included with South Australia and the Australian Capital Territory with New South Wales, introducing a small discrepancy between the IHS and ORES regional classifications. This discrepancy is ignored.

(iii) For the included respondents, the income survey records the number of weeks during 1989-90 that each was employed, unemployed or not in the labour force. Hence the average labour force status over the year, measured in person-years, can be calculated separately for the 540 groups defined at step (ii), i.e.,

$$L_{msg} = E_{msg} + U_{msg} + N_{msg} \quad (m = 1,..,9\,;\, s = 1,..,6\,;\, g = 1,..,10)\,,$$

where the E's represent the numbers of employed persons, the U's represent the numbers unemployed and the N's represent the numbers not in the labour force.

(iv) The forecast average annual rates of growth of employment by occupation and region are available from Table 1. The IHS occupational classification includes the psuedo-occupation *Defence forces* whereas the MONASH model does not. The forecast for *Defence forces* is obtained by taking a weighted sum of the industry employment growth rates (also shown in Table 1) using weights from the income survey.[9]

(v) According to Syntec, the working age population will grow at an average annual rate of 1.41 per cent during the forecast period. Hence, given the assumption of a uniformly expanding workforce, 1.41 percentage points of the forecast growth of 1.72 per cent per annum for *Para-professionals* in New South Wales, for example, is absorbed by population growth. In other words, employment of the pre-existing population of *Para-professionals* in New South Wales is forecast to increase by only 0.31 per cent per annum. Changes in employment are calulated in this way for each of the 54 groups identified by occupation and region (the OR groups). Note that employment actually contracts for many of these groups.

(vi) An increase in the number of employed persons belonging to an OR group must be matched by a corresponding decrease in the number of persons without a job. Such changes are distributed between unemployed persons and persons not in the labour force on the assumption that the ratio of the number of unemployed to the number without a job remains constant for each group. That is,

$$\Sigma_g U_{msg} \;/\; \Sigma_g (U_{msg} + N_{msg}) = R1_{ms} \quad (m = 1,..,9\,;\, s = 1,..,6)\,,$$

where the R1's represent the 1989-90 ratios. This assumption amounts to the specification of implicit labour supply functions for the individuals involved. It turns out that the forecast growth rates are not sufficient to exhaust the stocks of potential workers in any of the OR groups.

(vii) The changes in labour force status by occupation and region must now be allocated across income groups. If employment for an OR group increases, it is assumed that the

9 Note that the MONASH industry classification shown in Table 1 does not correspond precisely to the classification adopted in the income survey. In particular, in the survey, industry 8 is split into *Transport and storage* and *Commumication*, profits earned in industry 9 *Ownership of dwellings* are treated separately under the heading rent, and no unincorporated enterprises operate in industry 4 *Public utilities* or in industry 10 *Public administration and defence*.

number of persons without a job decreases in such a way that each income group maintains its base period share of unemployed persons and of persons not in the labour force, i.e., such that

$$U_{msg} \;/\; \Sigma_g U_{msg} = R2_{ms} \quad (m = 1,..,9\,;\, s = 1,..,6)$$

and

$$N_{msg} \;/\; \Sigma_g N_{msg} = R3_{ms} \quad (m = 1,..,9\,;\, s = 1,..,6)\,,$$

where the R2's and the R3's represent the relevant 1989-90 ratios. The distribution of employment between income groups is then determined as a residual. Thus, if no *Para-professionals* belonging to a particular income decile were without jobs in New South Wales in 1989-90, that income group does not participate in the 0.31 per cent average annual growth rate of employment for the OR group. If employment for an OR group decreases, it is assumed that each income group maintains its base period share of employed persons, i.e.,

$$E_{msg} \;/\; \Sigma_g E_{msg} = R4_{ms} \quad (m = 1,..,9\,;\, s = 1,..,6)\,,$$

and that unemployed persons account for a constant share of persons without a job for each income group, i.e.,

$$U_{msg} \;/\; (U_{msg} + N_{msg}) = R5_{msg} \quad (m = 1,..,9\,;\, s = 1,..,6\,;\, g = 1,..,10)\,.$$

Here the R's again represent the relevant 1989-90 ratios. The method is designed to ensure that, for each income group, the stock of persons in any labour force category is never exhausted. At the conclusion of these machinations, the average annual rates of change in the numbers of employed and unemployed persons by occupation, region and income decile, represented by

$$\hat{E}_{msg} \text{ and } \hat{U}_{msg} \quad (m = 1,..,9\,;\, s = 1,..,6\,;\, g = 1,..,10)\,,$$

respectively, are determined.

(viii) The rates of change in wages, salaries and supplements are then given by

$$\hat{W}_{msg} = \hat{E}_{msg} + \hat{W} \quad (m = 1,..,9\,;\, s = 1,..,6\,;\, g = 1,..,10)\,,$$

where $\hat{W}$ is the rate of change in the nominal wage rate. From Table 1, $\hat{W}$ is equal to 3.66 per cent per annum.

(b) Income from unincorporated enterprises

The computation for this category involves four steps.

(i) The income or net profit Y_n derived by the nth person in the income survey from the operation of an unincorporated enterprise can be written

$$Y_n = G_n - D_n - I_n ,$$

where G_n represents gross operating surplus or gross profit, D_n represents consumption of fixed capital or depreciation, and I_n represents interest payments. The equation can also be written as

$$y_n K_n = g_n K_n - d_n K_n - i_n r_n K_n ,$$

where K_n is the amount of capital owned by the nth person, y_n is the net rate of profit, g_n is the gross rate of profit, d_n is the rate of depreciation, i_n is the rate of interest and r_n is the debt-to-equity ratio. To prepare a database suitable for forecasting, we begin by assuming that the rate of depreciation, the rate of interest and the debt to equity ratio are the same for all unincorporated enterprises. Then

$$Y_n = y_n K_n = (g_n - \bar{d} - \bar{i}\,\bar{r}) K_n ,$$

i.e., the variations in Y_n between individuals recorded in the income survey arise only from variations in the amount of capital K_n they own and in the gross rate of profit g_n they earn on that capital.

(ii) Next, an estimate $\bar{y}$ of the average net rate of profit in 1989-90 is deduced from the range of rates published by the ABS (1991a). Given $\bar{y}$ and the total values of net profits, gross profits, depreciation and interest payments obtained from the national accounts (ABS, 1991), the average amount of capital $\bar{K}$ employed in unincorporated enterprises can be determined, along with $\bar{d}$, $\bar{i}$ and $\bar{r}$.

(iii) The net profit rates y_n implicit in the income survey are then assumed to be drawn from a normal distribution with mean $\bar{y}$ and standard deviation $\bar{y}$ (i.e.,with about two thirds of the observations in the range zero to $2\bar{y}$), and with no y_n greater than 2.5 times $\bar{y}$. Apart from the mean, these parameters are chosen as a matter of economic judgement. The capital stocks K_n are assumed to be drawn from a normal distribution with mean $\bar{K}$ and standard deviation $3\bar{K}$, with no K_n less than zero. This time the standard deviation is chosen to cover the range of the Y_n's reported in the income survey. Twenty thousand values of the product $y_n K_n$ are then selected at random and the nth individual is assigned the capital stock corresponding to the product that most closely approximates value of Y_n reported by that individual.

(iv) The forecast average annual rate of growth of the gross operating surplus earned by all enterprises operating in a particular industry and region is available from Table 1. Incorporated and unincorporated enterprises are not distinguished in the MONASH model, so the same growth rate is assumed to apply to both types. As for employment, 1.41 percentage points of the growth in gross operating surplus earned by unincorporated enterprises are accounted for by new operators, and the growth rate for pre-existing operators is correspondingly reduced. After making this adjustment, Table 1 yields the average annual growth rate (in per cent)

$$100\Delta G_{js} \;/\; G_{js} ,$$

where

$$G_{js} = g_{js} K_{js}$$

is the total gross profit earned by all pre-existing unincorporated enterprises in industry j in region s (or in industy js for short). Now the average annual change in total net profit is given by

$$\Delta Y_{js} = \Delta G_{js} - (\bar{d} + \bar{i}\,\bar{r})\,\Delta K_{js} ,$$

where ΔK_{js} is the average annual change in the amount of capital owned by the pre-existing enterprises. Thus we have enough information to determine the average annual rate of growth $\hat{Y}_{js}$ in the total income earned by all pre-existing unincorporated enterprises in industry js. However, the growth rate $\hat{Y}_{js}$ cannot be simply assigned to all the individual enterprises operating in that industy because typically some made profits and some made losses in the base period (i.e., in 1989-90). If $\hat{Y}_{js}$ is positive, the incomes of the corresponding individual enterprises ought to increase. But the application of a positive rate of growth to the income of an enterprise originally making losses would increase its losses and reduce its income. Consequently we define the average annual change

$$\Delta y_{js} = \Delta Y_{js} \;/\; K_{js}$$

in net profit expressed as a share of base period capital in industy js. The average annual rate of growth (in per cent) in the income of an individual enterprise n operating in that industry is then given by

$$\hat{Y}_n = 100\Delta y_{js} K_n \;/\; Y_n .$$

3(c) Property income

Property income consists of interest, dividends and rent, with the last category being further subdivided into landlord rent and imputed rent on owner-occupied dwellings. We begin by describing the method for imputing rent, a method that contains the following three steps for most of the income units involved.

(i) The IDS data records the value K_n of an owner-occupied dwelling and the amount M_n of any outstanding debt incurred in its purchase for each income unit n in the survey. If income unit n is not an owner-occupier, both variables have zero values. Hence the total value of the owner-occupied stock of dwellngs is given by[10]

$$K = \Sigma_n K_n$$

and and the total value of associated debt by

$$M = \Sigma_n M_n .$$

(ii) Values for total gross operating surplus G, total depreciation D, total interest payments I and total net income Y associated with owner-occuped dwellings are available from the national accounts (ABS, 1991b). Hence we can obtain the corresponding average rates $\bar{g}$, $\bar{d}$, $\bar{i}$ and $\bar{y}$ from

$$\bar{g} = G / K, \text{ etc.}$$

(iii) The average values $\bar{g}$, $\bar{d}$, and $\bar{i}$ are then assumed to apply to all owner-occupiers, so that the rent imputed to the nth income unit is given by

$$Y_n = (\bar{g} - \bar{d}) K_n - \bar{i} M_n .$$

If the income unit contains two parents, the rent is allocated equally between them.

Some of the survey respondents who own their dwellings outright, i.e., for whom M_n is zero, did not reply to the question concerning the value of their dewllings. For these income units, the following alternative procedure is adopted.

The IHS data contains information on the amount of gross rent paid by income units to private landlords. From this data, the average gross rent $G1_{ij}$ by type of dwelling i (separate house, terrace house, flat, etc.) and number of bedrooms j is computed, along with the average rent $G2_k$ by region k. In this regional classification, the capital city in each State is identified separately from the rest of the State. An owner-occupier of a dwelling of type ijk is then imputed the gross rent

[10] Strictly speaking these should be weighted sums, but we shall abstract from this complication.

$$G_{ijk} = G1_{ij} \times G2_k \; / \; G2 \; ,$$

where G2 is the average for all regions. Assuming the same values of g, d, and i apply as for other owner-occupiers, the corresponding values of the housing stock K and net rent Y can determined for the income units involved.

For landlords, rental income is given directly in the income survey and the task is to impute ownership of the housing stock. We begin by assuming that the debt-to-equity ratios r_n of the landlords are drawn from a normal distribution with the same mean and standard deviation as the distribution for owner-occupiers. Values of r_n equal in number to the number of landlords are chosen at random from this distribution and ranked in descending order. The landlord with the largest loss in the base period is then assigned the first value, i.e., the largest debt ratio. The same values of g, d and i are assumed to apply to landlords and owner-occupiers, yielding the value

$$K_n = Y_n \; / \; (\bar{g} - \bar{d} - \bar{i} \, r_n)$$

for the housing stock rented out by the nth income unit.

At this stage, the growth rates in the rental incomes of both landlords and owner-occupiers can be calculated in the same manner as the rates for incomes from unincorporated enterprises. In this case, the calculations are based on the rate of growth in the gross operating surplus of the *Ownership of dwellings* industry in Table 1.

The two remaining categories of property income, namely, interest and dividends, are handled much more simply. Interest income is assumed to grow at the same rate as the yield on 5-year Treasury bonds, as forecast by Syntec. The growth rate for dividend income is governed by the economy-wide growth in gross operating surplus available from Table 1.

(d) Government benefits

Government benefits are divided into four types: unemployment benefits, other taxable benefits, non-taxable benefits and benefits from overseas. Income from unemployment benefits for a selected group depends on the number of benefit recipients and the size of the benefit per recipient. The latter is assumed to be indexed to the nation consumer price index while the rate of change in the former is obtained as a by-product of the calculation for wages and salaries already described. For other taxable benefits and non-taxable benefits, the number of recipients is assumed to remain constant and the benefit per recipient to vary with the national CPI. Benefits from overseas governments are assumed to be unaffected by developments in the domestic economy. Clearly, the treatment of this part of the distributional calculation would be greatly enhanced if it were informed by a dynamic microsimulation model.

(e) Other income

The final category, i.e., other income, is divided into taxable and non-taxable components, and includes superannuation, alimony and income provided by relatives. Both components are assumed to remain constant.

Summing over the five broad categories gives gross income. Taxable income is obtained by subtracting from gross income the imputed rent of owner-occupiers, non-taxable government benefits and non-taxable other income. The total amount of income tax paid is taken from the national accounts, while its distribution is determined by IHS data. In calculating the growth rates in net incomes, the average rate of income tax for each group is assumed to remain constant.

3.2 Results

Table 2 presents our results for the sixty income groups. The most striking feature of the table is the strong growth in income for the lowest decile in every region. The relevant characteristic of that decile is that it contains many income recipients who reported large losses, either from landlord rent or from unincorporated enterprises, in 1989-90. Our method for imputing ownership allocates large amounts of capital to persons who made large losses or large profits in the base period, that is, large amounts of capital are allocated to persons at either end of the income scale. From Table 3, the tenth income decile ends up with 25 per cent of the capital stock in unincorporated enterprises, but the first decile (with more than 20 per cent) gets significantly more than any of the other eight. The ownership of the housing stock follows the income scale much more closely, but the first decile still surpasses the second and third. The general thrust of the economic forecasts is for a mild recovery, and persons with large holdings of capital are in a position to benefit most in absolute terms. This can be seen clearly in Table 4, which sets out the contributions to net income growth made by each of the five broad income categories. Of the 8.88 per cent per annum growth recorded nationally for the first decile in Table 2, 5.02 percentage points are accounted for by income from unincorporated enterprises.

At first glance, the results in Table 4 do not appear to reflect the large holdings of unincorporated capital by persons in the top decile, income from this source accounting for only 1.06 percentage points of net income growth. However, from the average income figures in Table 2, this represents $432 per income recipient on average, while the 5.02 percentage points for the first decile represents only $283 per recipient. Thus income from unincorporated enterprises increases by comparable absolute amounts for the two income classes, the large difference in the contributions to net income growth arising from the large difference in the two income bases.

If the first decile is excluded, the forecast changes in income across deciles are mildly progressive on balance. From Table 4, this general result can be partly attributed to the influence of government benefits, but the other income sources also contribute in a non-systematic way. Note that, compared with the seventh, eighth and ninth deciles, the tenth decile relies much less heavily on wages and salaries (and much more heavily on property

Table 2. Nominal Net Income by Decile Class and Region

Variable	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Australia
Average income, 1989-90, $							
1 First income decile	5725	5061	5529	6332	6268	6021	5632
2 Second income decile	12015	12112	12194	11981	12252	12074	12092
3 Third income decile	13398	13231	13109	12672	13032	12527	13164
4 Fourth income decile	14410	14306	14178	14191	14371	13697	14292
5 Fifth income decile	15903	16040	15225	15465	16145	15940	15808
6 Sixth income decile	18007	18190	17837	18036	17642	17823	17986
7 Seventh income decile	20704	20727	20210	20160	20407	20534	20550
8 Eighth income decile	23250	22962	22368	22576	22281	21717	22839
9 Ninth income decile	27141	26627	25458	25372	26412	25619	26494
10 Tenth income decile	40688	40498	41362	40043	41818	36914	40726
11 All income deciles	19712	19265	17971	18067	19173	17340	19029
Average annual income growth 1990-91 to 1996-97, per cent							
1 First income decile	8.29	8.87	10.37	8.33	9.11	7.49	8.88
2 Second income decile	3.73	3.67	4.34	4.12	3.99	3.76	3.90
3 Third income decile	3.75	3.65	4.05	3.49	4.01	3.46	3.78
4 Fourth income decile	3.62	3.64	3.99	3.48	3.83	3.57	3.70
5 Fifth income decile	3.72	3.32	3.72	3.33	4.03	3.84	3.62
6 Sixth income decile	3.64	3.37	4.05	3.32	3.74	3.45	3.62
7 Seventh income decile	3.61	3.32	4.06	3.22	3.80	3.32	3.58
8 Eighth income decile	3.45	3.07	3.89	3.41	3.87	3.65	3.46
9 Ninth income decile	3.52	3.22	3.79	3.36	3.93	3.60	3.50
10 Tenth income decile	3.10	2.70	3.55	2.83	3.31	3.34	3.07
11 All income deciles	3.60	3.33	4.08	3.47	3.91	3.66	3.63

Table 3. Ownership of Capital and Housing Stocks by Decile Class and Region, 1989-90, Per Cent

Variable	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Australia
Capital stock, unincorporated enterprises							
1 First income decile	6.87	4.99	4.40	1.88	2.13	0.47	20.73
2 Second income decile	1.08	1.52	1.21	0.92	0.58	0.16	5.47
3 Third income decile	1.81	1.51	1.06	0.43	0.50	0.10	5.41
4 Fourth income decile	0.97	1.66	0.70	0.62	0.52	0.16	4.63
5 Fifth income decile	1.48	1.39	0.88	0.47	0.76	0.25	5.23
6 Sixth income decile	2.75	2.18	1.84	0.77	0.64	0.22	8.40
7 Seventh income decile	2.21	1.63	1.68	0.59	0.75	0.22	7.09
8 Eighth income decile	2.08	1.26	1.13	0.91	1.18	0.33	6.89
9 Ninth income decile	3.99	2.75	1.57	1.09	1.51	0.24	11.15
10 Tenth income decile	9.02	4.94	5.45	2.19	2.90	0.50	25.01
11 All income deciles	32.24	23.84	19.94	9.87	11.47	2.64	100.00
Housing stock							
1 First income decile	2.60	1.71	0.95	0.37	0.52	0.10	6.24
2 Second income decile	1.73	1.36	0.88	0.42	0.37	0.10	4.88
3 Third income decile	1.96	1.49	1.05	0.37	0.30	0.13	5.29
4 Fourth income decile	2.50	2.21	1.25	0.58	0.71	0.15	7.41
5 Fifth income decile	3.83	2.44	1.41	0.51	0.73	0.20	9.12
6 Sixth income decile	4.00	2.38	1.67	0.50	0.62	0.17	9.34
7 Seventh income decile	4.12	2.49	1.22	0.54	0.76	0.16	9.28
8 Eighth income decile	4.29	2.60	1.54	0.62	0.95	0.19	10.18
9 Ninth income decile	5.45	3.53	1.56	0.59	1.00	0.17	12.29
10 Tenth income decile	12.10	6.02	3.55	1.77	2.25	0.26	25.96
11 All income deciles	42.58	26.22	15.08	6.26	8.22	1.63	100.00

Table 4. Income Components Expressed as Shares of 1989-90 Net Income, Australia, Per Cent

Variable	Income Decile										
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	All
Components of net income, 1989-90											
1 Wages, salaries and supplements	69.4	61.5	58.1	61.7	68.9	78.8	93.9	100.0	100.1	78.6	81.1
2 Income from unincorporated enterprises	-9.0	7.0	6.4	5.0	5.9	9.6	7.3	7.4	10.9	18.9	9.7
3 Property income	4.3	4.0	4.6	8.8	11.1	12.0	10.7	10.7	12.9	32.9	14.8
4 Government benefits	48.7	37.0	40.4	34.9	25.8	15.1	8.6	3.9	2.1	1.1	14.6
5 Other income	2.1	1.3	1.1	2.2	2.6	2.4	1.4	1.5	1.5	2.0	1.8
6 Gross income	115.4	110.7	110.6	112.6	114.3	117.8	121.9	123.4	127.6	133.5	122.1
7 Income taxes	15.4	10.7	10.6	12.6	14.3	17.8	21.9	23.4	27.6	33.5	22.1
8 Net income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Contributions of components to income growth, 1990-91 to 1996-97											
1 Wages, salaries and supplements	2.31	2.02	1.91	2.01	2.25	2.53	3.02	3.21	3.23	2.56	2.63
2 Income from unincorporated enterprises	5.02	0.66	0.57	0.49	0.52	0.73	0.57	0.48	0.69	1.06	0.83
3 Property income	1.29	0.46	0.43	0.54	0.54	0.47	0.41	0.38	0.38	0.31	0.44
4 Government benefits	1.48	1.13	1.22	1.07	0.77	0.47	0.28	0.12	0.07	0.03	0.45
5 Other income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 Gross income	10.10	4.27	4.14	4.11	4.07	4.20	4.28	4.19	4.37	3.98	4.34
7 Income taxes	1.21	0.37	0.37	0.42	0.46	0.57	0.70	0.73	0.87	0.91	0.71
8 Net income	8.88	3.90	3.78	3.70	3.62	3.62	3.58	3.46	3.50	3.07	3.63

income) as an income source. Hence the contribution of wages and salaries to net income growth is relatively low for the tenth income decile, a deficiency that is not made up for by the contribution of property income. Table 5 reveals that interest receipts are responsible for the prominent role of property income for the tenth decile. Hence the relatively poor forecast for that decile (compared with the the seventh, eighth and ninth) can be traced to the low interest environment predicted for the forecast period.

Our earlier discussion of the relative prospects of the regions carries over to the distributional results of Table 2, with Queensland and Western Australia doing generally better than the national average and Victoria and South Australia doing generally worse. In the more disaggregated results of Table 6, the role the forecasts for gross operating surplus from Table 1 is evident in the regional pattern of the contributions to net income growth of income from unincorporated enterprises.

4. Concluding Remarks

Most individuals receive most of their income in the form of factor payments (i.e., wages and profits). A forecast of changes in the distribution of income, therefore, will be improved if it is informed by a well constructed forecast of changes in factor markets and their associated commodity markets. Forecasts that rely entirely on modelling changes in the personal characteristics of individuals, as is typically the case in microsimulation studies, have a limited capacity to take into account developments that affect individuals only indirectly through the operation of markets. Furthermore, for purposes of distribution, the level of disaggregation at which the markets are modelled is important. Particular individuals derive their factor incomes from particular industries and occupations, and the prospects for different industries and occupations may deviate quite widely from the economy's general macroeconomic prospects.

This paper has been primarily concerned with the development of techniques for applying an existing set of detailed economic forecasts for the Australian economy to the question of income distribution. The centrepiece of the forcasting system is a large dynamic applied general equilibrium model, the MONASH model. Via the markets incorporated in the MONASH model, a range of otherwise intractable information is brought to bear on a forecast of the incomes of various groups of individuals over the period 1990-91 to 1996-97. The range includes detailed scenarios on macroeconomic developments in both the world and domestic economies, changes in the foreign demand for Australia's exports, changes in the world prices of all internationally traded goods, changes in protection, changes in indirect taxes and primary factor saving technical change. To generate the income forecasts, projections of changes in factor prices and factor employment levels from the MONASH model are interfaced with micro data from the 1990 Australian income suvey. The key to the interface is an allocation of the ownership of the relevant factors among the individuals identified in the survey.

Results are reported for sixty income groups differentiated by region and size of income. They suggest that the change in distribution over the forecast period is likely to be mildly progressive. They also highlight the role played by the business cycle in determing the membership of the various income deciles over time. During recessions, the lowest income decile contains a significant

Table 5. Income Components Expressed as Shares of 1989/90 Net Income, Per Cent Tenth Income Decile, Australia

Income Component	Base Share	Projected Share	Projected Change
Wages, salaries and supplements -			
Managers and administrators	20.130	20.774	0.644
Professionals	23.591	24.401	0.810
Para-professionals	5.618	5.813	0.195
Tradespersons	7.147	7.343	0.197
Clerks	8.933	9.202	0.269
Salespersons and personal service workers	6.185	6.404	0.219
Plant and machine operators, and drivers	3.542	3.659	0.117
Labourers and related workers	3.445	3.559	0.114
Defence forces	0.000	0.000	0.000
All occupations	78.591	81.155	2.564
Income from unincorporated enterprises -			
Agriculture, forestry, fishing and hunting	5.009	5.342	0.333
Mining	0.282	0.306	0.024
Manufacturing	0.536	0.557	0.021
Construction	1.460	1.506	0.046
Wholesale and retail trade	3.479	3.660	0.181
Transport and storage	1.145	1.251	0.105
Communication	0.123	0.132	0.008
Finance, property and business services	5.704	5.994	0.290
Community services	0.773	0.808	0.035
Recreation, personal and other services	0.357	0.378	0.021
All industries	18.868	19.933	1.065
Property income -			
Dividends	1.431	1.498	0.066
Imputed rent on owner occupied housing	3.722	4.178	0.456
Landlord rent	0.858	1.136	0.278
Interest	26.923	26.436	-0.487
All property income	32.935	33.248	0.313
Government benefits -			
Unemployment benefits	0.014	0.016	0.002
Other taxable benefits	0.545	0.562	0.016
Non-taxable benefits	0.515	0.530	0.015
Benefits from overseas governments	0.064	0.064	0.000
All government benefits	1.138	1.171	0.033
Other income -			
Taxable income n.e.c.	1.961	1.961	0.000
Non-taxable income n.e.c.	0.035	0.035	0.000
All other income	1.996	1.996	0.000
Gross income	133.528	137.504	3.976
Income taxes	33.528	34.437	0.909
Net income	100.000	103.067	3.067

Number of persons in income group: 1177873
Average net income in 1989/90: $40726

Table 6. Income Components Expressed as Shares of 1989-90 Net Income, All Income Deciles, Per Cent

Variable	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Australia
Components of net income, 1989-90							
1 Wages, salaries and supplements	81.7	85.6	76.7	74.9	80.5	76.3	81.1
2 Income from unincorporated enterprises	9.3	8.1	10.8	11.0	12.7	9.9	9.7
3 Property income	16.0	14.7	14.9	13.7	13.0	11.2	14.8
4 Government benefits	14.2	12.6	16.6	17.6	14.2	20.2	14.6
5 Other income	1.7	2.0	1.5	2.4	1.8	1.7	1.8
6 Gross income	122.8	123.1	120.4	119.5	122.2	119.4	122.1
7 Income taxes	22.8	23.1	20.4	19.5	22.2	19.4	22.1
8 Net income	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Contributions of components to income growth, 1990-91 to 1996-97							
1 Wages, salaries and supplements	2.72	2.45	2.78	2.28	2.86	2.53	2.63
2 Income from unincorporated enterprises	0.63	0.75	1.14	0.99	1.08	0.88	0.83
3 Property income	0.54	0.41	0.44	0.26	0.35	0.27	0.44
4 Government benefits	0.43	0.41	0.48	0.54	0.41	0.63	0.45
5 Other income	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 Gross income	4.32	4.01	4.85	4.08	4.71	4.32	4.34
7 Income taxes	0.71	0.68	0.76	0.61	0.80	0.66	0.71
8 Net income	3.60	3.33	4.08	3.47	3.91	3.66	3.63

number of individuals who own large amounts of capital and suffer large losses. When the economy picks up, and the return to capital increases, these individuals benefit more than those who own little or no capital, and hence they move rapidly up through the income deciles. Clearly, this circumstance should be borne in mind when determining social policies on the basis of income data from surveys carried out during recession years such as 1990.

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