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IMPACT is an economic and demographic research project conducted by Commonwealth Government agencies in association with the Faculty of Economics and Commerce at The University of Melbourne and the School of Economics at La Trobe University.

Paper presented to the

Australian Population Association Conference,
October 31 to November 2, 1982,
Canberra

DEMOGRAPHIC AND ECONOMIC INFLUENCES ON THE SIZE AND COMPOSITION OF THE AUSTRALIAN LABOUR FORCE, 1980 - 2000

by

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General Paper No. G-44 Melbourne June 1983

The views expressed in this paper do not necessarily reflect the opinions of the participating agencies, nor of the Commonwealth government

ISBN 0 642 52378 9

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plausible scenarios of future economic and demographic growth - - characterised broadly as low, medium and high. Given the estimated sensitivities of fertility, marriage, divorce and female labour force participation to changes in economic and demographic conditions, we are able, in Section 3 of the paper, to analyse what these scenarios imply for the future population and labour force in Australia.

DEMOGRAPHIC AND ECONOMIC INFLUENCES ON THE SIZE AND COMPOSITION OF THE AUSTRALIAN LABOUR FORCE, 1980 - 2000

by

Dennis Sams and Pamela Williams

1. INTRODUCTION

The evolution of the size and demographic composition of the Australian labour force is influenced by both changes in demographic behaviour and in the economic environment. At the IMPACT Project,¹ we have developed an economic-demographic model of population and labour force which is designed, inter alia, to track the evolution through time of the age, sex, and marital status composition of the Australian population and labour force. Elsewhere (Sams and Williams (1982)), we have described the Population Projection Facility as follows:

"The population projection facility is designed to provide, within a tightly integrated framework, annual projections of the Australian population disaggregated by sex, age and marital status. A high level of disaggregation is maintained for all population stocks and demographic flows, such as deaths, migration and marital status change, and the facility ensures that strict accounting identities are maintained between all

population stocks and flows. But this facility has not been developed simply to provide alternative demographic projections using conventional demographic techniques. It extends these techniques by integrating them with an econometric model of fertility, marriage and divorce which allows these demographic events to be influenced by changing economic and social conditions. As part of this econometric model, the facility also incorporates a set of equations for the projection of female labour force participation which determines the labour force participation rates of women in a simultaneous and consistent framework with the level of fertility, marriage and divorce."

This Facility is outlined briefly in Appendix 1 and further details can be found in Sams and Williams (1982) and elsewhere.²

The analysis of future influences on the Australian labour force presented in this paper is based on a set of projections produced with the IMPACT Population Projection Facility. In developing this Facility, we have attempted to capture explicitly the important influences on labour force activity and the linkages between demographic behaviour, labour force participation and the economic environment. Our principal interest here is to outline the significance of each of these influences on the determination of the size and composition of the Australian labour force and to investigate the sensitivity of our projections to variations in selected scenarios of economic and demographic conditions. In choosing these scenarios, we have not attempted to forecast the economic and demographic future of Australia. We have adopted realistic scenarios and

Weighted first marriages, weighted nuptial confinements and children per married female are all simultaneously determined outputs of the Facility, which are fed back into the econometric model. For all three projections, weighted first marriages per thousand married females increase over the projection period from 42.8 in 1980/81 to (49.7, 52.4, 52.0) in the (low, medium, high) projections in 2000/01. In 1980/81, weighted nuptial confinements were 101.73 per thousand married females, and in the low and medium projections they increase steadily to 112.25 and 106.80, respectively, in 2000/01. In the high projection, however, the higher economic growth has the effect of reducing weighted nuptial confinements slightly to 101.39 per thousand married females by 2000/01. The cumulative effect of changing marriage, divorce and fertility behaviour over the projection period results in a decline in children per married female from 1.09 in 1980/81 to (0.98, 0.95, 0.93) in the (low, medium, high) projections by 2000/01.

The indicator of demand for female labour is measured as the ratio of total employment of males and females to the male labour force. Since the male labour force and the unemployment rate are already specified in the economic scenario, the demand for female labour must be simultaneously determined from these values and the equations explaining female labour force participation. The demand for female labour so determined grows over the projection period from 1.50 in 1980/81 to (1.51, 1.61, 1.71) in the (low, medium, high) projections by 2000/01.

The exogenous scenarios outlined above are not an attempt to forecast what will happen in the future; they simply represent three

return to the high growth economy of the 1960's. Naturally, more optimistic scenarios could have been applied if desired.

The real male hourly wage rate has been assumed to grow at the same rate as real GDP per head and the female/male relative hourly wage rate is assumed to move towards unity by 1990/91 and remain at that level thereafter. Consequently, the real female hourly wage rate grows slightly faster than the growth in real GDP per head up until 1990/91 in each scenario. Social welfare payments (that is, the real old age and invalid pension and the real widows' pension) are assumed to grow at the same rate as real GDP per head.

In all three scenarios, the index of female educational attainment and the education participation rate of 15 to 24 year old unmarried females are both assumed to rise logistically to long term maxima of 40.0 per cent, with the latter rising at a faster rate. Finally, the oral contraceptive usage rate, which has been approximately constant in recent years, is assumed in all three scenarios to remain constant throughout the projection period.

The simultaneous inputs to the model

The simultaneous inputs to the econometric model are determined by the assumptions made earlier for the demographic and economic scenarios and/or by the outputs from the Facility. The infant mortality rate is determined directly from the assumptions made for mortality in the demographic scenario. Thus, in all three projections, the infant mortality rate is assumed to fall by 1.5 per cent per year.

analysed sensible variations in them, but the projections presented are conditional projections subject to these imposed scenarios. Others could easily specify different scenarios³ and suggest variations which we have not considered.

In the next section, we review demographic and economic influences on the Australian labour force and the attempts made at the IMPACT Project to quantify these influences and incorporate them into a Facility for the projection of population and labour force. Section 3 reports the results of three such projections of population and labour force, subject to imposed scenarios characterized by low, medium and high economic growth. Concluding remarks are contained in the final section.

2. DEMOGRAPHIC AND ECONOMIC INFLUENCES ON THE AUSTRALIAN LABOUR FORCE

Analysis of the changing size and composition of the labour force is aided by separating out changes in the numbers of persons in disaggregated demographic groups within the population and the rate at which individuals within these demographic groups participate in the labour force. The former is influenced predominantly by demographic factors, whilst the latter is influenced largely by changing economic and social conditions. In this section, we analyse very briefly some of the major demographic changes which have influenced the Australian labour force over the past three decades. We also analyse the economic and social influences which have impinged upon the likelihood that individuals in any given group will enter and remain in the labour force, making use of the IMPACT Facility's econometric model of fertility, marriage, divorce and female labour force participation which has quantified many of the important influences on female participation rates.

Demographic Influences

Between 1950 and 1980, Australia's population grew from 8.3 million to 14.7 million - an average annual increase of 1.93 per cent. Over the same period, the labour force grew from 3.5 million to 6.6 million - an average annual increase of 2.19 per cent. Thus the majority of labour force growth over this period can be attributed to the growth in the total population, with a smaller contribution deriving from increases in labour force activity. Changes in the age and marital status structure of the population also influenced labour force growth. For instance, over this period, the adult population grew by 2.00 per cent per year, whilst the working age (15 to 64 years) population grew by 1.92 per cent per

around 87,500 in 1980/81 to around 115,500 in 2000/01. The sex, age and marital status disaggregation of net migration is determined by using the average distribution of permanent arrivals and departures over the period 1976 to 1978, with a small adjustment to ensure consistency between the numbers of married male and female migrants. Death rates for each sex/age/marital status group were assumed to decline by 1.5 per cent per year to 2000/01. Given that the population and its sex/age/marital status distribution will vary over time and between the three projections, the number of deaths grows from 108,650 for all three projections in 1980/81 to between 144,500 in the low projection and 144,000 in the high projection in 2000/01.

The economic scenarios

The economic scenarios generally vary between the three projections, a major exception being that the labour force participation rates for males are assumed to have equivalent future values in all three projections. In the past, male labour force behaviour has been relatively insensitive to small changes in economic conditions, so such an assumption should not be crucial. The assumed scenario for male labour force participation rates are discussed in Section 3 of the paper.

The three economic scenarios can be best characterised by the assumptions regarding the growth in real Gross Domestic Product per head and the choice of the long term unemployment rate. In the (low, medium, high) growth scenario, real GDP per head grows at (0.0, 1.0, 2.0) per cent per year, while the unemployment rate is (6.0, 4.0, 2.0) per cent after 1990/91. These scenarios are quite pessimistic and do not indicate a

TABLE A1 : SUMMARY OF THE DEMOGRAPHIC AND ECONOMIC SCENARIOS AND THE SIMULTANEOUS INPUTS TO THE ECONOMETRIC MODEL

Variables ^{a,b}	1980/81 ^c	1990/91 ^d			2000/01 ^d		
		Low	Medium	High	Low	Medium	High
<u>Demographic scenario</u>							
- net numbers of international migrants	87515		101502			115488	
- crude migration rate (per thousand)	5.94	5.99	5.99	5.99	5.95	5.96	5.97
- number of deaths	108650	125363	125270	125184	144494	144263	144061
- crude death rate (per thousand)	7.38	7.40	7.39	7.39	7.45	7.45	7.45
<u>Economic scenario</u>							
- real gross domestic product per head	2762	2735	3051	3401	2735	3371	4145
- real female hourly wage rate	1.41	1.50	1.67	1.87	1.50	1.85	2.27
- female/male relative hourly wage rate	0.93		1.00			1.00	
- unemployment rate	5.63	6.00	4.00	2.00	6.00	4.00	2.00
- real old age pension	51.10	50.59	56.44	62.90	50.59	62.35	76.68
- real widows' pension	45.96	45.50	50.76	56.58	45.50	56.08	68.96
- index of female educational attainment	31.91		35.53			37.65	
- education participation rate of 15-24 year old unmarried females	30.81		37.13			39.21	
- oral contraceptive usage rate	24.00		24.00			24.00	
<u>Simultaneous inputs to model</u>							
- infant mortality rate	10.91		9.38			8.07	
- weighted first marriages per thousand married females	42.8	47.8	50.2	52.3	49.7	52.4	52.0
- weighted nuptial confinements per thousand married females	101.73	105.86	104.02	102.18	112.25	106.80	101.39
- children per married female	1.09	0.99	0.98	0.97	0.98	0.95	0.93
- indicator of demand for female labour	1.50	1.51	1.58	1.65	1.51	1.61	1.71

a. For a listing of sources and a detailed description of these variables see Brooks (1981).

b. All monetary variables are converted to real terms and expressed in constant 1966/67 Australian dollars.

c. As all variables were projected forwards from known data in 1979/80, there are some minor variations between the values for each scenario in 1980/81 which have not been reported.

d. Where values are quoted only for the medium scenario, the same values apply for all three scenarios.

year. Thus the below average rate of growth in numbers of children was counteracted by the above average growth in numbers of older persons, such that the population of working age increased slightly slower than the population and 0.21 percentage points slower than the labour force. As shown in Figure 1, the labour force participation rate for the adult population as a whole increased from 57.2 per cent to 60.3 per cent over this period, whilst the total participation rate for men declined from 90.1 to 77.1 per cent and that for women increased from 25.3 to 33.7 per cent. In particular, the participation rate for married women increased by 33.8 percentage points to reach 43.8 per cent in 1980 while that for unmarried women declined by 6.0 percentage points to 46.4 per cent. Thus, whereas in 1950 married women formed 5.6 per cent of the labour force, by 1980 they formed 22.3 per cent. This growth in the married female labour force occurred despite the relatively slower growth in the number of married women (at an annual average rate of 1.88 per cent) compared to the adult population (which grew at an annual average rate of 2.00 per cent).

Economic Influences

Economic and social variables may act directly in influencing a person's decision to enter or leave the labour force, or they may act indirectly via other actions which then influence labour force behaviour. For example, the female wage rate influences female labour force participation rates directly via the choices women make regarding time spent at labour and leisure (and, for married women, in household activity) and indirectly via the effects upon their fertility, marriage and divorce behaviour. Changes in fertility behaviour affect the likelihood that married women in their child-bearing years will enter the labour

The econometric model requires five other variables, four of which are actually simultaneous outputs of the Facility and the last of which is derived from a combination of the inputs and outputs of the Facility:

- the infant mortality rate
- weighted first marriages per married female
- weighted nuptial confinements per married female
- children per married female
- an indicator of demand for female labour.

These simultaneous inputs are determined within the Facility, providing a further link between demographic and economic behaviour.

The three projections of Australia's population and labour force presented in this paper (which are discussed more fully in Sams and Williams (1982)) employ three exogenous scenarios, corresponding to low, medium and high economic growth. To aid the reader, a summary of the values for each projection of the exogenous demographic and economic variables and of the simultaneously determined inputs to the econometric model in 1980/81, 1990/91 and 2000/01 are given in Table A1.

The demographic scenarios

For each of the three projections, the same demographic scenarios are used. Specifically, net annual international migration is assumed to maintain a level approximating 0.6 per cent of the population, such that the number of migrants for all three projections grows from

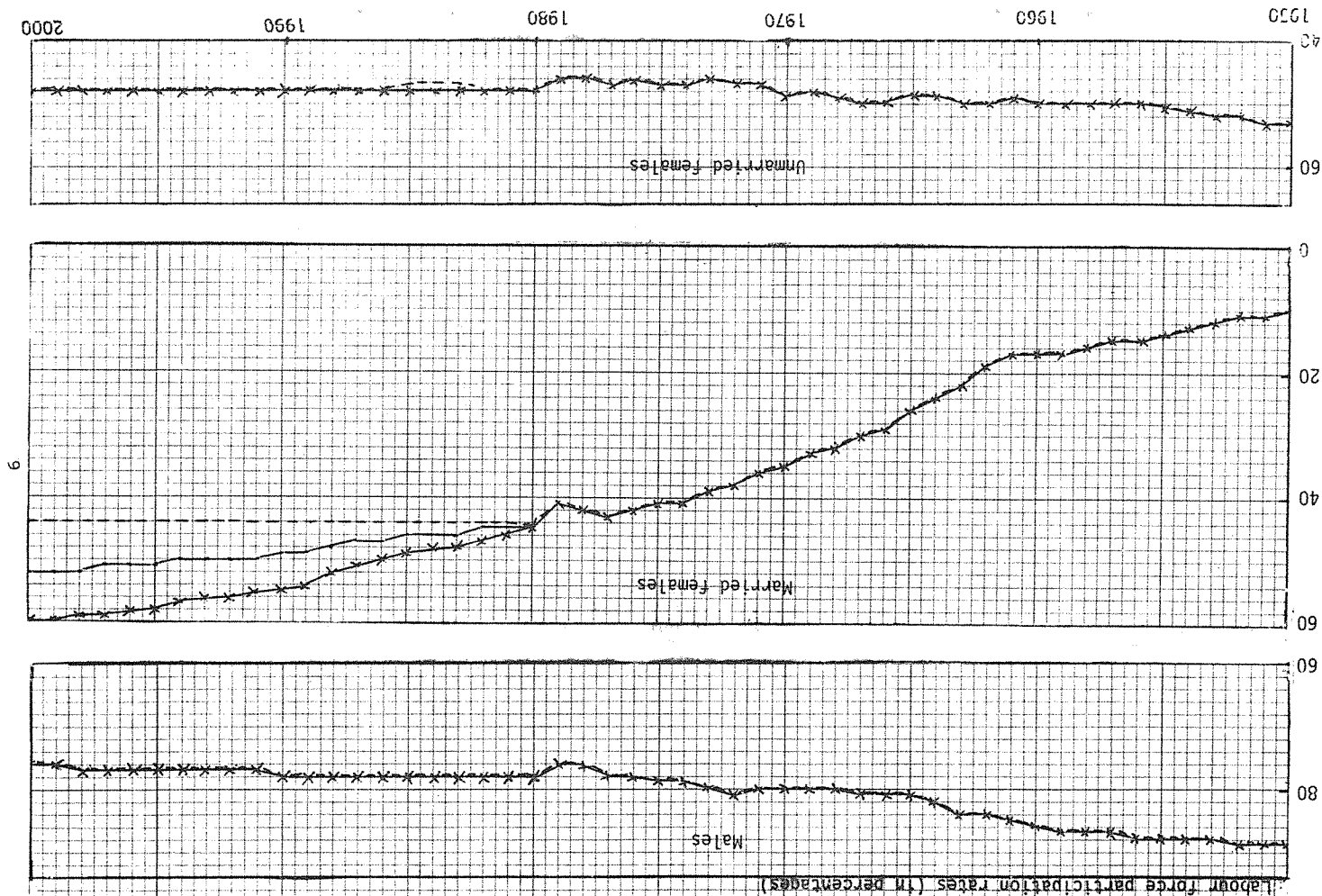
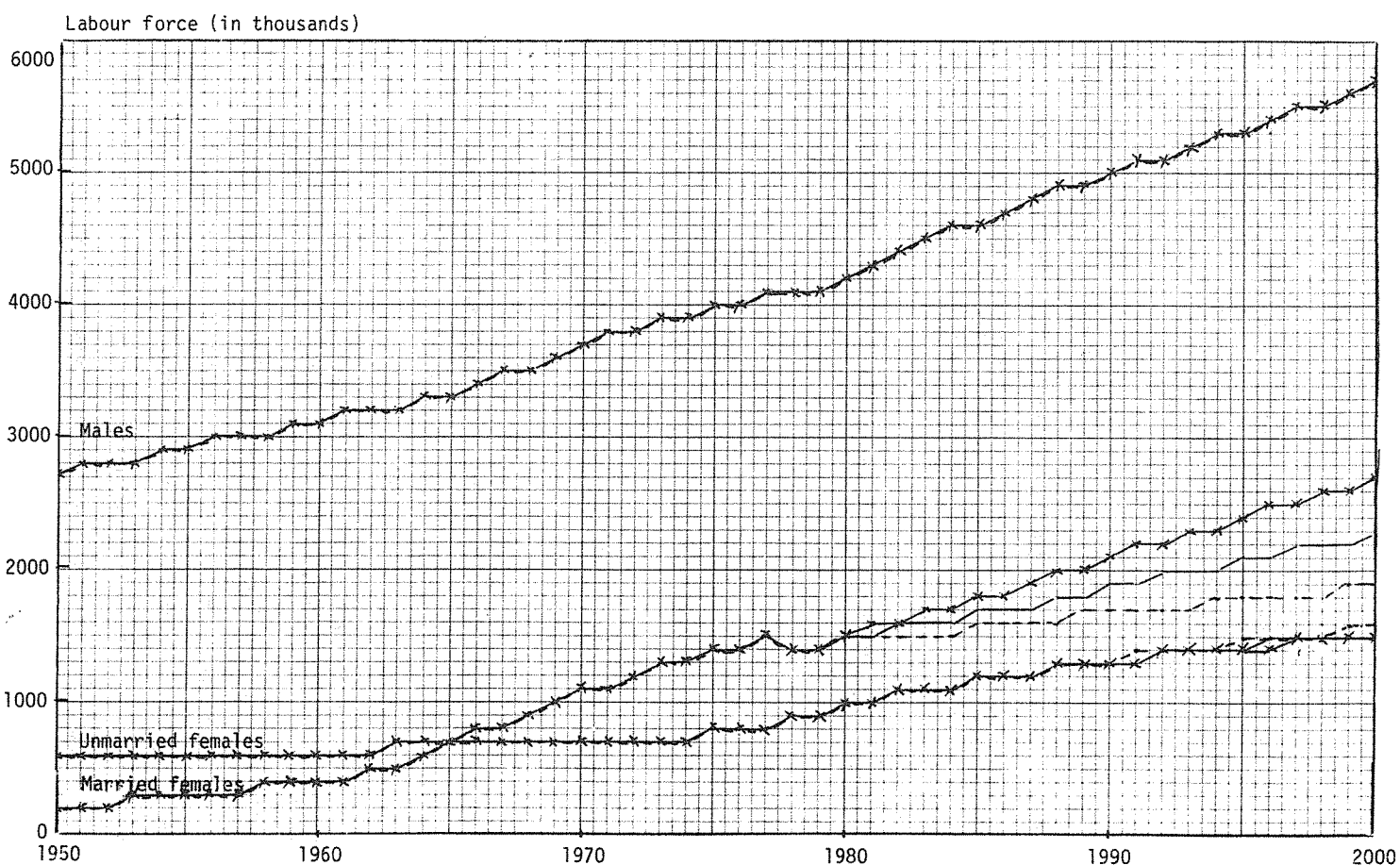


FIGURE 1 : ACTUAL AND PROJECTED LABOUR FORCE PARTICIPATION RATES FOR MALES AND MARRIED AND UNMARRIED FEMALES, UNDER SCENARIOS OF LOW (---), MEDIUM (—) AND HIGH (x—) ECONOMIC GROWTH, 1950/51 to 2000/01

the participation rates for married and unmarried women which, when combined with the population estimates, provides the female contribution to labour supply. At this stage in the development of the Facility, male labour force participation rates must be supplied exogenously. More precisely, for a projection of population and labour force, the Facility requires, for each year of projection:

- a) a demographic scenario specifying
 - net numbers of international migrants by sex, age and marital status
 - death rates by sex, age and marital status;
- b) an economic scenario specifying
 - labour force participation rates for males by age group
 - real gross domestic product per head
 - the real female hourly wage rate
 - the female/male relative hourly wage rate
 - the unemployment rate
 - the real old age and invalid pension
 - the real widow's pension
 - an index of female educational attainment
 - the education participation rate of unmarried females aged 15 to 24 years
 - the oral contraceptive usage rate.

FIGURE 1 : *continued*



force, whilst changes in marriage and divorce behaviour will alter the marital status composition of the population which, in turn, will affect the structure and size of the female labour force.

The direct effect of a rise in the wage rate upon participation in the labour force is generally considered to be two-fold. Firstly, the increased payment for each hour's work encourages people to enter the labour force (or to work more hours if already in the labour force), and secondly, since income at a given number of hours of work is increased by the rise in the wage rate, they may choose to purchase more leisure; that is, they may choose to work fewer hours. The relative importance of these two effects can only be resolved empirically. Unfortunately, at its current stage of development, the IMPACT Facility does not model hours of work but only participation rates.⁴

Whilst this conventional distinction between labour and leisure is appropriate for males and unmarried females, it is fruitful in the case of married women to expand the analysis to include three options - labour, leisure and household activity. Such analysis follows from the "new home economics", which recognises that, in considering whether or not to enter the workforce, a married woman must consider not only the utility of the income she will receive by working but also the opportunity costs of both her leisure and the time she cannot commit to the home and to child rearing. The household is envisaged as a production unit which produces household commodities (such as home cooked meals, companionship and children) by combining inputs of market goods and services and the time of family members. In this analysis, children are seen as intensive in the use of the time of their parents, especially the mother, and the

APPENDIX A

A Brief Explanation of the IMPACT Facility and the Demographic and Economic Scenarios Used in the Projections of the Australian Population and Labour Force

Essentially, the IMPACT Population Projection Facility consists of a population projection algorithm which calculates consistent and disaggregated population projections from a set of demographic rates and flows, and an econometric model which determines the levels of fertility, marriage and divorce operating within the population projection algorithm. It is this algorithm which enables the Facility to produce consistent population projections at the high level of disaggregation adopted. The algorithm incorporates the conventional demographic technique of applying age specific rates to appropriate populations at risk to allow the resultant population to be influenced by both changes in these rates and in the sex, age and marital status structure of the population. By integrating these conventional demographic techniques with the econometric model of fertility, marriage, divorce and female labour force participation, demographic events can be influenced by each other and by changing economic, social and demographic conditions. This treatment differs significantly from standard methods of producing demographic projections which have avoided any explicit attempt to incorporate the influence of economic and social factors within a systematic framework.

Within the Facility, migration flows and death rates are supplied exogenously, along with an exogenous economic scenario which is used by the econometric model in its determination of the levels of fertility, marriage and divorce. As well, the econometric model projects

FOOTNOTES

1. The IMPACT Project is an inter-agency initiative of the Commonwealth Government in co-operation with the University of Melbourne and La Trobe University. For a full discussion of the IMPACT Project and the BACHUR00 module see Powell (1977) and (1983).
2. The Population Projection Facility has been outlined in several previous papers: Sams (1979) provides an overview of the demographic accounting equations in the Facility; Sams and Williams (1980) provide a summary of the useful features of the Facility; Sams, Williams, Williams and Stevenson (1981) provide a comparison of the projections of the Facility and those of the Australian Bureau of Statistics as a test of the demographic accounting equations; and Brooks, Sams and Williams (1982) describe the econometric model.
3. The IMPACT Population Projection Facility is designed as a tool for the analysis of the effects of changes in the economic and demographic environment on the size and composition of the Australian population and labour force and is available as a public facility. A computer implementation of the model is available on the CSIRONET Computing System and can be accessed by those with appropriate computing facilities, expertise and finance. Anyone who wishes to run their own projections should contact the IMPACT Project.
4. As part of the IMPACT Project, several studies have been undertaken to estimate econometric models of hours worked (for example, see Tulpuie (1980)), but these have not yet been incorporated into the Facility.

shadow price of her time is (in the simplest approach) identified with the wage rate she could obtain in the labour market. Thus, if the shadow price of mothers' time increases, the cost of children will rise and we would expect a decline in the demand for children. However, the demand for children is a component of the demand for "child services", itself a household produced commodity, which combines the number of children and the resources, both material and time, invested in each child (or "child quality"). If the income of the family is increased, without increasing the shadow price of the mother's time, our prejudices suggest that the demand for child services will increase. However, the latter increase need not be translated into an increased demand for children but may be reflected in increased inputs of goods, services and time into the raising of a given number of children.

Conventionally, it is expected that an increase in the non-wage income of an individual worker would lead to a decline in the number of hours worked, as this income is spent on increased leisure. However, if the decision-making unit is a household in which both husband and wife are actual or potential members of the workforce, an increase in non-labour income could be used to buy increased leisure for either or both of them. Thus, an increase in labour income earned by the husband (wife) could be spent as increased leisure for the wife (husband) or on increased household production. If the increased income is spent on child services it could lead to an increase in the number of children or in child quality, or both. However, if the increased income derives from a rise in the female wage rate, the shadow price of female time and the cost of children will also rise. Results from the estimation, using Australian data for 1921 to 1976, of an econometric model of fertility, marriage

divorce and female labour force participation (see Brooks, Sams and Williams, 1982) suggest that a rise in income, at fixed female wage rates, increases the demand for children and the demand for child quality but that a rise in the female wage rate at a fixed income level lowers the demand for children while still increasing the demand for child quality. Thus, our estimated results indicate that a rise in the female wage rate (at a fixed income level) encourages married women into the labour force while a rise in income (at fixed female wage rates) encourages them to withdraw from the labour force. Both these changes produce an increase in the demand for child quality, whilst the former causes a decline in fertility and the latter an increase. In turn, these fertility changes impinge on later labour force decisions. In particular, there are two direct impacts of fertility on labour force participation incorporated in the Facility. Firstly, an increase in fertility causes married women to withdraw from the labour force in the first five years of the child's life. Secondly, a rise in the demand for child quality encourages women to enter the labour force, presumably to earn income to satisfy this demand.

Within the Facility, fertility decisions are treated as a set of sequential decisions consisting of the decision to have a first child and then whether to have higher order confinements. Thus the Facility projects not only the probability of having a family but also the distribution of family size (see Brooks, Sams and Williams (1982) for details). The decision to have a first or higher order nuptial confinement is influenced by changes in wage rates and income. Increases in income tend to increase the likelihood of women progressing from one birth order to the next while increases in the wage rate lowers this likelihood. The latter effect is more important for fourth and higher order births. This model of fertility is able to represent one of the principal features of fertility behaviour

determining the interaction of the labour market with the rest of the economy. Fortunately, the demographic-economic framework established by the IMPACT Project forms a useful basis upon which a fuller labour supply model, incorporating these other dimensions, can be developed.

economic variables specified in the Facility are not exhaustive, they do constitute the major influences on demographic and labour force behaviour for which data are available.

As a tool for analysing labour force behaviour, the Facility has a number of limitations. Past Australian experience suggests that the numbers in the labour force will be strongly influenced by labour demand. Unfortunately, whilst the Facility does include some labour demand variables (such as an indicator of demand for female labour and the unemployment rate), their specification could be strengthened. Eventually it is intended to integrate the Facility within the IMPACT medium term model of the Australian economy, in which labour demands are determined by a multisectoral general equilibrium model of Australian industry structure (see Powell (1977)).

Currently, the Facility models female labour force behaviour disaggregated by only six demographic groups and does not explicitly model male labour force behaviour. It is planned to further develop the analytical power of the Facility by estimating a model of male labour force participation and a more disaggregated model of female participation. Whilst such improvements would provide us with a better model of labour force participation rates and the size and demographic composition of the labour force, these variables represent only one dimension of labour supply. A point which, to quote Fisher (1981), is "inadequately appreciated in 'labour market demography'". Other significant aspects such as hours worked and part-time employment, and the occupational distribution, quality and mobility of the labour force are also important in

in Australia since World War II; that is, the concentration of family size at 2 or 3 children and the decline in the popularity of one child families and very large families.

However, there are several weaknesses in the current fertility model. Firstly, exnuptial fertility rates are determined exogenously. Whilst changes in exnuptial fertility depend partly upon medico-legal influences (such as the availability of contraception and abortion), it is plausible that decisions regarding exnuptial fertility are made partly in the context of the decisions to marry and/or to remain in the labour force. The general state of the labour market and the availability of income from non-labour market sources (such as the supporting parent's benefit) will influence these decisions. A model which could analyse such inter-relationships could provide important insights into the labour force and fertility behaviour of young females. Secondly, the current fertility model takes no account of how the economic environment influences the timing of fertility decisions. At a given level of family income, it is possible that births are brought forward in times of recession, in response to reduced labour market opportunities for women and the consequent reduction in the shadow price of a woman's time. Similarly, in better times births may be deferred. (For an econometric model which attempts to capture these effects, see Ward and Butz (1978), and for a discussion of the demographic effects of such timing decisions on Australian fertility, see Ruzicka and Choi (1981)). Thirdly, the link between nuptiality and fertility in the Facility is not as strong as may be desired. The rate of first marriage directly influences the rate of first nuptial confinements, but changes in the proportions married only indirectly influence the number of nuptial confinements of each order via changes in the number of confinements of lower orders in preceding years.

Despite these limitations, the econometric model is able to provide some insights into the influences of the economic environment on fertility and labour force participation and the linkages between them.

To return to our discussion of economic influences on labour force behaviour, the availability of pensions and other forms of cash transfers can also directly and indirectly influence the decision to enter the labour force. Labour force participation rates of older males have declined since the early 1970s. The degree to which this has been caused by increased pension rates and the degree to which it represents hidden unemployment is unclear. Merrilees (1982) has argued that the declines in participation of males in each of the age groups 55-59, 60-64 and 65 years and over are related to the availability of government benefits. In particular, the decline in the participation rate for males aged 55-59 years can be explained almost completely by the increased rate of uptake of invalid pensions, while the decline for males aged 60-64 years can be explained principally by the increased proportion of such men on war service pensions, which are available at age 60, with a smaller, but still significant, contribution from the growth in the proportion of invalid pensioners at this age. The availability of the old age pension for women at age 60 may also have encouraged some married men to retire before age 65 and rely upon this income, their savings and retirement or superannuation benefits. For men over 65, the decline in participation rates has been matched by an increase in the proportion receiving the old age pension.

The future implications of this decline in the participation rates of older men is unclear. If the growth in the proportion of each age

4. CONCLUDING REMARKS

In this paper, we have reviewed economic and demographic influences on the size and structure of the Australian labour force. Using the IMPACT Population Projection Facility, we have made three illustrative projections of population and labour force for 1980/81 to 2000/01. These projections were based on three plausible scenarios of economic growth - low, medium and high - allowing us to analyse the effects upon projected population and labour force of varying levels of economic growth. These projections are not intended to be forecasts of the short or long term growth in Australia's population and labour force. Rather, they provide an indication of possible future growth and enable us to identify the sensitivity of that growth to its major influences. The scenarios upon which the projections are based, whilst being internally consistent, are crudely specified and do not explore all possibilities. In particular, the scenarios do not attempt to forecast the short term prospects of recovery from the current recession.

The analysis presented here, being based on an explicit economic-demographic model, traces and quantifies some of the complex economic, social and demographic interactions determining the changing growth and composition of the population and the labour force. In particular, the interaction between major aspects of demographic behaviour (including migration, fertility, marriage and divorce) and the resultant population and labour force structure is explicit, whilst many of these demographic variables and the labour force participation of females are themselves determined, both directly and indirectly, by economic variables (including wages, incomes, pensions and unemployment). Although the

especially under the lower growth scenario. In the low growth scenario, this slower population growth and projected falls in participation rates lead to a slowing in the growth of the married female labour force. In contrast, for the medium and high growth scenarios, increases in participation rates are so substantial that the married female labour force grows at an above average rate. As a result of these changes, the sex and marital status composition of the labour force changes markedly in the projections. In all three projections, the share of males in the labour force falls and the share of unmarried females rises, whilst the share of married females falls in the low projection but rises in the medium and high projections.

In summary, the net effect of the shifts in the participation rates of males and females and in the population structure is to increase the size of the labour force faster than the population in all three projections. Specifically, the ratio of the labour force to the population increases from 46.2 per cent in 1980/81 to (47.30, 49.34, 51.42) per cent in the (low, medium, high) scenario. This positive relationship between participation rates and economic growth is such that, despite the negative relationship between population growth and economic growth, labour force numbers are greater for the higher growth projections.

group receiving pensions has been induced by the recession, as argued by Strickler and Sheehan (1982), economic recovery may prompt a decline in the proportion of such beneficiaries. However, if the growth reflects a liberalization of the eligibility criteria and/or the increased social acceptability of pensions, the proportions receiving such pensions may not decline with improvements in the labour market. Similarly, if the growth in the number of pensioners has been stimulated by increases in the real pension rate since 1973, an economic recovery may prompt further increases in these pension rates and, in turn, an increased uptake of pensions. The number of beneficiaries receiving war pensions is predominantly affected by ageing and deaths. Table 1 contains a forecast of the number of surviving ex-service personnel by age group for 1981 to 2000. The largest group is under 60 years in 1981 but this group will be aged 60-64 years 1985 and so on. Thus, the number of service veterans aged 60-64 years will be negligible by the year 2000 and one might expect the labour force participation rate for men aged 60-64 years to increase accordingly. However, the degree to which the participation rate for men of this age group who are not war veterans declines because of early retirement will moderate any recovery in the participation rate of 60-64 year olds. It is interesting to speculate whether the presence of this cohort with a high incidence of early retirement may generate an expectation among succeeding cohorts regarding the desirability of early retirement (even in the absence of a war pension). The projections of male labour force participation rates used in this paper, and discussed later, represent a compromise between these possible outcomes and suggest only small shifts from the current participation rates.

The econometric model includes changes in the available level of

TABLE 1 : FORECAST OF SURVIVING EX-SERVICE PERSONNEL^a
BY AGE : 1981-2000

Age Group	Estimated					
	June 1981	June 1985	June 1990	June 1995	June 2000	
Under 60	272600	116300	54400	40700	34000	
60-64	164500	167200	55400	11300	5000	
65-69	102600	139500	145100	48200	9500	
70-74	53400	79600	113300	116300	34100	
75 and over	43100	59300	90900	132500	154100	
TOTAL	636200	561900	459100	349000	236700	
Average Age (years)	63	66	69	72	75	

^a Excludes peace-time veterans.

Source : Department of Veterans' Affairs (1981).

TABLE 5 : SUMMARY OF PROJECTED SEX AND MARITAL STATUS SPECIFIC LABOUR
FORCE, POPULATION, AND LABOUR FORCE PARTICIPATION RATES^a

	Males			Married Females			Unmarried Females		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Labour Force									
1980/81		4180000			1482250			976900	
2000/01		5659680 (1.53)	5660038 (1.53)	5660224 (1.53)	1869426 (1.17)	2291146 (2.20)	2702233 (3.05)	1587368 (2.46)	1515631 (2.32)
Population									
1980/81		5502495			3471797			2029255	
2000/01		7435248 (1.52)	7435500 (1.52)	7435563 (1.52)	4292096 (1.07)	4391181 (1.18)	4471716 (1.27)	3334762 (2.51)	3154854 (2.36)
Labour Force Participation Rate									
1980/81		75.97			42.69			48.14	
2000/01		76.12			43.56	52.18	60.43	47.60	48.04

^a Figures in brackets are average annual growth rates from 1980/81 to 2000/01.

TABLE 4 : PROJECTED MARITAL STATUS PROPORTIONS FOR ADULT MALES
AND FEMALES, 1980 AND 2001

	2001			
	1980	Low	Medium	High
MALES				
Never Married	31.4	32.7	31.0	29.6
Married	62.2	57.6	59.0	60.1
Divorced	3.8	7.0	7.4	7.8
Widowed	2.6	2.7	2.6	2.5
Unmarried ^a	37.8	42.4	41.0	39.9
FEMALES				
Never Married	23.0	24.7	22.8	21.3
Married	61.6	56.2	57.5	58.6
Divorced	4.4	8.8	9.3	9.8
Widowed	11.0	10.4	10.4	10.3
Unmarried ^a	38.4	43.8	42.5	41.4

(a) Unmarried comprises never married, divorced and widowed persons.

government support as a determinant of labour force participation of women who are not in the labour force. For unmarried women, we would expect a rise in the old age pension to encourage older women to leave the workforce. This is confirmed by our estimated results. Similarly, an increase in the widows' pension, which is available to some of these women as an alternate source of income, would also be expected to lower their participation rate. Our results indicate that this effect is negative, but significant, for older women. Similarly, our estimation results suggest that the effect of the widows' pension on the participation rate of younger unmarried women is also insignificant. However, this insignificant may indicate only a dilution of the effect by the presence of large numbers of young unmarried women who are ineligible for such pensions.

A rise in unemployment is generally expected to lead to a fall in the labour force participation of prime aged males, since it is more difficult to secure a job. For married females, however, a rise in unemployment may cause not only withdrawal from the labour force (the "discouraged worker" effect) but also entry to the labour force (the "encouraged worker" effect), where labour force participation of women increases to compensate for the loss of income to the household when the male "breadwinner" becomes unemployed. Our results indicate that a rise in the overall unemployment rate discourages younger married women from, and encourages older (over 55 years) married women into, the labour force. For unmarried women, we are unable to detect any significant effect, although it is generally a small discouraged worker effect.

At young ages, both men and women are faced with a choice between entering the labour force and undertaking further education. We

have not attempted to model explicitly this choice but we do introduce the education participation rates of 15-19 and 20-24 year olds into our assumed projections of the male labour force and into our model of female participation rates as exogenous determinants. In general, education participation is projected to increase steadily over the projection period.

Although we have been able to incorporate the influence of a number of economic variables into the projections of the labour force participation rates of men and women reported in this paper, there are some further influences which we have not been able to incorporate. Specifically, we have not considered the effects of changes in the average number of hours worked by persons in the labour force or the growth in part-time employment. Growth in the labour supply of married women may have been enabled by improvements in home productivity, via the purchase of household equipment, which reduced the opportunity cost of women being out of the home. We have not captured this influence explicitly within our model, nor have we considered the role of increased levels of household consumption in increasing the necessity for women to enter and remain in the labour force. We plan to incorporate such influences in a future model of Australian labour force behaviour.

In the next section we report the results of our three projections of population and labour force, generated using three different scenarios of economic growth. We will attempt to analyse the contributions to these results from the demographic and economic factors discussed above, and consider the sensitivity of our results to the different scenarios of economic growth.

specification of the Facility, whilst distinguishing four marital states for each sex in its projections of the population, does not distinguish between males of different marital states and distinguishes only married and unmarried females in its projections of the labour force.

Table 4 provides the projected marital status proportions for adult males and females, which indicate substantial changes in the marital status distributions of the projected populations. The most significant change over the sample period is the growth (especially under the higher scenario) in the proportion of adult males and females divorced, which is projected to approximately double by the year 2001. At the same time, the proportions married are projected to decline, with this decline being less severe for the projections assuming higher economic growth. In these projections the presence of higher economic growth tends to promote increased movement between marital states including remarriages of divorcees, with the result that, in the higher growth projections, the proportions never married fall, the proportions married fall less rapidly and the proportions divorced increase over the sample period. The projections of marital status change and of the proportions in each marital state are analysed in greater detail in Sams and Williams (1982).

A summary of the projected sex and marital status specific labour force, population and participation rates is given in Table 5. These results show that, whilst participation rates of unmarried females decline in all three scenarios, the growth in the population of unmarried (principally divorced) females leads to substantial above average growth in the unmarried female labour force (particularly in the lower growth scenario). For married females, population growth is below average,

is predominantly due to the slow average annual growth of 0.22 per cent in the population of that age group and partly to the assumed decline in labour force activity for that group. For older males (55 years and over), the average annual growth of 1.19 per cent in the labour force is maintained despite our assumption of declining participation rates, because of the above average annual growth of 2.08 per cent in the population of older males. For women, similar patterns in population growth by age group occur: the average annual growth in the population of (young, prime aged, older) females is (0.27, 1.99, 1.99) per cent over the period, whilst the average annual growth in the labour force for the same age groups is (0.05, 2.97, 3.87) per cent. Thus the below average labour force growth of young females is predominantly due to their below average population growth and partly due to the decline in their labour force activity. For prime aged and older women, increases in labour force activity are an important component of the growth in the labour force, as is the above average population growth. Whilst these figures refer to the medium scenario projection, the analysis is applicable to all three projections, since the age distribution of the population varies only slightly between the projections.

Labour force numbers are also influenced by changes in the marital status distribution of the population. In 1980/81, married males, in every age group, had higher participation rates than their unmarried counterparts, while married females, in every age group except 65 years and over, had lower participation rates than unmarried females (although this differential appears to be rapidly disappearing). Consequently, a shift in the marital status distribution towards married persons could be expected, if participation rates are constant, to increase the male labour force and decrease the female labour force. Unfortunately, the current

3. THREE PROJECTIONS OF THE AUSTRALIAN LABOUR FORCE

The three projections of the labour force and population from 1980/81 to 2000/01 detailed in this paper were produced using the IMPACT Population Projection Facility and three scenarios of demographic and economic growth, broadly characterized as low, medium and high. The Facility and the specification of these scenarios are described briefly in Appendix 1 and in more detail in Sams and Williams (1982). In analysing these projections, we will firstly examine in detail the projections of labour force participation rates. For males, participation rates for eight age groups (15-19, 20-24, 25-34, 35-44, 45-54, 55-59, 60-64, 65 and over) were set exogenously and not varied between the projections. For females, participation rates for married and unmarried females in three age groups (15-24, 25-54, 55 and over) were projected using the econometric model and our three chosen scenarios of economic growth. In describing these projections, an attempt will be made to identify the important influences upon the projected participation rates. Following the discussion of participation rates, the projected populations and their impact upon the projected labour force will be considered.

The projections of male labour force participation rates

The projections of participation rates for males in each age group, summarized in Table 2, were based partly on an analysis of trends apparent during the 1960's and 1970's and partly on the basis of the expected responses of labour force participation rates to the assumed changes in economic and social conditions. Although this exogenous projection of male labour force participation could have varied between

TABLE 2 : PROJECTED LABOUR FORCE PARTICIPATION RATES (IN PERCENTAGES) FOR MALES AND MARRIED AND UNMARRIED FEMALES, 1980/81 TO 2000/01

	1980/81				1990/91				2000/01			
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
females												
- total	78.19	77.51								76.12		
- 15 to 19 years	62.80	61.40								60.00		
- 20 to 24 years	90.60	90.60								90.60		
- 25 to 34 years	95.50	95.50								95.50		
- 35 to 44 years	95.90	95.90								95.90		
- 45 to 54 years	91.40	91.40								91.40		
- 55 to 59 years	83.30	79.00								75.00		
- 60 to 64 years	50.10	60.00								50.00		
- 65 years and over	11.10	10.50								10.00		
Married females												
- total	44.79	44.24	49.30	54.55	43.56	52.18	60.43					
- 15 to 24 years	58.90	58.42	67.32	77.04	56.79	70.68	83.09					
- 25 to 54 years	52.46	52.33	57.51	63.27	52.30	61.17	70.03					
- 55 years and over	17.22	18.05	20.91	22.60	18.49	23.79	28.04					
Unmarried females												
- total	47.82	47.89	48.03	48.22	47.60	47.78	48.04					
- 15 to 24 years	65.70	59.80	60.22	60.62	57.83	58.48	59.00					
- 25 to 54 years	69.53	70.12	70.97	71.96	70.05	71.75	73.56					
- 55 years and over	9.24	9.35	8.98	8.58	9.35	8.69	8.04					

TABLE 3 : SUMMARY OF AGE SPECIFIC LABOUR FORCE, POPULATION AND LABOUR FORCE PARTICIPATION RATES FOR MALES AND FEMALES IN THE MEDIUM PROJECTION^a

	Males aged				Females aged			
	15 to 24	25 to 54	55 and over		15 to 24	25 to 54	55 and over	
Labour Force								
1980/81	1006242	2727506	504349		809185	1478336	171629	
2000/01	1034548 (0.14)	3985892 (1.91)	639598 (1.19)		817015 (0.05)	2653495 (2.97)	366493 (3.87)	
Population								
1980/81	1315824	2885797	1219054		1242110	2772159	1486783	
2000/01	1376156 (0.22)	4220549 (1.92)	1838795 (2.08)		1311766 (0.27)	4114312 (1.99)	2200607 (1.99)	
Labour Force Participation Rate								
1980/81	76.47	94.52	41.37		65.15	53.33	11.54	
2000/01	75.18	94.44	34.78		62.28	64.49	16.65	

^a Figures in brackets are average annual growth rates from 1980/81 to 2000/01.

average annual rate of (-0.10, 0.77, 1.46) per cent, whilst the number of married women grows at (1.19, 1.30, 1.40) per cent. Consequently, the labour force of married women grows at (1.09, 2.07, 2.86) per cent per year. These changes in the overall level of labour force activity are partly explained by changes in the disaggregated labour force participation rates discussed earlier (and summarized in Table 2) and partly by changes in the age and marital status composition of the population. Because labour force participation rates differ across age and marital status, changes in population composition may lead to relative concentrations of people in demographic groups with low or high participation rates, leading to a smaller or larger labour force.

To illustrate the influence of changes in the age distribution of males and females upon their numbers in the labour force, Table 3 provides a summary of age specific labour force, population and participation rates for males and females under the medium projection. Consider prime aged males (25 to 54 years): in 1980, the participation rate for prime aged males was around 94.5 per cent, whilst the participation rates for younger and older men were substantially lower. Thus, even if age-specific participation rates remain unchanged, the labour force activity of men would be expected to increase as the population bulge discussed earlier moves into the prime aged group and to decline again later as this bulge moves into the older age groups. In fact, because participation rates of prime aged males are assumed to remain approximately constant throughout the projection period, the average annual growth of 1.91 per cent in the labour force of prime aged males is almost entirely due to population growth. Similarly, the relatively slow average annual growth of 0.14 per cent in the labour force of young males (aged 15 to 24)

scenarios, such soothsaying was avoided. Thus the projection of male labour force participation rates should be treated as a reasonable, but illustrative, projection.

During the 1960's and up to the mid-1970's, labour force participation rates for 15-19 year old males fell continually, predominantly as a result of increased participation in education. The recession of the mid-1970's led to a reversal of this trend, such that, by 1980, the young male labour force participation rate of 62.8% was the highest since the late 1960's. Whilst it seems unlikely that the high rates of education participation experienced in the early 1970's will be repeated, we do expect some recovery from the low level of education participation experienced in 1980. Hence, we have projected young male labour force participation rates to decline from their 1980 level of 62.8% at a constant geometric rate to a level of 60.0% in the year 2000.

Labour force participation rates for 20-24 year old males also declined over the 1960's and 1970's due to increased participation in education. This decline appears to have been arrested over the latter years of the 1970's, probably as a result of the recession forcing men out of the education system and into the labour force. The lack of a definite trend in labour force participation rates in the late 1970's has prompted us to project the labour force participation rates for this group to remain constant at the 1980 level of 90.6%.

Over the 1960's and early 1970's there was little movement in labour force participation rates of 35-44 year old and 25-34 year old males. From the mid-1970's, there was some decline in participation rates

which could possibly be attributed to the discouraged worker effect. We have projected labour force participation rates for these groups to remain constant at their 1980 levels of 95.5% and 95.9% respectively.

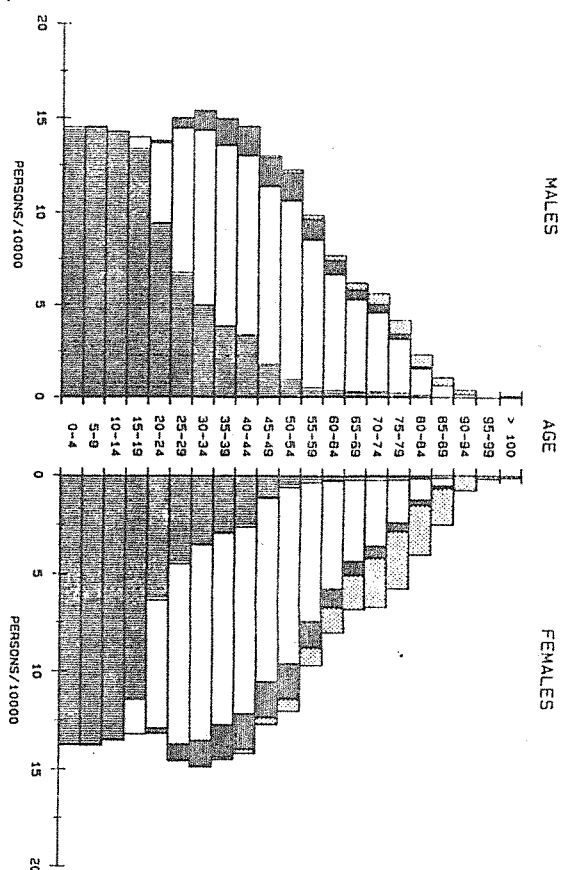
Over the 1960's and early 1970's, the labour force participation rates for 45-54 year old males showed little variation. From the early 1970's, however, there were continual declines in these rates. These declines are probably not totally due to the discouraged workers who have left the labour force as a result of the recession; early retirement may also be a pertinent factor. However, the trends are not yet clear, so we have projected participation rates to remain constant at the 1980 level of 91.4%.

A similar historical experience to that described for the previous age group was shown by 55-59 year old males, although the decline during the 1970's was more severe, with participation rates declining by 0.9% per annum. In the future, we expect the increased incidence of early retirement to dramatically affect labour force participation rates in this age group. We have, therefore, projected labour force participation rates in this age group to decline from their 1980 level of 83.3%, using a constant geometric rate of decline of 0.5% per annum, to a level of 75.0% in the year 2000.

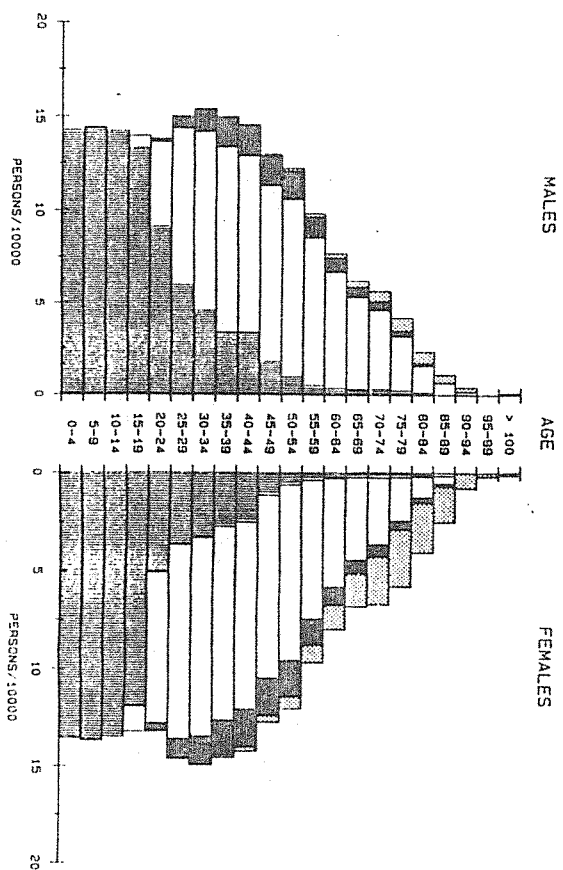
During the 1960's, labour force participation rates for 60-64 year old males varied little, but from the early 1970's they declined at a rate of 2.15% per annum to a level of 50.1% in 1980. It has been suggested above that these substantial declines in participation rates over the 1970's have been partly due to the early retirement of veterans from the

62.2, 64.7) per cent, whilst the ratio of the labour force to the working age population varies from 71.1 per cent in 1980/81 to (70.6, 73.6, 76.6) per cent in 2000/01 under the (low, medium, high) scenarios. Thus, at least in the higher scenario projections, increasing labour force activity by the population provides a greater contribution to growth in the labour force than in the past: (0.05, 0.27, 0.48) percentage points per year under the (low, medium, high) scenarios compared with 0.21 percentage points per year between 1950 and 1980.

As shown in Figure 1 on page 6, this general increase in the labour force and in labour force activity varies between males and married and unmarried females. Since the age specific participation rates for males are set exogenously and are assumed to be the same in each scenario, the size of the male labour force and the total male labour force participation rate varies little between the projections. As shown in Table 2, the total participation rate for males declines by only 2.07 percentage points between 1980 and 2000. The total labour force participation rate for unmarried females varies little over time or between the projections, but the size of the unmarried female labour force increases over time and is larger in the lower growth projections. For married women, the total labour force participation rate varies substantially between the projections; under the low growth scenario, the participation rate changes only slightly over the projection period, but, under the higher growth scenarios, the rate increases substantially. The higher growth in married female participation rates in the higher growth projections is accompanied by higher growth in the population of married women. In the (low, medium, high) projection, the total married female labour force participation rate grows over the projection period at an



JUNE POPULATION 2001. MEDIUM GROWTH SCENARIO



JUNE POPULATION 2001. HIGH GROWTH SCENARIO

Second World War and the Korean War. It is expected, therefore, that as these veterans move into the older age group participation rates will rise again, before falling as a result of increases in early retirement. Thus, labour force participation rates are projected to rise smoothly to 60.0% in 1990 and then to decline smoothly to 50.0% in 2000.

Over the 1960's and 1970's, labour force participation rates for males 65 years and over have declined almost continually at an average annual rate of 3.94%. Given the already very low rates of participation for males of this age, we would not expect these high rates of decline to continue. Hence, we have projected male labour force participation rates for this age group to decline at a constant geometric rate of about 0.5% per annum from a level of 11.1% in 1980 to 10.0% in 2000.

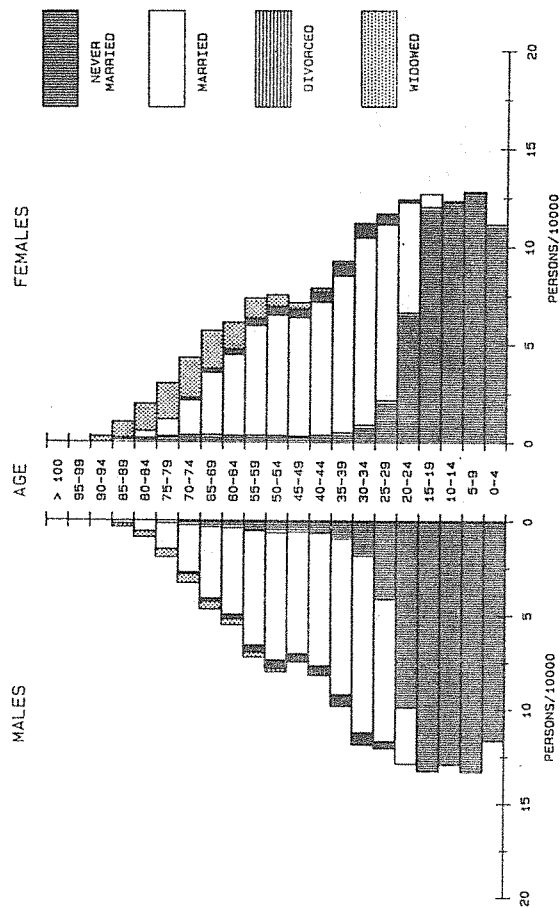
The projections of female labour force participation rates

The econometric model has been able to quantify the sensitivity of female labour force participation rates to their important economic determinants. In our projections, therefore, the three scenarios of economic growth detailed in Appendix 1 provide the future trends in the determinants which are used in the econometric model to project participation rates. For each age and marital status group, we will describe the trends in the relevant determinants under each scenario of economic growth and their impact upon labour force participation rates for that group.

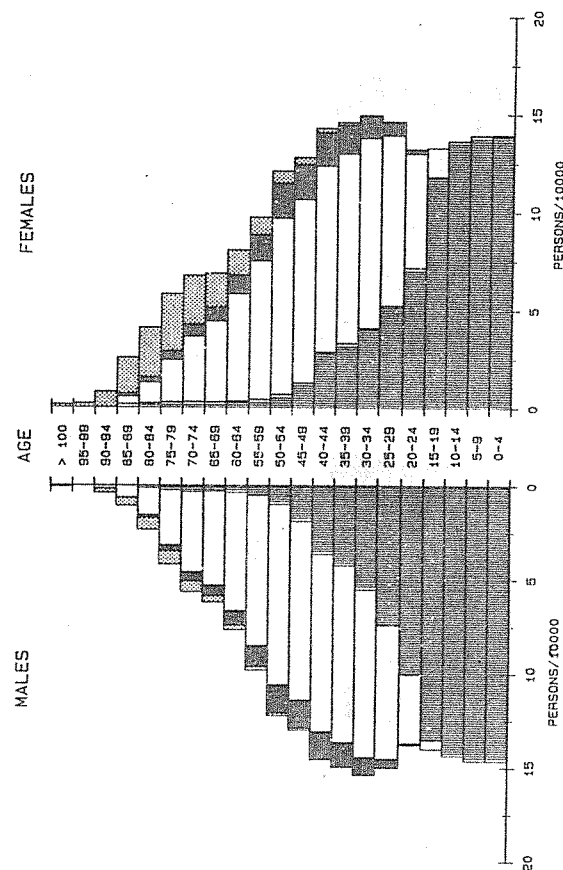
According to the econometric model, participation rates for young married women aged 15 to 24 years and 25 to 54 years are influenced

by both labour market variables, such as the level of real female wages and the state of the labour market, as well as by fertility variables, such as their recent childbearing experience and their demand for child services. In all three projections, the participation rates of these women are increased by the assumed growth in demand for child services but diminished by the projected growth in fertility. Movements in the former variable are composed, partly, of a decline in the number of dependent children per married female and, predominantly, of a growth in child quality. The net effect, under all three scenarios, is for demand for child services to increase with higher economic growth and to grow more rapidly after 1990/91, when the decline in the number of dependent children per married female is projected to level off. The latter variable, measured by weighted nuptial confinements per married woman, grows in the low scenario, grows only slightly in the medium scenario, and remains steady in the high scenario. The combined effect of these fertility variables is, in the low projection, to take married women out of the labour force, via the immediate effect of increased levels of childbearing, and, in the higher projections, to draw women into the labour force to provide them with sufficient income to support high levels of child quality. In general, the effect of labour market variables is to draw young married women into the labour force in all three projections, although this effect is minimal in the low projections. Rising real female wage rates encourage married women to join the labour force, this effect becoming more pronounced under the assumption of higher economic growth. In the higher growth projections, the assumed decline in unemployment rates to 1990/91 and the slight increase in demand for female labour lead to the return of discouraged women to the labour force. Thus, the separate effects of the fertility and labour market variables on the participation

FIGURE 2.: AGE AND MARITAL STATUS PYRAMIDS FOR THE AUSTRALIAN POPULATION AS AT JUNE 1980 (ACTUAL) AND 2001 (PROJECTED UNDER SCENARIOS OF LOW, MEDIUM AND HIGH ECONOMIC GROWTH)



JUNE POPULATION 1980.



JUNE POPULATION 2001. LOW GROWTH SCENARIO

characteristics of the migrant intake; further simulations with the Facility are intended to examine this sensitivity.

As the above analysis indicates, in a relatively short projection period of twenty years, the major demographic influences (apart from migration) on the size of the population of working age will already be embodied in the structure of the population in the base year of the projection. In this projection, the working age population grows faster than the total population mainly as a result of the ageing of a "population bulge". The age pyramid in June 1980 (see Figure 2) indicates a concentration of people between ages 5 to 24 years. By June 2001, this over-sized group will be aged between 25 and 44 years and their movement into the working age population constitutes the major impetus to its growth over the projection period. This growth can be expected to slow after 2001, however, as the relatively smaller cohorts of children born in our projection period move into the working age population and the population bulge moves into the retirement ages.

Whilst the population of working age is projected to grow more quickly than the total population, both are projected to grow more slowly than in the past. Consequently, it is not surprising to observe that the labour force is projected to grow more slowly than in the past, at an average annual rate of (1.51, 1.72, 1.92) per cent in the (low, medium, high) scenarios. The higher growth in labour force numbers in the higher scenario projections indicates that the slightly negative effects of lower fertility and slower population growth are outweighed by more substantial increases in the activity level of the population. In 1980/81 the overall participation rate for adults was 60.3 per cent and in 2000/01 is (59.7,

rates of married women of childbearing age are complementary for the high and medium projections but countervailing for the low projection, leading to the result discussed earlier; participation rates rise in the high and medium projections but remain approximately constant in the low projection.

Participation rates for older (55 years and over) married women grow over time, especially in the higher growth projections. This growth arises principally from the rising demand for female labour; although it is opposed partly, over the first part of the projection period, by the movement of encouraged workers out of the labour force as the unemployment rate declines, and partly, in the higher growth projections, by the growth in the real old age pension. Young unmarried women experience a decline in their participation rates in all three scenarios, principally as a result of the assumed increase in their education participation. However, there are some slight offsetting effects from the higher real wages and demand for female labour in the higher growth projections. The rise in the participation rates for unmarried females aged 25 to 54 years is principally due to the growth in the female wage rate, whilst, for the older unmarried females, this positive effect is swamped by the negative effect of a rise in the real old age pension, especially in the higher growth scenarios.

The population and labour force projections

The projections of the population for the period, 1980/81 to 2000/01, indicate a slower rate of population growth than was experienced over the past three decades. This is a result of the assumption of

relatively lower migration levels and a decline in fertility to about or below replacement level. This slower population growth occurs despite the assumption of continuing falls in mortality. By the year 2001, the population is projected to be (19.53, 19.50, 19.45) million under the (low, medium, high) scenarios, implying average annual growth rates over the projection period of only (1.46, 1.45, 1.44) per cent. Given that death rates and migration levels do not vary between our scenarios, these differential growth rates derive from variations in fertility levels between the scenarios. In these projections, higher economic growth implies lower fertility and, hence, slower population growth.

Of more importance for labour force growth than total population numbers is the growth in the population of working age. The population of working age is projected to grow from 9.5 million in 1980/81 to around 12.9 million in 2000/01, implying an average annual increase of 1.47 per cent in all three projections, which is slightly faster than the total population growth and is only marginally affected by the economic scenario used in projection. Since children born during the projection period will only just begin to reach working age near the end of that period, the population of working age is not responsive to variations in assumed economic conditions, since these variations predominantly affect fertility. The assumptions of declining death rates and increased life expectancy also have little effect on the size of the working age population since working age persons have already very low death rates. The assumed level of migration does, however, affect the numbers of working age persons. In 1980, (25.4, 65.0, 9.6) per cent of the population were in the age group (0 to 14, 15 to 64, 65 and over) years. In contrast, for settler arrivals in 1980/81, the corresponding percentages were (31.1,

65.2, 3.7) implying an age distribution more heavily concentrated on children and less heavily on older people than the resident population. Thus, high levels of migration tend to increase the proportion of children and eventually, of persons of working age. Also, whilst the age distribution of settler arrivals is generally younger than that of the resident population, it can vary substantially between eligibility categories. For instance, arrivals in the family reunion category are more likely to be in the 65 and over group, whilst those in the general eligibility (or occupational) category are more likely to be of working age. Thus a selective intake of migrants in the general eligibility category could result in extra growth in the population of working age and therefore in the labour force.⁴ In the projections, the proportion of migrants of working age is approximately the same as that of the resident population but the proportion in the young age group is substantially higher than in the resident population. Earlier simulations with the Facility (reported in Filmer, Fleming and Stevenson, 1982) suggest that an increase of 10,000 per year in the net migration gain, when maintained over a twenty year projection period, will increase population at the end of twenty years by $(20 \times 10,000 \times 1.2) = 240,000$ persons, given similar fertility and mortality scenarios to those applied here, and will add 160,000 persons to the working age population (or 66.7 per cent of the population increase). Thus our assumption of increasing migration (from 87,500 in 1980/81 to 115,500 in 2000/01) will provide an extra impetus to growth in the population of working age, both directly (via increased numbers in the population) and indirectly (via a slight bias towards persons of working age). Unfortunately, our assumption of identical migration scenarios in each projection does not enable us to examine the sensitivity of population and labour force growth to varying demographic