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THE LABOUR SUPPLY BEHAVIOUR OF SINGLE
MOTHERS AND MARRIED MOTHERS
IN AUSTRALIA

Russell Ross and Peter Saunders

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**THE LABOUR SUPPLY BEHAVIOUR OF SINGLE MOTHERS
AND MARRIED MOTHERS IN AUSTRALIA**

Russell Ross and Peter Saunders*

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ABSTRACT

Using data from the 1986 Income Distribution Survey and other sources, a comparison of the socio-economic status and employment patterns of single mothers and married mothers is presented. A model is then developed and estimated using a probit analysis of factors thought to explain employment status (employed full-time, employed part-time, not employed) and the relative importance of marital status in determining employment status. Factors included in the model are the woman's age, her level of educational attainment, her previous employment experience, age(s) and number of dependent children, access to non-earnings forms of income, and, for married mothers, the employment status of her spouse and his income.

The results indicate that most of the variation in labour force behaviour of the two groups can be explained by variations in the factors listed above. However, even after adjusting for all other factors, it is still true that sole mothers are less likely than married mothers to be in the labour force, but if they are employed they are more likely (than married mothers) to be in full-time employment. The major differences between the two sets of mothers is in their responsiveness to changes in their access to sources of income other than earnings.

1. INTRODUCTION

The increased prevalence of single parenthood has created a number of dilemmas for social policy. There is now a body of empirical research showing for a number of countries that sole parent families have high poverty rates - well above those for two parent families with children or for the population as a whole (Smeeding and Torrey, 1988). Since most sole parent families are reliant on income support provided through government social security schemes, this has raised questions about the adequacy of these payments. At the same time, others have argued that the level and availability of income support for sole parents has contributed to the growth in the number of sole parent families (Murray, 1984; McDonald and Spindler, 1988). In the Australian context, it has also been argued that the income tested nature of social security payments for sole parents has created a poverty trap that reinforces income support dependency once that support is received. The design of income support policy for sole parents thus confronts head-on the conflict between issues of adequacy and incentive.

It is, however, also recognised that these issues are particularly complex in the context of income support provisions for sole parents. Work decisions revolve around a far greater range of considerations than just the level and availability of income support payments (Cass, 1986; Brown, 1989). Factors such as the presence of children, particularly younger children, access to jobs, market wage rates and the availability and affordability of child care are equally significant in the overall calculus that ultimately influences the decision to work. Recent government policies for sole parents, guided by the analysis undertaken by the Social Security Review (SSR, 1986; Raymond, 1987), has recognised the need for a policy approach that is far broader in scope than income support alone, including also initiatives in child care, housing, wages policy, and education and training. Income support clearly plays a key role in influencing the financial rewards from work and thus the incentive to undertake paid work, but decisions are also framed and action pursued within an environment shaped by these other considerations.

However, despite the merits of the broader strategy for tackling what is a very complex problem, the extent to which the structure of income support provision for sole parents is a factor - for some, the factor - causing high income support dependency remains unresolved. To argue that other factors are also important in sole parents' work decisions does not, of itself, imply that the strength of any benefit-induced work disincentive effects are insignificant. Rather, it suggests that investigation of the presence and size of disincentive effects needs to be undertaken within a framework that also encompasses these other factors. Yet there has to date in Australia been no serious

attempt to investigate the determinants of the work decisions of sole parents within such a framework. Numerous studies have highlighted statistical trends between aspects of sole parent labour force behaviour and other variables (parent's occupation or education status; number and ages of dependent children, and so on) but these comparisons can be no more than suggestive unless analysed within some form of decision-making framework if they are to assist in understanding the determinants of actual behaviour.

This paper represents a first step in this direction by analysing and comparing the labour supply behaviour of sole mothers and married mothers. In this paper mothers are defined as women with dependent children, and married means actually living with spouse. The framework of analysis adopted is the conventional microeconomic theory of female labour supply (work decisions) of Australian mothers in order to evaluate how well the model explains the behaviour of married mothers as compared with single mothers. The paper thus attempts to gain an insight into the question of whether or not there are additional factors relevant to the work behaviour of single mothers that are not also relevant to the work decisions of married mothers. Or to put this differently, does being a single mother make any substantial difference to work decisions over and above those factors associated with being a mother, per se. Since one of the differences between single mothers and married mothers is that most of the former are eligible for specific income support provisions while most of the latter are not, posing the research question in this way will hopefully shed some light on to the impact of income support arrangements on work decisions. It is to be emphasised, however, that this question is not addressed directly in the research but is left as a (potential) indirect implication of the results.

The paper is organised as follows: Section 2 presents some Australian evidence on the financial circumstances of single parent families (the vast majority of whom are headed by single mothers) relative to other families with children. Section 3 reviews recent labour market trends and presents some comparative data on the labour force status of single mothers and married mothers, and establishes the link between poverty and labour force status of single mothers. Section 4 describes the labour supply model and the data and variables used to estimate the parameters of the model. (The details of the model are outlined at greater length in the Appendix). Section 5 presents and discusses the results, which should be viewed as preliminary and subject to further research.

2. POVERTY AND INCOME INEQUALITY AMONG FAMILIES WITH CHILDREN

Relative poverty and income inequality are related, but not identical, indicators of the financial circumstances of particular groups or the population as a whole. Measures of relative poverty indicate the proportion with incomes below a poverty line expressed relative to average income in the community as a whole. Income inequality measures indicate how well different groups fare in relation to the share of total income received by different sections of the population, classified according to their income. While previous Australian research has focused on relative poverty measures to indicate the position of single parents (or other groups), these measures can be complemented by income inequality statistics in order to provide a more complete picture. In line with the focus of later Sections of the paper, the data presented here compares the situation of single parent families with that of married couple families with children.

2.1 Poverty

In line with earlier poverty research, poverty has been measured using the 'Henderson' poverty line first established in the work of Ronald Henderson and his colleagues (Henderson, Harcourt and Harper, 1970) and used subsequently by the Commission of Inquiry into Poverty (1975).¹ The Henderson poverty line embodies a set of equivalence scales derived from the relative expenditure patterns prepared by the Budget Standard Service of New York in 1954. The poverty line for the 'standard family' (two adults, one in the workforce, and two dependent children) was set at 56.6 per cent of average earnings in August 1973, with the equivalence scales used to derive poverty lines for other income unit types. Over time, the poverty line has been adjusted in line with movements in average earnings, although the earnings index was subsequently replaced by an index of household disposable income per capita in the early 1980s. Although the Henderson poverty line is widely used to estimate poverty in Australia, it has not been officially endorsed by governments of either of the two main political persuasions. Neither has an alternative been proposed by government, despite the release of an official report on the subject in the early eighties. (Social Welfare Policy Secretariat, 1981).

1. For a detailed discussion of the Henderson poverty line and other approaches to poverty measurement, see Saunders and Whiteford (1989).

Table 1 summarises published evidence on the poverty status of income units with dependent children between 1972-73 and 1985-86. Over much of this period, the overall poverty rate at the point in time when the estimates were made was around 10 per cent, although by 1985-86 it had increased to 12.6 per cent. This increase reflects the sharp recession of 1982-83 and its disproportionate impact on families with children, combined with the low levels of income support payments for families with children in the first half of the 1980s (Saunders and Whiteford, 1987). Throughout the period, the poverty rate among sole parent families has been far above the overall poverty rate, rising from about a third of the national poverty rate in 1972-73 to almost a half by 1985-86. The rise in poverty among sole parent families has been faster than the rise in the overall poverty rate, but slower than the rise in the poverty rate among couples with dependent children, although the latter began from an extremely low base in 1972-73. In 1972-73, poverty among sole parent families was about three times the overall poverty rate, while by 1985-86 it had risen to almost four times the national poverty rate.

The relative rise in the poverty rate among sole parents has been reinforced by the increased size of the sole parents population relative to the population as a whole. Table 1 indicates that the number of sole parent families in poverty rose from 45.3 thousand to 118.1 thousand between 1972-73 and 1985-86, an increase of 175 per cent. This has resulted in a change in the composition of the poverty population towards sole parents, who represented 18.1 per cent of all income units in poverty in 1985-86 compared with 11.3 per cent in 1972-73.

2.2 Income Inequality

It is hardly surprising that sole parent families are heavily clustered in the bottom of the income distribution. This results from the heavy reliance of sole parents on income support as a major source of income, combined with the low level of government cash benefits. This is shown in Table 2 which locates sole parents in the gross income distribution of all families with dependent children. It needs to be emphasised, however, that no adjustment is made in Table 2 for the needs of families of different size and composition. To the extent that sole parent families tend on average to be smaller in size than couples with children, adjusting for needs would lead to a somewhat more favourable situation emerging for sole parents.

The situation for sole parents that emerges from Table 2 is, however, particularly unfavourable. Close to 88 per cent of those in the lowest quintile (bottom two deciles) of

ERRATUM

On page 4, the fourth sentence of the first paragraph should read:

Throughout the period, the poverty rate among sole parents has been far above the overall poverty rate, rising from about 30 per cent in 1972-73 to almost 50 per cent by 1985-86.

TABLE 1: POVERTY RATES FOR FAMILIES WITH DEPENDENT CHILDREN, 1972-73 TO 1985-86

Year	Couples with Children			Sole Parents			All Income Units		
	Total Number	Number in Poverty	Poverty Rate	Total Number	Number in Poverty	Poverty Rate	Total Number	Number in Poverty	Poverty Rate
	('000)	('000)	(%)	('000)	('000)	(%)	('000)	('000)	(%)
1972-73	1215.0	36.9	3.0	140.0	45.3	32.4	3916.0	399.4	10.2
1978-79	1498.1	111.6	7.4	210.1	76.3	36.3	4963.4	463.1	9.3
1981-82	1510.0	132.1	8.7	211.9	92.0	43.4	4844.7	489.3	10.1
1985-86	1523.0	159.5	10.5	249.7	118.1	47.3	5184.2	653.2	12.6

Note: The poverty lines and survey populations used to derive these estimates are broadly comparable, although some minor differences remain.

Sources: 1972-73: Commission of Inquiry into Poverty (1975), Tables 3.9 and 3.11.
 1978-79: Social Welfare Policy Secretariat (1981), Table 5.6.
 1981-82 and 1985-86: Social Policy Research Unit (1988), Table 5.

**TABLE 2: INEQUALITY IN GROSS INCOME FOR SOLE PARENTS AND
OTHER FAMILIES WITH CHILDREN**

Gross Income Decile (a)	Percentage of decile who are sole parents	Percentage of sole parents in decile
1982		
Lowest	63.6	53.7
Second	24.6	20.3
Third	11.1	9.3
Fourth	6.6	5.5
Fifth	4.9	4.0
Sixth	3.8	3.2
Seventh	1.9	1.6
Eighth	1.5	1.2
Ninth	1.1	0.9
Highest	0.4	0.3
Gross Income Decile (a)	Percentage of decile who are sole parents	Percentage of sole parents in decile
1986		
Lowest	64.9	53.6
Second	22.9	18.9
Third	13.7	11.3
Fourth	5.9	4.7
Fifth	5.6	4.8
Sixth	1.9	1.6
Seventh	1.7	1.5
Eight	2.5	2.2
Ninth	1.6	1.3
Highest	0.4	0.3

Note: (a) Deciles refer only to income units with dependent children.

Sources: ABS, 1981-82, Income and Housing Survey and 1986 Income Distribution Survey, unit record files.

the income distribution of all families with children are sole parents, compared with 2 per cent (in 1986) in the highest quintile (top two deciles). Indeed, less than 9 per cent of all those in the top half of the income distribution of families with children were sole parents in 1982, and by 1986 this figure had declined to only 8.1 per cent. The distribution of sole parents is also very heavily concentrated in the lower gross income deciles, with almost 84 per cent of sole parents in the lowest three deciles in 1986 and less than 4 per cent in the highest three deciles. According to data published by ABS, the mean weekly income of sole parent income units at the time of the 1986 Survey was \$251, equivalent to only 41 per cent of mean weekly income of married couple units with dependent children. The median weekly income of sole parents, at \$190, was an even lower proportion (35 per cent) of the median weekly income of couples with children (ABS, 1989, Table 3, p. 8).

Table 3 presents the same income distribution data to that used in Table 2 in a somewhat different form. Here, income shares are expressed by income unit type rather than by gross income decile. The picture revealed by the earlier analysis is reinforced. The relative mean income of sole parents, i.e. their mean income relative to the mean income for all income units, is lower than for all other groups except single youth and single aged people, both of whom have lower needs due to the absence of dependent children. Overall, the relative mean income of sole parents is close to 57 per cent, compared with between 146 per cent and 154 per cent for non-aged couples with dependent children.

2.3 Income Composition

The predominance of government cash benefits as a source of income has already been mentioned, and Table 4 provides confirmation of this. Sole parents obtain half of their income in the form of wages and salaries, and a little over a third from government cash benefits (see also Johnstone, 1985). In contrast, non-aged couples with dependent children obtain about three quarters of their income from wages and salaries and only five per cent from government cash benefits. Other income sources (property income, self employment income, and so on) account for about 14 per cent of sole parents' income and around 20 per cent of the income of couples with children.

Given the high proportion of sole parent families resulting from marital breakdown, another area of cash income which merits consideration is receipt of maintenance and alimony. In a survey based on departmental records, Johnstone (1985) found that 25 per cent of sole parent pensioners in September 1984 were receiving maintenance, with most

TABLE 3: INCOME DISTRIBUTION BY INCOME UNIT TYPE

Income Unit Type	1982			1986		
	Share of income units (%)	Share of gross income (%)	Relative mean income ^(a) (%)	Share of income units (%)	Share of gross income (%)	Relative mean income ^(a) (%)
Sole parent	3.9	2.24	57.4	3.7	2.11	57.0
Single youth ^(b)	5.9	2.53	42.9	8.3	3.34	40.2
Single adult, non-aged ^(c)	28.1	20.94	74.5	26.6	20.86	78.4
Single aged ^(c)	10.9	4.06	37.2	10.5	3.87	36.9
Married aged ^(d)	6.7	4.83	72.1	7.4	5.09	68.8
Married non-aged couple, no children	15.2	21.72	142.9	16.7	24.10	144.3
Married non-aged couple, up to 2 children	21.3	31.55	148.1	19.9	30.54	153.5
Married, non-aged couple, 3 or more children	8.1	12.14	149.9	6.9	10.10	146.4
All Income Units	100.0	100.0	100.0	100.0	100.0	100.0

Notes: (a) Relative mean income is derived by dividing the second column by the first column in each year.

(b) Youth is defined as aged 16 to 19 in 1982, aged 16 to 20 in 1986.

(c) Aged is defined as females aged 60 or over, males aged 65 or over.

(d) Married aged are defined if the income unit head is aged 65 or over.

Source: As for Table 2.

Table 4: Sources of Gross Income by Income Unit Type (a)
(Percentages)

Income Source	Sole Parents	Non-aged couples with children	All non-aged income units	All income units
1982				
Wages and Salaries	50.0	72.0	75.5	69.6
Government Cash Benefits	35.1	5.4	4.8	9.2
Other	14.9	22.6	19.7	21.2
	100.0	100.0	100.0	100.0
1982				
Wages and Salaries	49.8	76.3	77.4	71.2
Government Cash Benefits	36.9	5.8	5.5	9.8
Other	13.3	17.9	17.1	19.0
	100.0	100.0	100.0	100.0

Note: (a) In this and subsequent tables, negative recorded incomes (e.g. from employment) have been re-coded with a value of zero on the data files.

Source: As for Table 2.

payments falling between \$10 and \$30 a week (well below the prevailing free area of \$36 a week for a sole parent pensioner with one child). Among sole parents included in the **1986 Income Distribution Survey**, 18.8 percent were currently receiving some regular income from maintenance or alimony. For these families, such payments comprised on average 17.4 per cent of their gross weekly income, the actual percentages ranging from 1.8 per cent to 80.6 per cent. The data also suggests, however, that the extent of dependence on maintenance payments indicated by the latter figure is probably only temporary in most cases. An examination of annual income data from the same source shows that while a similar proportion of sole parents had received income at some stage during 1985-86 from maintenance as were currently doing so, the overall proportion of gross annual income received from this source in no case exceeded 50 per cent. The significance of maintenance and alimony for sole parents is, however, likely to increase as the recent child support scheme takes effect.

The evidence presented in this Section highlights the dire financial circumstances of many single parent families in Australia. Poverty rates are high among single parent families and most of them are clustered at the bottom of the income distribution. Reliance on government cash benefits as a source of income is also particularly high among sole parent families. Improving the financial situation of sole parents thus involves them gaining access to additional income. There are two main ways of achieving this, as Millar (1989) has recently emphasised. The first is through living with an employed man. This is in fact quite common among sole parents. For example, Department of Social Security (DSS) statistics indicate that of the 90.6 thousand terminations of supporting parent's benefit in 1987-88, no less than 31.9 thousand (35.2 per cent) resulted from reconciliation with the spouse or establishment of a de facto relationship (DSS, **Annual Report 1987-88**, p. 60). The second route to improved financial circumstances involves the sole parent themselves joining the paid labour force or increasing their participation in it. The remainder of this paper focuses on this second route, beginning in the next Section with some labour market indicators.

3. PARENTS AND THE LABOUR MARKET

Two features have characterised changes in employment patterns in Australia since 1973. The first is the rapid growth in part-time employment, both in absolute terms and relative to full-time employment growth. The second is the growth in full-time female employment relative to full-time male employment, particularly for unmarried females. Table 5 indicates that over the period 1973-88, male employment grew at an annual

TABLE 5: FULL-TIME AND PART-TIME EMPLOYMENT GROWTH, 1973-1988 (a)
(Thousands)

Year (August)	Males		Married Females		All Females		Persons	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
1973	3697.5	142.1	780.2	448.0	1395.4	547.9	5092.9	690.1
1974	3710.9	136.2	820.7	481.9	1416.9	591.2	5127.8	727.4
1975	3668.4	152.3	783.9	519.7	1378.5	642.2	5046.8	794.4
1976	3665.6	170.7	781.9	555.9	1371.3	690.2	5036.8	860.9
1977	3682.6	184.2	799.3	575.2	1411.9	716.7	5094.6	900.9
1978	3642.5	208.5	739.1	579.5	1402.9	751.6	5045.3	960.0
1979	3715.9	205.2	726.7	581.0	1397.2	760.2	5113.1	965.4
1980	3773.8	209.0	743.4	626.9	1477.3	821.2	5251.1	1030.3
1981	3835.6	222.3	746.4	629.9	1501.5	834.3	5337.1	1056.6
1982	3782.5	241.9	749.6	631.6	1503.4	851.6	5285.9	1093.4
1983	3663.4	240.2	753.3	630.7	1486.9	850.5	5150.3	1090.7
1984	3767.3	245.1	786.9	659.6	1547.5	902.5	5314.8	1147.5
1985	3836.0	253.0	803.1	701.0	1603.2	953.9	5439.2	1206.9
1986	3901.6	278.2	881.2	770.1	1680.7	1025.2	5582.4	1303.3
1987	3947.0	315.3	909.7	807.5	1709.2	1101.6	5656.3	1416.9
1988	4060.4	303.9	957.8	860.3	1795.5	1170.2	5856.0	1474.1
Average Annual Growth Rates (%):								
1973-1978	-0.30	7.97	-1.08	5.28	0.11	6.53	-0.19	6.82
1978-1983	0.11	2.87	0.38	1.71	1.17	2.50	0.41	2.59
1983-1988	2.08	4.82	4.92	6.41	3.84	6.59	2.60	6.21
1973-1988	0.63	5.20	1.38	4.45	1.69	5.19	0.94	5.19

Note: (a) Estimates from August 1986 are based on a revised definition and are thus not strictly comparable with those prior to 1986.

Source: ABS, The Labour Force, Catalogue No. 6203.0; various issues.

average rate of 0.86 per cent, while total female employment grew more than three times faster, at 2.86 per cent. The annual growth rate of part-time employment (5.19 per cent) was more than five times the growth of full-time employment (0.94 per cent). While the trend towards part-time jobs generally, and towards female jobs relative to male jobs, have both been in train since 1973, the period since 1983 has seen a much stronger growth in full-time employment relative to earlier years, associated with much better employment performance generally. Thus as labour market performance has improved since 1983, the movement towards part-time jobs and female employment has continued, but at a somewhat slower pace than in earlier periods. These developments would appear initially to be particularly beneficial to sole parents, most of whom are women, particularly those sole parents who prefer part-time employment.

3.1 Labour Force Status of Sole Parents and Other Parents

Table 6 confirms that the labour force participation rate of female sole parents, after declining until 1983, has risen sharply since then and is now approaching 50 per cent. For married women, the trend since 1974 has been upward, and this too has accelerated since 1983. Male sole parents, in contrast, have been withdrawing from the labour market since the early seventies, although this process has been arrested since 1983. Married male labour force participation has also declined slightly, although much of this has been concentrated among older workers in the form of early retirement. The employment status of sole mothers and married mothers is compared in Table 7. The general trend towards part-time employment already noted is again apparent, but what is interesting here is the higher percentage of full-time employment amongst sole mothers as compared with married mothers. Over the last five years, the proportion of employed sole mothers in full-time and part-time employment has been approximately in the ratio 60:40, while for employed married mothers the ratio has been closer to 40:60. The extent to which such observations reflect the preferred choices of individuals is, of course, a separate question.

There is a common view in Australia that the relatively low part-time employment status of sole parents generally (and sole mothers in particular) results from the financial disincentives associated with the poverty trap. Certainly, as Whiteford, Bradbury and Saunders (1989) have recently established, the potential for the poverty trap facing supporting parent beneficiaries to adversely affect work incentives is considerable. Cass

TABLE 6: LABOUR FORCE PARTICIPATION RATES OF FEMALE PARENTS, 1974-1988^(a)
(Percentages)

Year	Female Sole Parents	Other Female Parents
1974	45.1	40.7
1975	47.9	n.a.
1976	43.6	n.a.
1977	42.4	n.a.
1978	n.a.	n.a.
1979	43.4	44.6
1980	42.9	46.1
1981	41.2	45.7
1982	39.3	45.9
1983	38.8	46.1
1984	40.5	47.2
1985	40.8	50.5
1986	45.2	53.9
1987	44.1	55.8
1988	47.0	56.6

Notes: (a) Due to change in estimation procedures in 1983, data for subsequent years are not strictly comparable with data prior to 1983.

n.a. not available.

Sources: 1974-1985: Social Security review (1986), Table 5.

1985-1988: ABS, *Labour Force Status and Other Characteristics of Families, 1986 to 1989*, Catalogue No. 6224.0.

TABLE 7: FULL-TIME AND PART-TIME EMPLOYMENT STATUS OF MOTHERS, 1979-1988 (a)

Year	Full-Time				Part-Time			
	Sole Mothers (^{'000})	(%)	Married Mothers (^{'000})	(%)	Sole Mothers (^{'000})	(%)	Married Mothers (^{'000})	(%)
1979 (b)	50.4	59.3	336.9	44.3	34.6	40.7	424.4	55.7
1980	55.0	63.4	345.3	43.4	31.9	36.8	450.6	56.6
1981	52.5	59.0	347.0	43.1	36.4	40.9	457.7	56.9
1982	55.1	60.5	351.4	43.6	36.0	39.5	454.6	56.4
1983	52.5	63.3	343.6	43.5	30.6	36.9	446.1	56.5
1984	52.8	56.5	360.4	43.6	40.6	43.5	466.3	56.4
1985	58.6	59.4	379.5	42.8	40.1	40.6	507.9	57.2
1986	66.2	60.6	396.8	42.1	43.1	39.4	545.2	57.9
1987	71.4	60.6	419.9	42.5	46.5	39.4	567.3	57.5
1988	67.7	57.5	427.7	41.7	50.0	42.5	598.6	58.3

Notes: (a) See Note (a) to Table 6. Discrepancies in figures are due to rounding.

(b) Data for 1979 and 1980 for married mothers are slightly understated due to the non-inclusion of wives whose husbands were not in the labour force.

Sources: 1979-1985: Social Security Review (1986), Table 6.

1986-1988: ABS, Labour Force Status and Other Characteristics of Families, 1986 to 1988, Catalogue No. 6224.0

(1986) however, argues that a range of other factors are also relevant to the work decisions of sole parents:

In their daily attempt to combine child care, household duties and part-time employment, single mothers may find that the increased expenditure of time, effort and income involved in labour force participation does not yield a commensurately increased level of disposable income. As a result, the two most economically feasible options of income support are clarified: full-time employment or full benefit. (Cass, 1986, p. 8)

Table 8 presents evidence that, while not confirming this view, is broadly consistent with it. The table compares the labour force states of sole mothers and married mothers by the age of youngest child. For both groups, labour force attachment increases sharply when the youngest child reaches the age of five and enters compulsory schooling. For female sole parents, there is a further increase when the youngest child reaches fifteen, although the reverse happens at this stage for married women. For both groups, increased labour force participation for those with a youngest child over five is concentrated in full-time employment, although part-time employment also rises sharply. For sole mothers with a youngest child over fifteen, there is a marked switch from part-time to full-time employment, with a much weaker switch apparent for married mothers.

However, perhaps the most revealing aspect of Table 8 is the fact that (in both 1984 and 1988) the overall percentages in full-time employment are identical for married women and sole mothers. In contrast, the rate of part-time employment for sole mothers is only just over half that for married mothers. Although these data indicate that there are life cycle factors that play an important role in the labour supply decisions of both married mothers and sole mothers, the difference in part-time employment rates remain important even when life cycle factors are standardised by comparing those with a youngest child in the same age range. While the evidence is not definitive as to the impact of the poverty trap on part-time employment among sole mothers, there is a presumption that this is a factor underlying the observed trends. And if this is the case, it implies that sole parents have been prevented by the poverty trap from receiving some of the benefits associated with the growth in part-time employment that has characterised Australian labour market developments in the last fifteen years.

3.2 Labour Force Status and Poverty Among Single Mother Families

The data presented so far establish a number of similarities between the labour market involvement (as well as trends therein) of single mothers and married mothers. The

TABLE 8: LABOUR FORCE PARTICIPATION OF MOTHERS BY AGE OF YOUNGEST CHILD, 1984 AND 1988

	Age of Youngest child (years)	Full-time employment	Part-time employment	Unemployment	In the labour force
1984					
Married Women					
	0-4	11.2	19.1	4.0	34.3
	5-9	20.9	31.3	3.7	55.9
	10-14	27.0	28.7	2.1	57.8
	15-20	30.1	24.0	*	56.0
	Total	19.1	24.8	3.3	47.2
Female Sole Parents					
	0-4	8.8	10.4	5.1	24.2
	5-9	17.9	16.6	8.3	42.8
	10-14	25.8	16.9	6.3	49.0
	15-20	34.4	17.6	*	57.6
	Total	19.3	14.8	6.4	40.5
1988					
Married Women					
	0-4	12.9	27.9	3.9	44.7
	5-9	24.9	36.7	4.0	65.6
	10-14	32.7	32.7	3.5	68.9
	15-20	30.2	28.1	*	59.8
	Total	22.1	30.9	3.5	56.6
Female Sole Parents					
	0-4	11.7	10.4	8.2	30.5
	5-9	25.4	19.8	6.8	51.9
	10-14	25.1	23.3	7.3	55.8
	15-20	40.4	15.7	9.0	65.2
	Total	22.6	16.7	7.8	47.0

Note: An asterisk (*) indicates that the sample is too small to produce reliable estimates.

Source: ABS, Labour Force Status and Other Characteristics of Families, Catalogue No.6224.0

main exception to this being the relatively low participation of single mothers in part-time work. Section 2 also established the high incidence of poverty among single parent families compared with married couples with children. This, of course, is consistent with the broad similarities in labour force participation of all mothers, because while married mothers' earnings are likely to be supplemented by the earnings (and other income) of the husband, the earnings of sole mothers is far more likely to replace rather than supplement income which might otherwise have been received, particularly income support.

The importance of labour force status in determining the poverty status of sole mothers (and their children) in 1985-86 is further explored in Table 9.² These estimates should be interpreted with caution because many of them are based on small samples and are thus subject to large standard errors. However, the estimates illustrate the great importance of paid work as a route out of poverty for single mothers. Overall, poverty was higher where there were two or more children than where there was only one child, although this relationship varies according to the labour force status of the mother. The poverty rate for all sole mothers not in the labour force is over 72 per cent. This falls to 63 per cent for part-rate workers, is almost halved again to 32 per cent for permanent part-time workers, and falls further to below 6 per cent for full-time full-year workers. However, only 24.3 per cent of sole mothers worked all year (either full-time or part-time) in 1985-86, while 59.2 per cent were not in the labour force. The poverty rate of sole mothers in full-time work for the entire year was only 5.8 per cent, well below the overall poverty rate for the population as a whole (Table 1).

These results thus indicate that poverty is not a characteristic associated with sole parenthood itself, but arises from the combination of sole parenthood and lack of labour market participation.³ It follows that if the labour market is to offer a realistic route out of poverty for sole mothers, the barriers preventing their involvement in paid work must be overcome. Certainly, Table 9 suggests that a strategy that facilitates sole mothers' labour force participation, given the availability of appropriate job opportunities, has much to recommend it as a way of improving the financial circumstances of sole mothers and their children. In addition to the availability of jobs, the success of such a

2. Note that the figures in Table 9 differ from those shown in Table 1 primarily because of the exclusion of income units headed by a sole father.

3. See also Bradbury, Encel, James and Vipond (1988: Appendix B) for similar evidence for 1981-82.

TABLE 9: POVERTY RATES FOR SOLE MOTHER INCOME UNITS BY LABOUR FORCE STATUS^(a)

Labour Force Status	Sole Mother and 1 Child			Sole Mother with 2 or More Children			All Sole Mothers		
	Sample Size	Weighted Sample ('000)	Poverty Rate (%)	Sample Size	Weighted Sample ('000)	Poverty Rate (%)	Sample Size	Weighted Sample ('000)	Poverty Rate (%)
Full-year, full-time worker	36	25.2	7.1	26	18.1	4.0	62	43.3	5.8
Full-year, part-time worker	14	9.4	27.4	5	3.7	43.0	19	13.1	31.9
Part-rate worker ^(b)	34	21.3	60.7	21	14.9	65.8	55	87.1	62.9
Not in the Labour force	96	62.6	64.3	101	71.2	79.8	197	142.4	72.5
Total	180	118.4	48.6	153	107.9	63.9	333	226.3	55.9

Notes: (a) Poverty status has been determined using annual net income and the Henderson poverty line based on simplified equivalence scales. The 1985-86 poverty line for the standard family (working husband, non-working wife and two dependent children) is set at \$240 a week.

(b) Includes both part-year, full-time and part-year, part-time workers because sample sizes prevented separate analysis for each group.

Source: ABS, 1986 Income Distribution Survey, unit record file.

strategy depends on identifying the factors that inhibit the labour market decisions of sole mothers, in order that policies may be better tuned to facilitating entry to, and continuation in, the labour market. The remainder of the paper focuses on this issue.

4. LABOUR SUPPLY ANALYSIS

4.1 Theoretical Framework

The framework used here is the standard 'second generation' static labour supply model for estimating disaggregate labour supply functions in the absence of longitudinal panel data (which would facilitate fitting a dynamic life cycle model) and data on consumption patterns (which would facilitate fitting a life cycle consistent model). The rigorous presentation of the model is in the Appendix.

The essential feature of this model is that all individuals have a minimum wage below which they will not contemplate entering employment. This minimum wage is referred to as the reservation wage (denoted W_r in the Appendix). A mother's W_r is influenced by demographic and economic factors including her age, education, experience, her family situation (numbers and ages of dependent children, whether she has a spouse and if so his employment status and earnings). Although W_r is not readily measured, it plays a central role in this model. Market wages, denoted W_o , are influenced by factors such as her level of education and the extent of her previous employment. Only those women who are offered market wages in excess of their reservation wage will choose employment, and the hours they work are assumed to be related to the difference between W_o and W_r . Under certain circumstances, estimation of the parameters of [A2], the W_r function, can be derived from estimates of the parameters of [A1], the W_o function, and [A3], the hours function. That is, when there is one and only one variable in [A1] which is not in [A2], estimates of the parameters of [A1] and [A3] (or [A3']) can be used to derive estimates of the parameters of [A2].

Several important econometric issues arise in the estimation of the model presented in the Appendix. First, the data set used here, while containing very good information on all the independent, right hand side variables required, has very poor wage and hours information, i.e. on W_r and H the dependent variables of [A1] and [A3] respectively. The only earnings data relates to total annual earnings and the only hours information concerns a full-time/part-time dichotomy on hours worked in the survey week. This precludes direct estimation of the parameters of [A1] and [A3].

In the empirical work reported here, attention is focussed on the decision to seek employment. Factors influencing this decision are those contained in X_{1i} . That is, a woman will only accept employment if her expected offered wage exceeds her reservation wage. The likelihood that a woman will seek employment is the same as the likelihood that she will have $H_i > 0$. This likelihood function is describe fully in Heckman (1980) and Heckman and MaCurdy (1980). It is denoted here by Φ and is estimated here using probit analysis.

Estimating the parameters of Φ yields estimates of [A3] up to a factor of proportionality equal to the standard error on [A3]; see Ross (1986). This factor is positive and constant, and therefore the probit estimates of the parameters of the likelihood function provide direct insights into the directions of influence and the relative magnitudes of influence of each of the variables in X_{1i} .

$F(Z_i)$ is the standard normal distribution function, $f(Z_i)$ is the standard normal density function. In the current context, $F(Z_i)$ is the probability that the i^{th} mother will not be in the labour force, i.e. $[1 - F(Z_i)]$ is the probability that she **will** be in the labour force.

Probit analysis is used on a random sample of **all** women with children to produce an estimate of $\beta_h/(\sigma_{hh}^{1/2})$, i.e. the vector of co-efficients for the hours equation up to a factor of proportionality equal to the standard error on that equation. The probit analysis estimates the co-efficients of a reduced form index of the probabilities of labour force participation. The probit analysis is of interest in its own right since it provides estimates of this index. It is the main focus of attention when the data base being analysed does not permit direct estimation of the hours function [A3] or its variant [A3']; see, for example, Eyland, Mason and Lapsley (1982).

The second econometric issue is how should the unemployed be treated? They are seeking employment and therefore are labour force participants, but their hours of work are constrained to zero. This problem is an empirical issue which will be important only if the incidence of unemployment is systematic within a sub-group of the population of mothers. As this is essentially an empirical issue, estimates of two sets of probits are presented in this analysis. The first set of estimates are on labour force participation, and the second set are on employment. A comparison of the estimates obtained will indicate if unemployment is experienced randomly among mothers or whether there is in fact a systematic pattern to their incidence of unemployment. These results are reported in Columns 1 and 2 of Table 13 in Section 5.

4.2 The Data Base

The data are taken from the unit record file from the 1986 Income Distribution Survey. There are 3202 mothers with dependent children on this file; 2841 of whom were married at the time of the survey and 361 were sole mothers. Of the 361 sole mothers, 285 had previously been married and 76 had never been married. In this analysis, all sole mothers are grouped together because of the relatively small number (i.e. 76) who had never been married. However, it should be noted that sole mothers are a very heterogeneous group. Compared to the previously married mothers, the never married mothers are much younger (average age is 27 compared to 37 for previously married mothers, with 44 per cent of never married mothers aged less than 25 compared to only 6 per cent of previously married mothers under the same age). Never married mothers have twice as many young children but only a quarter the number of older children, reflecting their own relatively young age. The employment situation of never married mothers is quite different to that of previously married mothers. For never married mothers, the incidence of full-time employment is 14 per cent, the incidence of part-time employment is also 14 per cent and the incidence of unemployment is 8 per cent; the corresponding figures for previously married mothers are 27 per cent, 15 per cent and 7 per cent respectively.

Table 10 summarises the labour market position of married and sole mothers. Table 10 indicates that although sole mothers have a lower labour force participation rate and a higher unemployment rate than is the case for married mothers, those sole mothers who are employed are concentrated more in full-time employment. The information presented in Table 10 highlights the central research question addressed in this paper. The key differences in Table 10 are; compared to married mothers, sole mothers have lower labour force participation but higher unemployment, and among those who are employed there is lower part-time employment and higher full-time employment. The research question raised is: do these differences reflect fundamental differences in the way sole mothers respond to labour market signals compared to married mothers, or do sole mothers respond in the same manner as do married mothers, in which case the differences reported in Table 10 simply reflect differences in endowments of characteristics?

By use of multi-variate regression analysis it is possible to determine whether this disparity is in some way related to sole parenthood per se, or whether the differences in labour force behaviour can be explained by systematic differences in endowments of particular characteristics.

TABLE 10: LABOUR FORCE STATISTICS, MARRIED AND SOLE MOTHERS, 1985-86

	Married Mothers	Sole Mothers
	(#)	
In Labour Force	1659	162
Employed Full-time	583	85
Employed Part-time	933	50
Unemployed	143	27
Not in Labour Force	1182	199
Grand Total	2841	361
	(%)	
Labour Force Participation Rate	58.1	44.9
Unemployment Rate	8.6	16.7
Incidence of Unemployment	5.0	7.5
Incidence of Full-time Employment	20.5	23.6
Incidence of Part-time Employment	32.8	13.9

Source: ABS, 1986 Income Distribution Survey, unit record file.

4.3 The Estimated Equations

The actual formulations of equations [A1], [A2] and [A3'] reported here are

$$\ln(W_O) = \beta_{01} + \beta_{02}.EDUCN + \beta_{03}.EXPER \quad [1]$$

$$\begin{aligned} \ln(W_r) = & \beta_{r1} + \beta_{r2}.EDUCN + \beta_{r3}.KIDS04 + \\ & \beta_{r4}.(KIDS04)^2 + \beta_{r5}.KIDS59 + \beta_{r6}.KIDS10 + \\ & \beta_{r7}.OFINC + \beta_{r8}.SPWORK + \beta_{r9}.TRANS + \\ & \beta_{r10}.AGE1524 + \beta_{r11}.AGE2534 + \beta_{r12}.AGE3544 \\ & + \beta_{r13}.AGE4554 + \beta_{r14}.NM + \beta_{r15}.NM.EDUCN + \\ & \beta_{r16}.NM.KIDS04 + \beta_{r17}.NM.(KIDS04)^2 + \\ & \beta_{r18}.NM.KIDS59 + \beta_{r19}.NM.KIDS10 \\ & + \beta_{r20}.NM.OFINC \\ & + \beta_{r21}.NM.SPWORK + \beta_{r22}.NM.TRANS \\ & + \beta_{r23}.NM.AGE1524 + \beta_{r24}.NM.AGE2534 \\ & + \beta_{r25}.NM.AGE3544 + \beta_{r26}.NM.AGE4554 \end{aligned} \quad [2]$$

$$\begin{aligned} H &= h.[\ln(W_O) - \ln(W_r)] \\ &= h(\beta_{01} - \beta_{r1}) + \\ & \quad h(\beta_{02} - \beta_{r2}).EDUCN + h\beta_{03}.EXPER \\ & \quad - h\beta_{r3}.KIDS04 - h\beta_{r4}.(KIDS04)^2 - h\beta_{r5}.KIDS59 \\ & \quad - h\beta_{r6}.KIDS10 - h\beta_{r7}.OFINC - h\beta_{r8}.SPWORK \\ & \quad - h\beta_{r9}.TRANS - h\beta_{r10}.AGE1524 - h\beta_{r11}.AGE2534 \\ & \quad - h\beta_{r12}.AGE3544 - h\beta_{r13}.AGE4554 - h\beta_{r14}.NM \\ & \quad - h\beta_{r15}.NM.EDUCN - h\beta_{r16}.NM.KIDS04 \\ & \quad - h\beta_{r17}.NM.(KIDS04)^2 - h\beta_{r18}.NM.KIDS59 \\ & \quad - h\beta_{r19}.NM.KIDS10 - h\beta_{r20}.NM.OFINC \\ & \quad - h\beta_{r21}.NM.SPWORK - h\beta_{r22}.NM.TRANS \\ & \quad - h\beta_{r23}.NM.AGE1524 - h\beta_{r24}.NM.AGE2534 \\ & \quad - h\beta_{r25}.NM.AGE3544 - h\beta_{r26}.NM.AGE4554 \end{aligned} \quad [3]$$

All of the right hand side variables are defined in Table 11. β_{02} , β_{03} , β_{r2} , β_{r3} , β_{r5} , β_{r7} to β_{r9} , and β_{r10} to β_{r13} are all expected to be positive. The expected signs on β_{r4} and β_{r6} are ambiguous, and depend on the existence of (dis)economies of scale in child rearing. The signs on β_{r14} to β_{r26} are discussed in detail in section 4.4 below.

TABLE 11: MNEMONICS AND DEFINITIONS OF VARIABLES USED IN THE PROBIT ANALYSIS

MNEMONIC	DEFINITION
AGE	mid-point of age group; 15 (15), 17 (16-19), 22 (20-24), 27 (25-29), 32 (30-34), 37 (35-39), 42 (40-44), 47 (45-49), 52 (50-54), 57 (55-59), 62 (60-64)
AGE1524	dummy variable, = 1 if aged 15-24, else = 0
AGE2534	dummy variable, = 1 if aged 25-34, else = 0
AGE3544	dummy variable, = 1 if aged 35-44, else = 0
AGE4554	dummy variable, = 1 if aged 45-54, else = 0
AGE5564	dummy variable, = 1 if aged 55-64, else = 0
EDUCN	minimum number of years of formal education required to obtain highest educational qualification held (full-time equivalent years)
EXPER	full-time equivalent years of employment experience, instrumental variable defined as $\text{EXPER} = -15.128 + 1.222 \times \text{AGE} - 0.011 \times (\text{AGE})^2 - 0.938 \times \text{KIDS04} - 1.398 \times \text{KIDS59} - 1.625 \times \text{KIDS10}$ <p>NB: this equation was derived from a regression analysis of the experience patterns of women in the 1980 Sydney Survey of Work Patterns of Married Women; see Ross (1986) for description of that data set.</p>
KIDS04	number of dependent children aged 0-4
KIDS59	number of dependent children aged 5-9
KIDS10	number of dependent children aged 10 and over
TRANS	gross annual family income from government transfer payments (i.e. pensions and benefits) [\$ p.a.]
FAMINC	gross annual family income from all sources other than the woman's own earnings from employment and TRANS. [\$ p.a.]
SPWORK	= 1 if woman's spouse is employed full-time, = 0.5 if woman's spouse is employed part-time, = 0 otherwise (i.e. if no spouse or if spouse not employed)
NM	= 0 if woman is currently married and living with her spouse, = 1 if woman is not currently married and living with her spouse (i.e. if woman is separated, divorced, widowed, or has never been married)
LFPR	= 1 if in the labour force (i.e. if in paid employment or unemployed), else = 0
EMP	= 1 if in paid employment, else = 0
LBRFT	= 1 if in full-time (i.e. at least 35 hours per week) paid employment, else = 0

The offered wage function [1] is a standard human capital formulation. Employers are assumed to place a positive value on both formal educational achievement and previous employment experience.

In the reservation wage function [2], the quadratic term in young children (KIDS04²) is included to allow for the possibility of economies of scale in rearing very young children. With β_{r3} positive, if there are such economies then the impact of a second child in this age group will be less than that for the first child (in this age group), i.e. β_{r4} will be negative. Conversely, if there are diseconomies of scale in child rearing the impact of the second child will be greater than that of the first child and so β_{r4} will be positive. A zero value for β_{r4} implies constant economies of scale, i.e. the marginal impact of the second child is the same as that for the first child. For the older children category (KIDS10), β_{r6} negative would indicate that these children are net substitutes for their mothers in some home related activities which are time-competitive with the mother's labour force participation. The expectations about the relative magnitudes of the co-efficients on the children variables are

$$\beta_{r3} > \beta_{r5} > \beta_{r6} > 0, \beta_{r4} < 0, \text{ and } \beta_{r3} > |\beta_{r4}|.$$

The age variables AGE1524, AGE2534, AGE3544, and AGE4554 are included to isolate cohort effects. As the reference group is those women aged 55-64, a trend to increasing participation rates implies that each of β_{r10} , β_{r11} , β_{r12} , and β_{r13} should be positive. Previous research has found an inverted-U shape age effect; see e.g. Miller and Volker (1983) and Ross (1986). The expectations on the relative magnitudes of the age variables are

$$\beta_{r11} > \beta_{r12} > \beta_{r13} > 0, \beta_{r10} > 0, \beta_{r11} > \beta_{r10}, \text{ and } \beta_{r10} > \beta_{r13}.$$

The parameter h , which is proportional to the wage elasticity of labour supply⁴, is expected to be positive, although if there is a backward bending labour supply function and most of the offered wages are on the upper portion of the function, h will be negative.

4. The factor of proportionality is equal to the average hours worked by all workers. That is, the wage elasticity is equal to the estimate of h divided by average weekly hours of work. Unfortunately, average hours worked can not be calculated from this data set.

Table 12 compares descriptive statistics for employed and not employed married and single mothers. It is clear that there are significant differences between the groups of mothers. Sole mothers have fewer children in all age groups (KIDS04, KIDS59, KIDS10) than do married mothers. Employed sole mothers are marginally older (AGE), marginally more educated (EDUCN) and have marginally more labour force experience (EXPER) than do employed married mothers but the reverse is true of mothers not in employment; i.e. not employed sole mothers are slightly younger, slightly less educated and have slightly less labour force experience than do married mothers who are not employed. Overall, the age distribution of sole mothers is more even than that for married mothers; eighty per cent of married mothers are aged between twenty-five and forty-four, whereas only sixty-six per cent of sole mothers are in this age range. However, the biggest differences are in the income variables. Sole mothers have three times as much income from government transfer payments (TRANS) but only around 10 per cent as much family income from other all other sources (FAMINC). In addition to not having access to the earnings of an employed spouse, sole mothers have less than half as much income from all other sources than is the case for married mothers. For example, married mothers had spouses who, on average, earned around \$19,142 per annum and had other family income (i.e. other than from their own earnings, their spouse's earnings and transfer payments) of \$5,968 per annum on average. By contrast, sole mothers had no spouse income and the other sources of income averaged only \$2,109 per annum.

4.4 Testing for the Impact of Sole Parenthood

The co-efficients on the set of cross-product terms (i.e. β_{r14} to β_{r26}) will indicate the impact on labour force status of sole motherhood per se. If β_{r14} is significantly different from zero, this will indicate that sole motherhood results in a 'parallel' shift of the decision function. If any of β_{r15} to β_{r26} are significant, it will indicate that sole mothers respond differently to changes in that variable than do married mothers; a negative co-efficient will indicate that sole mothers are less likely to be in the labour force as the value of the variable increases, while a positive co-efficient indicates sole mothers are more likely to be in the labour force with increases in the variable. If all these co-efficients are insignificant, then sole mothers don't react differently to married mothers. If this is so, then the variations in the labour force status of sole mothers compared to married mothers can be explained entirely by variations in their 'endowments' of characteristics.

**TABLE 12: VARIABLES USED IN THE ANALYSIS, MEANS BY
EMPLOYMENT STATUS, MARRIED AND SOLE MOTHERS, 1985-86**

Mnemonic	Married Mothers			Sole Mothers		
	Employed	Not Employed(a)	Total	Employed	Not Employed(a)	Total
AGE	36.31	35.00	35.70	37.28	33.55	34.95
AGE1524	.0382	.0785	.0621	.0532	.1991	.1462
AGE2534	.3620	.4468	.3973	.3259	.3673	.3369
AGE3544	.4752	.3464	.4100	.4011	.3142	.3558
AGE4554	.1189	.1026	.1150	.1980	.1018	.1402
AGE5564	.0057	.0157	.0156	.0218	.0176	.0209
KIDS04	.4104	.7268	.5614	.2777	.5885	.4792
KIDS59	.5210	.5925	.5498	.3767	.5089	.4661
KIDS10	1.0240	.7917	.9144	.9493	.7345	.8026
(total number of children)	1.9554	2.1110	2.0256	1.6036	1.8319	1.7479
EDUCN (yr)	11.74	11.19	11.48	12.08	11.02	11.42
EXPER (yr)	11.21	10.34	10.77	11.94	9.85	10.67
SPWORK	.946	.828	.891	0	0	0
FAMINC (\$/p.a.)	26,573	23,937	25,110	2,378	1,941	2,109
TRANS (\$/p.a.)	850	1,881	1,336	1,966	5,260	3,989
NM	0	0	0	1.000	1.000	1.000
Sample size	1,516	1,325	2,841	135	226	361
Population Estimate	970,622	817,617	1,788,238	85,832	114,699	200,531

Note: (a) i.e. the Unemployed and Not in the Labour Force categories.

Source: ABS, 1986 Income Distribution Survey, unit record file.

5. EMPIRICAL RESULTS

The results of the probit analysis are in Table 13. In the Table are estimates for three likelihood functions. Column 1 presents the estimates of the parameters of the index of the likelihood of a mother being in the labour force (i.e. being either employed or officially unemployed, indicated by LFPR = 1; see Table 11). Column 2 presents the estimates of the parameters of the index of the likelihood of a mother being successful in the labour market, i.e. actually being in employment (i.e. EMP = 1). Column 3 presents the estimates of the parameters of the index of the likelihood of an employed mother being in full-time employment rather than part-time employment (i.e. LBRFT = 1; see Table 11).

The interpretation of the estimates presented in Table 13 of the co-efficients is as follows. A positive (negative) estimated co-efficient indicates that (i) an increase in the value of that variable will increase (decrease) the likelihood that the dependent variable (LFPR, EMP or LBRFT) will have the value one, and (ii) a decrease in the value of that variable will increase (decrease) the likelihood that the dependent variable (LFPR, EMP or LBRFT) will have the value zero. If the estimated co-efficient is zero (or at least statistically insignificantly different from zero), then changes in that variable have no impact on the value of the dependent variable. When comparing two variables with co-efficients of the same sign (i.e. both positive, or both negative) the one with the greater magnitude will have the greater impact for a one unit change. However, this sort of comparison is only useful for variables of a similar nature. For example, while it is of considerable value to compare the impact of a one unit change in KIDS04 with the same change in KIDS59, there is little point in comparing a one unit change in KIDS04 with, say, a one unit change in FAMINC or EDUCN.

Each column of Table 13 will be discussed in turn. Within these discussions, the focus will initially be on the impact of each of the key variables and their associated co-efficients, i.e. β_{01} to β_{03} , and β_{11} to β_{13} . The central research question of the differential labour market behaviour of sole mothers will then be addressed by focussing on the set of cross-product terms and their co-efficients β_{14} to β_{26} .

5.1 Results of Labour Force Participation

Column 1 of Table 13 indicates that labour force participation is determined by both economic and demographic variables. Previous research on female participation has indicated that the presence of children, especially very young children, has a major,

TABLE 13: PROBIT ANALYSIS RESULTS, ALL MOTHERS

Dependent Variable → (No. of observations → Regressor ↓	Co-efficient Estimate		
	LFPR 3202	EMP 3202	LBRFT 1651)
Constant	-1.5388* (.4711)	-2.5146* (.5113)	-1.2582** (.7845)
KIDS04	-.6535* (.1170)	-.4643* (.1210)	-.2842 (.1838)
KIDS04 ²	.0813** (.0471)	.0351 (.0502)	.0071 (.0856)
KIDS59	-.0928** (.0480)	-.0663 (.0494)	-.1970* (.0725)
KIDS10	.0095 (.0485)	.0733 (.0503)	-.0086 (.0712)
AGE1524	1.0058* (.3435)	1.1430* (.3738)	.9059 (.6103)
AGE2534	1.1396* (.2632)	1.2714* (.2867)	.5481 (.4930)
AGE3544	1.0252* (.2285)	1.1134* (.2470)	.3346 (.4494)
AGE4554	.6603* (.2288)	.7193* (.2441)	.0796 (.4463)
EDUCN	.0851* (.0123)	.0843* (.0122)	.0538* (.0152)
EXPER	-.0003 (.0233)	.0419** (.0247)	.0585** (.0358)
FAMINC/1,000	-.0024* (.0012)	-.0022** (.0012)	-.0008 (.0016)
TRANS/1,000	-.0853* (.0145)	-.1072* (.0163)	-.0413 (.0335)
SPWORK	.3159* (.1003)	.4899* (.1032)	-.4284* (.1613)

TABLE 13: PROBIT ANALYSIS RESULTS, ALL MOTHERS
(continued)

Dependent Variable → Regressor ↓	LFPR	Co-efficient Estimate EMP	LBRFT)
NM	-.1391 (1.5160)	.1406 (1.5980)	1.1122 (2.6210)
NM.KIDS04	-.0385 (.3758)	-.2680 (.3999)	.0352 (.7044)
NM.KIDS04 ²	.0869 (.1571)	.1949 (.1637)	.1054 (.2961)
NM.KIDS59	-.0276 (.1780)	-.0100 (.1914)	.2518 (.3090)
NM.KIDS10	.3220* (.1631)	.1353 (.1736)	.1169 (.2820)
NM.AGE1524	-.2543 (1.0670)	-.2789 (1.1250)	-.6074 (1.8570)
NM.AGE2534	-.2711 (.7657)	-.4295 (.7984)	-.5930 (1.3100)
NM.AGE3544	-.6371 (.6109)	-.9894 (.6324)	-.1125 (1.0510)
NM.AGE4554	-.5681 (.5970)	-.6902 (.6138)	.0801 (1.0110)
NM.EDUCN	.0134 (.0390)	.0188 (.0397)	-.0257 (.0594)
NM.EXPER	.0656 (.0776)	.0835 (.0826)	-.0140 (.1336)
NM.FAMINC/1,000	-.0710* (.0191)	-.0572* (.0187)	-.0473** (.0259)
NM.TRANS/1,000	-.0918* (.0283)	-.1004* (.0312)	-.1961* (.0637)

Notes: Reference group are sole mothers aged 55-64 years.
Standard errors in parentheses.

* indicates co-efficient significant at the 95% confidence level

** indicates co-efficient significant at the 90% confidence level

negative influence on participation; see, e.g. Eyland et al. (1982), Miller and Volker (1983), and Ross (1986). The present results reinforce this conclusion. Pre-school aged children (KIDS04) have a very large negative impact on participation, although there are strong economies of scale evident; it is the first such child which has the biggest impact on participation, with the marginal impact of additional pre-schoolers in the family declining as the number of children increases. Evaluated at sample means, the presence of one pre-school aged child lowers the probability of participation by 22 percentage points, while the marginal impact of a second pre-schooler is a further reduction of 11 percentage points. Children of primary school age (KIDS59) also reduce the participation probability, but by a much smaller degree; e.g. the impact of one primary school aged child reduces the participation probability by 3.7 percentage points. Older children (KIDS10) have no impact on the labour force participation decisions of their mothers.

The co-efficients on the four age dummies appear to suggest that the age profile of participation does have the familiar inverted-U shape, peaking in the 25 to 34 age range although the profile is fairly flat around its peak. However, while all four age groups have higher participation probabilities than the reference group (i.e. the 55 to 64 age group), the co-efficients on the first three (AGE1524, AGE2534, AGE3544) are not statistically significantly different from each other, although each is statistically significantly higher than that for AGE4554, which in turn is greater than that for the reference group. That is, after adjusting for all other variables, the age profile of participation is very flat up to age forty-five, after which participation declines with age.

The co-efficient on EDUCN indicates that more highly educated mothers are more likely to be in the labour force. This co-efficient is the net effect of two opposing effects, i.e. in [3] the co-efficient is $h(\beta_{02} - \beta_{12})$. The fact that the net effect is positive (i.e. the co-efficient value is +.0851) indicates that the value of an extra year of formal education is relatively more highly rewarded by employers, i.e. that $\beta_{02} > \beta_{12}$. Curiously, the impact of previous labour force experience (EXPER) appears to have no impact on current participation, although this may simply be due to the way in which the experience variable has had to be represented; see Table 11.

The impact of the income variables is in accord with economic theory. Mothers with greater access to other sources of income are less likely to be in the labour force. The impact on participation of changes in the level of transfer payments (TRANS) is much greater than that of other sources of family income (FAMINC). The co-efficient on TRANS (-.0000853) is considerably larger in absolute magnitude than that on FAMINC (-.0000024). Evaluated at sample means of all other variables, these co-efficients

suggest that a \$5,000 increase in TRANS will decrease the likelihood of a mother being in the labour force by some sixteen percentage points whereas the same increase in FAMINC will reduce the likelihood of labour force participation by only one-half of one percentage point.

Mothers with working spouses are more likely to be in the labour force themselves than are mothers without working spouses. The co-efficient on SPWORK indicates that, *ceteris paribus*, the likelihood that a mother with a working spouse will be in the labour force is some 18.7 percentage points higher than that for a similar woman without a working spouse (be she married or single).

The differential impact of marital status on participation can be seen in the set of co-efficients on the cross-product terms involving the NM variable, i.e. the co-efficients β_{T14} to β_{T26} . The differential impact of sole parenthood is captured in these cross-product terms. The total responsiveness of sole parents to changes in a specific variable is reflected in the sum of the co-efficients on the cross-product term and the non cross-product term for the same variable. For example, the differential impact of one primary school aged child on the labour market position of a sole mother is reflected in β_{T18} (i.e. the co-efficient on NM.KIDS59) whereas the total impact of that child on a sole mother is reflected in $\beta_{T18} + \beta_{T5}$ (i.e. the sum of the co-efficients on NM.KIDS59 and KIDS59).

These co-efficients indicate that sole mothers do respond to labour market signals in the same manner as do married mothers bar three important exceptions. All the co-efficients on the cross-product terms, including that on NM alone, are insignificant except for those on the two income variables (FAMINC and TRANS) and that on NM.KIDS10. The insignificant co-efficient on NM indicates that there is no 'parallel' shift in the behaviour of sole mothers compared to their married counterparts, while the other insignificant co-efficients indicate that the same conclusion is true with respect to each of those variables individually.

However, sole mothers do react to changes in the two income variables considerable more strongly than do married mothers. The co-efficient on NM.TRANS (-.0000918) indicates that the total effect of this variable is double that for married mothers. For a married mother, the effect is reflected completely by the co-efficient on TRANS (i.e. -.0000853), while for sole mothers the effect is reflected in the sum of the co-efficients on TRANS (-.0000853) and NM.TRANS (-.0000918), i.e. the net co-efficient is -.0001771 (= -.0000853 + -.0000918). Evaluated at sample means, the impact of a \$5,000 increase in TRANS is to reduce the likelihood of participation by some thirtytwo percentage points; i.e. double the reduction for a married mother.

The co-efficient on NM.FAMINC (-.0000710) is statistically identical to that on NM.TRANS; that is, the hypothesis that these two co-efficients are equal can not be rejected at usual levels of confidence. Thus, the differential impact of changes in income sources for sole mothers is independent of the source of that income. However, the overall impact of changes in FAMINC is not the same as that for TRANS. This is because the underlying impact (as measured via the co-efficients on TRANS and FAMINC) are different. Nevertheless, after adjusting these co-efficients by the differential impact of NM.TRANS and NM.FAMINC, much of the gap is eliminated. The adjusted co-efficient on FAMINC is -.0000735, while that for TRANS is -.0001771. The TRANS co-efficient is now only twice as large, in absolute size, as that on FAMINC whereas previously it was some thirty five times larger. To illustrate the importance of this difference, recall the above comparison of a \$5,000 increase in TRANS and the same increase in FAMINC. For a married mother, the relative impacts were 15.5 percentage points (TRANS) and 0.5 percentage points (FAMINC). For a sole mother, these impacts are 32.5 percentage points (TRANS) and 14.8 percentage points (FAMINC).

Although the co-efficient on KIDS10 was insignificant, that on NM.KIDS10 is significant. Thus sole mothers with older children (KIDS10) are more likely to be in the labour force than are married mothers, other things being equal. Whereas the impact of older children on participation is insignificant for married mothers, there is a positive, and fairly strong, impact for sole mothers. Evaluated at sample means, the impact of the presence of one older child on a sole mother's labour force participation is to raise the likelihood by around eleven percentage points.

5.2 Employment

There are four major differences in the results presented in Column 2 of Table 13 compared to those in Column 1. First, there are no economies of scale evident in the presence of pre-school aged children; i.e. the co-efficient on (KIDS04)² is no longer significant. Second, primary school aged children appear not to have any impact on employment, i.e. the co-efficient on KIDS59 is also no longer significant. Third, previous employment experience (EXPER) is now significant with mothers with more previous experience being more likely to be currently employed. Fourth, the co-efficient on the cross-product term between NM and KIDS10 is not statistically significant. These results indicate that unemployment, i.e. the difference between participation and

employment, might not be randomly spread among mothers. Thus, there is possibly a sub-group of participating mothers who are more likely to be unemployed.⁵

In all other respects, the results in Column 2 reflect those in Column 1. With the exception of SPWORK, for every variable which is statistically significant in Column 2, the estimated co-efficient is within one standard error of the estimate presented in Column 1. The co-efficient on SPWORK in Column 2 is more than one standard error greater than that in Column 1, although the difference is not quite as much as twice the standard error on the Column 1 estimate. For all the variables with significant co-efficients, the story is the same as in Column 1. For example, the age profile of employment is flat up to age forty-five, and thereafter employment declines with age. More highly educated mothers are more likely to be employed, as are mothers with working spouses.

The differential impact of sole parenthood on employment is here reflected completely in the responsiveness of sole mothers to changes in the levels of other sources of income, as the cross product with KIDS10 is not significant. FAMINC and TRANS are the only two variables for which the response of sole mothers is different to that for married mothers. For both of these variables, sole mothers are more responsive than married mothers (i.e. the co-efficients on NM.FAMINC and NM.TRANS are both negative). Interestingly, unlike Column 1, these two co-efficients are not statistically identical, with the marginal impact on employment of transfer payments being twice that of other sources of income.

5.3 Full-time Employment versus Part-time Employment

The results in Column 3, which relates only to **employed** mothers, complement the picture presented in the first two columns although there are some important differences to note. In this Column, a negative co-efficient indicates that an increase in the characteristic leads to a lower likelihood of full-time employment, and therefore a correspondingly higher likelihood of part-time employment. Working mothers with primary school aged children (KIDS59) are more likely to be in part-time employment than in full-time employment. Curiously, the presence of one or more pre-school aged children has no impact on the type of employment gained. That is, the insignificant co-efficients on KIDS04 and (KIDS04)² indicate that mothers with pre-schoolers who are employed are just as likely to be in full-time employment as in part-time employment.

5. This point will be further developed in future research.

Given that these data are from mid-1986, when the availability of long day child care⁶ was fairly scarce, it was expected that employed mothers with pre-schoolers would be more likely to be in part-time employment than in full-time employment as these children were more likely to be in kindergartens than in long day care.

The age profile is completely flat; all age groups, including the reference group, are equally likely to be in full-time employment. More highly educated mothers are more likely to be in full-time employment, as are mothers with more previous employment experience.

Mothers with working spouses are more likely to be in part-time employment. Interestingly, neither FAMINC nor TRANS has any impact on the type of employment. It had been expected that these income variables would have negative co-efficients as mothers with higher levels of transfer payments or other non-wage income would via the income effect be more likely to be in part-time employment.

Turning to the cross-product terms, again only the two income variables are significant. For all other characteristics, the likelihood of an employed sole mother being in full-time employment (rather than part-time employment) is exactly the same as it is for an employed married mother. Sole mothers who are employed are more likely to be in part-time employment if they have some other income (NM.FAMINC) while working sole mothers in receipt of transfer payments (NM.TRANS) are also less likely to be in full-time employment; this latter result no doubt reflecting the application of the income tests on many transfer payments.

5.4 Summary

The results presented in Table 13 can be summarised as:

- (1) Mothers with pre-school aged children are the most unlikely to be in the labour force and in employment, but if they are employed they are just as likely to be in full-time employment as they are to be in part-time employment.

6. Long day care refers to child care which is available for at least eight hours per day five days per week, and is to be contrasted with kindergarten or pre-school care which is typically available to individual children for no more than six hours per day and for less than five days per week.

- (2) Mothers with primary school aged children are more likely than are mothers with pre-schoolers, but less likely than mothers with older children, to be in the labour force and to be employed.
- (3) More educated mothers are more likely to be employed and are most likely to be in full-time employment rather than part-time employment.
- (4) Mothers with working spouses are more likely to be in the labour force and to be employed, but are more likely to be in part-time employment than in full-time employment.
- (5) Mothers with more employment experience are no more likely to be in the labour force, but if they are in the labour force they are more likely to be employed and if employed in full-time jobs.
- (6) The age profile of employment is very flat. After allowing for all other factors, all mothers aged up to forty-five are equally likely to be in the labour force and to be employed.
- (7) Finally, although sole mothers respond to most labour market signals exactly the same as do married mothers, there is one important exception. Sole mothers are far more responsive to income changes than are married women. This is especially true in relation to transfer payments, but is also significant in relation to other sources of income.

6. SUMMARY AND CONCLUSIONS

There is now a body of evidence pointing to the adverse economic and social circumstances of many single parent families in Australia. Rates of dependency on income support among single parents is high, although the duration of income support receipt is in many instances not unduly long. But such dependency, combined with the fact that this is the only form of income for many single parent families, serves to place them towards the lower end of the income distribution and thus with a high incidence of poverty. The evidence presented in Section 2 of the paper confirms that single parent families are among the most disadvantaged groups in Australian society.

One way of addressing this situation is to provide single parents with greater access to employment opportunities. A number of policy initiatives have been introduced in recent years with this aim in mind, including the provision of priority access to child care and measures to reduce the severity of the poverty trap facing sole parents in receipt of

income support. It is interesting, however, to observe that the pattern of participation rates of single mothers in full-time employment are very similar to those of married mothers with a youngest child of the same age. In contrast part-time employment among sole mothers is well below that of married mothers with a youngest child of the same age. This latter evidence is suggestive of the fact that high effective marginal tax rates arising from interactions between the tax system and income-tested social security arrangements have resulted in disincentive effects for sole mothers, at least in relation to part-time work.

This paper has investigated this issue by estimating labour supply functions for single mothers and comparing these with the labour supply functions of married mothers. The focus of the analysis has been on establishing whether the labour supply behaviour of the two groups is different, and if so why. Specifically, the issues addressed relate to the question of whether or not being a **single mother** makes any substantial difference to work decisions over and above those factors contributing to the work decisions of **mothers, per se**.

The evidence presented in Table 13 and discussed in Section 5 suggests that sole mothers do respond to labour market signals in much the same way as do married mothers with the important exception that they (sole mothers) are much more responsive to changes in access to other sources of income - particularly government transfer payments but more generally to all non-wage income sources. The fact that this analysis has found that the negative impact of transfer payments, on labour market participation, is much greater for sole mothers than it is for married mothers does suggest that sole mothers have been prevented by the poverty trap from sharing in some of the benefits associated with the growth in employment, and especially part-time employment, that has characterised Australian labour market developments in the last fifteen years.

These findings are, however, preliminary. It remains to be seen if they are supported in further research using other data sets and using more refined estimation techniques. But the findings reported in the paper are consistent with the view that the labour supply behaviour of mothers in Australia has more to do with the fact that they are mothers (and, more significantly, with the age of their youngest child), than whether or not there is an adult partner present. This suggests that the emphasis in understanding the labour supply decisions of single mothers should be placed more on the fact that they are **mothers**, rather than on the fact that they are **single mothers**.

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Appendix: The Theoretical Framework

The framework used here is the standard 'second generation' static labour supply model (see Heckman, Killingsworth and MaCurdy (1981), pp 106-112, or Killingsworth (1983), Chap. 4) for estimating disaggregate labour supply functions in the absence of longitudinal panel data (which would facilitate fitting a dynamic life cycle model; e.g. Heckman and MaCurdy (1980)) and data on consumption patterns (which would facilitate fitting a life cycle consistent model; e.g. Blundell and Walker (1983)).

The theoretical model is described by three equations:

$$W_{oi} = f(X_{oi}) + u_{oi} \quad [A1]$$

$$W_{ri} = g(X_{ri}) + u_{ri} \quad [A2]$$

$$H_i = \max [0, h(W_{oi} - W_{ri})] \quad [A3]$$

where W_o , W_r and H are the offered wage, the reservation wage, and depth of participation (typically measured by hours worked per week or per annum) respectively; subscript i referring to the i^{th} individual. X_o and X_r are vectors of characteristics[♦]; X_o comprises human capital characteristics (e.g. education, previous employment experience), while X_r contains both human capital and demographic (e.g. marital status, age) characteristics. f , g and h are functions^{♦♦}, and u_o and u_r are the random error components of the system.

Only those women who are offered wages in excess of their reservation wage will choose employment, and the hours they work are assumed to be related to the difference between W_o and W_r .

The functional forms of [A1] - [A3] used in the empirical work reported here assume that f and g are log-linear in their parameters, h is a constant, and the error terms u_o and u_r are joint normal variables which are independent across observations. Thus

♦ Each contains a constant term.

♦♦ Note that, in this model, no variable can influence hours without also influencing participation

$$\ln(W_{oi}) = \beta_o \cdot X_{oi} + u_{oi} \quad [A1]$$

$$\ln(W_{ri}) = \beta_r \cdot X_{ri} + u_{ri} \quad [A2]$$

$$H_i = \max \{0, h[\ln(W_{oi}) - \ln(W_{ri})]\} \quad [A3]$$

For **employed** women, i.e. those for whom $H_i > 0$, [A3] can be rewritten as

$$\begin{aligned} H &= h[\ln(W_o) - \ln(W_r)] \\ &= h(\beta_o X_o - \beta_r X_r) + h(u_o - u_r) \\ &= \beta_h \cdot X_h + u_h \end{aligned} \quad [A3']$$

i.e. X_h consists of all elements of X_o and X_r , and $u_h = h(u_o - u_r)$.

$$\begin{aligned} \text{Thus } \beta_{hj} &= h\beta_{oj} \text{ for variables in } X_o \text{ but not in } X_r, \\ &= h\beta_{rj} \text{ for variables in } X_r \text{ but not in } X_o, \\ &= h(\beta_{oj} - \beta_{rj}) \text{ for variables appearing in both } X_r \text{ and } X_o. \end{aligned}$$

In the empirical work reported here, attention is focussed on the decision to seek employment. Factors influencing this decision are those contained in X_h . That is, a woman will only accept employment if her expected offered wage exceeds her reservation wage. The likelihood that a woman will seek employment is the same as the likelihood that she will have $H_i > 0$. This likelihood function is describe fully in Heckman (1980) and Heckman and MaCurdy (1980). It is estimated here using probit analysis. The exact formulation of the likelihood function used is

$$\Phi = \prod F(Z_i)^{1-d} \cdot [1-F(Z_i)]^d \quad [A4]$$

where Φ is the value of the function, $F(Z_i)$ is the cumulative frequency of a standard normal variable Z_i , and d is a dummy variable equal to one if $H_i > 0$ and equal to zero if $H_i = 0$. Z_i is defined as

$$Z_i = -\beta_p \cdot X_h \quad [A5]$$

where β_p is the vector of estimated co-efficients from the probit analysis, i.e.

$$\beta_p = \beta_h / (\sigma_{hh}^{1/2}) \quad [A6]$$

Thus, estimating the parameters of Φ yields estimates of [A3] up to a factor of proportionality equal to the standard error on [A3]; see Ross (1986). This factor is positive and constant, and therefore the probit estimates of the parameters of the likelihood function provide direct insights into the directions of influence and the relative magnitudes of influence of each of the variables in X_h .

$F(Z_i)$ is the standard normal distribution function, $f(Z_i)$ is the standard normal density function. In the current context, $F(Z_i)$ is the probability that the i^{th} woman will not be in the labour force, i.e. $[1 - F(Z_i)]$ is the probability that she will be in the labour force.

Probit analysis is used on a random sample of all women with children to produce an estimate of [A6], i.e. of $\beta_h / (\sigma_{hh}^{1/2})$ the vector of co-efficients for the hours equation up to a factor of proportionality equal to the standard error on that equation. The probit analysis is of interest in its own right since it provides estimates of the co-efficients of a reduced form index of the probabilities of labour force participation. It is the main focus of attention when the data base being analysed does not permit direct estimation of [A3] or [A3']; see, for example, Eyland, Mason and Lapsley (1982).

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