* Youth in the Eighties * Research from the ALS * CEPR ANU-DEET *

Youth in the Eighties

Papers from the Australian Longitudinal Survey Research Project

Editors:
R.G. Gregory and T. Karmel

Department of Employment, Education and Training &
Centre for Economic Policy Research, ANU

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Tom Karmel

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Preface

The papers in this volume are the outcome of the Australian Longitudinal Survey (ALS) Research Project, sponsored by the Department of Employment Education and Training (DEET) and organised under the auspices of the Centre for Economic Policy Research, Australian National University

The Project, which commenced in February 1990, was designed to promote use of the unique ALS data set for research of economic and social policy relevance, particularly in the area of youth and labour market issues In commissioning the research, the major criteria were policy relevance and emphasis on the longitudinal nature of the ALS data. Expressions of interest were received from universities throughout Australia and from overseas. Draft proposals were the subject of an author's Workshop held in June 1990.

The Conference *The Australian Longitudinal Survey· Social and Economic Policy Research* held in December 1990 was convened as part of the ALS Research Project to provide a forum for presentation and discussion of the papers which were subsequently revised and edited for publication

Manipulation and effective use of longitudinal data place heavy demands on researchers, who must acquire both detailed knowledge of this complex data set and specialised computing and econometric skills A major aim of the Project was to encourage researchers to utilise the ALS data, and this was assisted by making available tailor-made data files in PC readable form and by providing access to support staff with specialised computing and programming skills.

In that context some special acknowledgements are due: to Margi Wood, whose expertise, patience and dedication piloted many foundering researchers safely through the hazardous shoals of longitudinal data extraction and computation; to Shirley Halton who provided similar computing support; to Trevor Breusch who presented an invaluable, specialist econometrics workshop for authors in the early stages of the project; and to Roger Jones and Gina Roach, Social Science Data Archives, ANU, who made the data available in user-friendly form and provided the appropriate volumes of the *ALS User's Guide* [1]

The ALS Research Project depended on many people for its successful completion. Geoff Parkinson administered the Project for DEET and, as a Principal Investigator for the ALS, was also an important source of technical advice. Steve Dowrick for CEPR, saw the project through its initial stages and convened the authors' workshop before leaving for overseas and handing the reins to Alan Stretton, who convened the ALS Conference.

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1 The *ALS User's Guides* were prepared by and can be obtained from the Social Science Data Archives (SSDA), ANU. A full list is included in the Bibliography at the end of this volume

A major contribution was made by Catherine Baird, CEPR, who not only expertly and efficienctly coordinated the Project but also undertook the unenviable task of preparing the papers for publication. The able assistance of Merilyn Wolfe in formatting the papers, and of Eileen Berry in running the ALS Conference is also gratefully acknowledged.

The Department of Employment, Education and Training and the Centre for Economic Policy Research are indebted to the authors for their willingness to invest substantial time and effort in familiarising themselves with the ALS data set and the special skills required to use it effectively. We would also like to thank all who participated in and contributed to the ALS Conference, in particular the formal discussants Bruce Bradbury, John Creedy, Owen Covick, Trish Mercer, Paul Miller, Alan Stretton, Richard Sweet, and Michael Pergamit of the US Bureau of Labor Statistics.

In addition to producing this volume, the Project has been successful in significantly enhancing the pool of expertise available to future users of the ALS data.

R.G. Gregory, CEPR
T. Karmel, DEET *September 1992*

Overview

R.G. Gregory

The topics addressed in this book will be familiar to many policy makers, practitioners and researchers. However, the analysis of the youth labour market and many of the insights are new and based on a new longitudinal data base—the Australian Longitudinal Survey (ALS). This survey has been conducted annually since 1985 by the Department of Employment, Education and Training.

The reader who is unfamiliar with the ALS might ask: Why was the Survey established? What are its aims? How does longitudinal data differ from other data sources? What are its advantages? Could the questions canvassed in the research presented here have been effectively addressed without the ALS data? The first part of this Overview attempts to answer these questions by reference to the individual studies which make up this volume.

The second part provides a summary of some of the major themes of the papers and relates them to the important changes which are taking place in the labour market.

The ALS : Background and Data Advantages

Over the last two decades there have been profound and generally adverse changes in the Australian youth labour market Since 1970, 70 per cent of full-time jobs for women aged 15-19 years and 55 per cent of full-time jobs for men aged 15-19 years, have disappeared. Each recession since 1970 has involved larger job losses for teenagers than the one before, and the losses have not been made good in the recovery. For example, from the peak of the preceding boom to the depth of the recession two years later, teenage males lost 6 per cent of full-time jobs between 1973 and 1975, 24 per cent of full-time jobs between 1981 and 1983, and 35 per cent between 1989 and 1991. The 20-24 year age group has also been adversely affected and since 1970 unemployment rates have increased thirteen-fold for men and seven-fold for women.

The magnitude of these adverse labour market changes can be emphasized by the following hypothetical and pessimistic exercise *If linear trends of the last two decades continue then in the year 2001:*

- there will be no full-time job opportunities for young women aged 15-19 years and full-time employment for young men will also disappear if, as has been recently suggested, apprenticeships are no longer based on full-time employment;
- full-time employment opportunities for young men aged 20-24 years, will fall another 16 per cent; and,
- between the ages of 15-24 years, young people will spend an average of 20 months searching for full-time employment

However, not all outcomes over the last two decades have necessarily been adverse. Participation rates for high school and tertiary education have increased considerably, especially since the early 1980s, and increased government income support and part-time employment growth have allowed more education to be financed more easily than otherwise The involvement of young people in the labour market has not fallen over the two decades but the nature of that involvement has changed: a greater proportion are in part-time employment or in a combination of education and part-time employment.

Another favourable outcome is that women in the 20-24 years age group have made substantial labour market gains in relative terms Unlike the experience of all the male age groups, full-time employment for young women 20-24 years has not fallen markedly, and their full-time wages have increased by about thirty per cent, in relative terms, in response to government equal pay initiatives in the early seventies

In recognition of these major changes in the youth labour market, and in anticipation of further changes over the next decade, the Department of Employment Education and Training (DEET) has been collecting data—the Australian Longitudinal Survey data base—from the same group of young people each year since 1985, utilizing it for policy development and making it available on computer tapes for researchers. The papers collected in this volume are based on that data and cover a wide range of different aspects of the experiences of young Australians over the years 1985-1988 [1]

The ALS data focuses on young people aged 15-25 years There are a number of reasons why this group is the subject of special attention One is the general belief that young people bear a disproportionate part of the burden of difficult economic times, a belief supported by teenage unemployment rates being many times those of prime age adults. Another is that governments spend considerable sums of money on training and education subsidies to encourage young people to make decisions that will improve their future economic well-being and there is a need to monitor the effectiveness of this policy.

Finally, longitudinal data are most needed when there are considerable changes in an individual's circumstances from one year to the next. From a labour market perspective it is the young who are subject to greatest change and the rewards from collection and analysis of longitudinal data, are greatest for them.

Before the ALS became available researchers and policy analysts were largely dependent on the *Labour Force Survey*, collected by the Australian Bureau of Statistics (ABS). The availability of the ALS data base has

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1 The first wave of the representative Youth sample consisted of 8995 young people aged 16 to 25 years in 1985. The group was re-interviewed in 1986, 1987 and 1988. There were no new additions to the sample during these years After 1988 the Youth sample was conducted by telephone interview and data for 1989 and 1990 are now available. The Survey is the responsibility of the Economic and Policy Analysis Division of the Department of Employment, Education and Training, Canberra

considerably enhanced the analysis of the youth labour market and the data base has a number of advantages not shared by the *Labour Force Survey*.

First, the ALS collects a wider range of data and it is available on a unit record basis. Thus it is possible to match individual responses to employment questions to the same individual's income, attitudes towards a range of social issues, family background and so on. Because of the special nature of the confidentiality requirements imposed on the ABS it is severely restricted in its ability to release unit record data and as a result Australia's research capability and understanding of labour markets is constrained. The ALS data base has therefore become the principal source of data for research into the operation of the Australian youth labour market.

The second major advantage of the ALS data base is its longitudinal nature The *Labour Force Survey* is not longitudinal and is used mainly to describe the average experience of groups of individuals at a point of time and changes of these average experiences through time The *Labour Force Survey* data are most useful when outcomes are random across individuals so that average changes in the group describe equally well the changing circumstances of any sub-group. In many instances, however, outcomes are not random across individuals and changes in the group average are not sufficient to present a good picture of what is happening to young people. In these circumstances, we need longitudinal data which follow the experiences of the same set of individuals from one period to another

Some of the limitations of the *Labour Force Survey* data and the advantages of longitudinal data can be illustrated by the following examples taken from this volume.

In addition to measuring average unemployment variations from one period to the next governments need to know unemployment incidence. Is unemployment spread evenly, so that on average all share equally in the experience, or is unemployment concentrated on a small group of people who are continually becoming unemployed? The need for special employment programmes is greater if unemployment is concentrated on a sub-group of people who experience many unemployment spells and targeting of programmes can be improved if the characteristics of the sub-group can be identified (see Junankar and Wood; and Chapman and Smith) Measurement of unemployment incidence to take account of recurrent unemployment spells requires longitudinal data that identify the labour force state of the same individuals over a long period of time.

Similarly, it is well known that the unemployed have lower health status than the employed. But does poor health lead to unemployment or does unemployment lead to poor health? (see Graetz). Once again data on the same individual through time is needed to enable us to answer such questions.

Finally, how does training affect young peoples wages? Does training increase future wages for the individual but depress wages during the training period? Do women benefit from training as much as men? These questions can only be answered using longitudinal data (see Chapman and Tan). As Miller points out in his comments on the Pergamit paper, the ALS

permits 'before and after' comparisons. He also notes that since the data refer to the same individuals through time, some research difficulties that arise because individuals differ in ways not adequately measured by the data, may be avoided.

Major Themes of the Papers

It is impossible to fully summarize the wealth of information contained in each chapter and the strategy adopted in this Overview is to show how these studies increase our understanding of four important themes which recur in many of the papers Those themes are· youth wages, employment and the structure of jobs; education and training; determinants of the pay of men and women; and unemployment, poverty and health

Researchers and governments in many OECD countries have access to longitudinal data but the US National Longitudinal Surveys (NLS), which began in the mid-1960's, and the ALS are by far the best.[2] As Australian research based on longitudinal data is very much in its infancy,Dr Michael Pergamit, Director of Research, US Bureau of Labour Statistics, was invited to provide a paper which describes some of the ways in which the NLS data have been used to assist US policy makers

Pergamit focused on six research projects· (i) the impact of minimum wage legislation on employment and training for young people; (ii) recent growth of youth wages; (iii) school to work transition of different ethnic groups; (iv) work and the family; (v) the effect of private training on wage levels and growth, and (vi) the impact of military training on subsequent economic success of low ability men.

It is interesting to compare Pergamit's selection with the research and policy work which has emerged in Australia. The major differences seem to be our emphasis on unemployment and part-time jobs, presumably because the growth rates in those areas are much higher in Australia. Another difference is that the US surveys have been in existence longer and the range of issues addressed can include those that need a long data series, such as changes in the growth of youth wages and changes in family formation.

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2 Other longitudinal data bases include the German Socio-economic Panel, the Japanese High School and Beyond, and the UK National Child Development Survey (NCDS) The German Socio-economic Panel is a representative sample of the resident population of the Federal Republic of Germany with annual repetitions since 1984 It consists of 6000 households and 12,250 individuals. The Japanese High School and Beyond survey consists of two waves of seniors of the Class of 1980 and a two year follow-up. The initial sample was 7000 students. The NCDS is a longitudinal data set of children born in the UK in the first week in March 1958 Unlike the ALS this data is collected in a series of sweeps, the first of which was conducted in 1958, the second in 1965, the third in 1969, the fourth in 1974 and the most recent in 1981. The sample size of the most recent sweep is 12,537

Youth wages, employment and the nature of jobs

Concern has been expressed in the US that increases in the minimum wage (which are very low by Australian standards, perhaps fifty per cent of Australian levels for youth and thirty per cent for adults) lead to poor jobs and discourage training. It is argued that those who retain their jobs after a minimum wage increase will have the initial benefit of a higher minimum wage but employers will not be able to afford to train their workers for higher paying jobs in the future. There are notions of poverty traps in the analysis which lead to suggestions that a lower minimum wage leads to more and better jobs with training and therefore will be in the long run interest of youth

Pergamit suggests that US results indicate that young people do not stay in low paying jobs very long and that almost *all* move into better jobs. In his view the links between minimum wages, poor jobs, lack of training and poor future prospects are not obvious in the data He also examined the proposal that a training wage be paid in the US to those with little work experience The longitudinal results suggest that it would be very difficult to implement such a programme and perhaps it is not needed as almost all young people manage to accumulate some work experience. Among those 22-29 years of age in 1987 only 2 per cent of the US sample had not accumulated at least 6 months work experience.

Australian research has not focused on the relationship between the minimum wage and the creation of bad jobs, or the extent to which individuals move from bad jobs with no training to good jobs. The government, however, has responded to increasing levels of youth unemployment by introducing and enhancing wage subsidies for the training of particular groups of youth. These schemes include apprenticeships, youth traineeships and special employment subsidies for the long term unemployed. The relatively poor link to date between research based on ALS data and youth wage subsidies and employment creation is obviously a gap in Australian research [3]

When employment subsidies and proposals for wage reductions for the 16-19 years age group are placed against the data, it seems fairly obvious that increasingly these proposals will be aimed at an ever shrinking small group of young people, unless there is a major change in employment trends, and as a result the level of youth wages may in the longer term become of less interest. Most employment and unemployment difficulties that were

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3 It is relatively easy, however, to use the data to analyse the special nature of apprenticeships For example, a young male apprentice is almost certain to be fully employed for the four years of the apprenticeship, a very unusual occurrence for young people who leave school so early, and as a result, apprenticeships are much sought after. It is also easy to document the difference in access which males and females have to apprenticeships. All the difference in full-time employment between men and women in the 15-19 year age group is attributable to apprenticeship access which in 1985 accounted for 42 per cent of male full-time employment and 6 per cent of female full-time employment.

evident in the 15-19 years labour market are moving into the older age group 20-24 years.

One limited way in which young people can avoid minimum wage and employment regulations is to enter self-employment which, for the population as a whole, is about twice as high in Australia as it is in the US The higher Australian incidence seems fairly evenly spread across all industries and may well be a reaction to more rigid wage structures In Australia 4.5 per cent of young people are self-employed, compared with 3.8 per cent in the US.

Blanchflower and Meyer find that the young self-employed are disproportionately male (71 per cent), are likely to work in the construction and agriculture industries or in skilled manual occupations, to have experienced short tenure in their previous job and are more likely to be in the 20-24 years age group. The self-employed are less likely to have been union members or workers in large firms in their previous job In Australia, unlike the US, higher levels of education are not associated with self employment but, as might be expected, a large proportion of Australian apprentices become self-employed. Within the 16-25 year old age groups 24 per cent of males with apprentice qualifications are self-employed.

Most countries, including Australia, have introduced schemes to help the unemployed begin their own businesses. The Blanchflower-Meyer analysis, however, shows that new young entrepreneurs come overwhelmingly from those who were previously employed and that self-employment in response to unemployment is a rare occurrence

Self-employment is a fairly risky endeavour and the turnover rate is high. In Australia 37 per cent of the 15-19 year olds who were self-employed in 1985 left self-employment in the following year, usually to wage employment. As individuals in the sample become older the turnover rate falls and three years later, in 1988, the exit rate from self-employment had fallen to 26 per cent. Another indication of risk is that although the self-employed earn on average about 25 per cent more than wage and salary earners, income variation is four times larger and a significant proportion earn low incomes.

Education and training

How best to train a nation's labour force is of vital concern to governments and increasingly questions are being asked about the appropriate level of training and the optimum mix of training in education institutions and training on-the-job.[4] Chapman and Tan investigate relationships between wages, technological change and training in Australia. Their results are consistent with those found for the US. After training, the individual

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4 Many countries are re-evaluating their training efforts and there is considerable interest in international comparisons Staff of the Centre for Economic Policy Research have received a number of invitations to contribute commissioned studies of Australian training-wage-productivity relationships, *based on the ALS data,* for comparative research projects The ALS data base has quite clearly received international recognition

experiences an increase in wage levels and growth rates. Wages for young people may increase 6 to 7 per cent in the same year as in-company training occurs although there seems to be a quick depreciation rate Out-of-company training initially reduces wages, but leads to faster wage growth.

Training seems to be fairly widespread in Australia. About 25 per cent of youth attend in-company formal training classes in their first year on the job and about 75 per cent have had a training experience over the period 1985-88. Similar proportions apply for out-of-company training. In both countries those with more formal education receive more on-the-job training and men generally receive more training than women, although the gender gap seems to be narrower in Australia Union members receive more in-company training and less out-of-company training. Training has a greater effect on wages when individuals are employed in industries subject to rapid rates of technological change.

Of particular interest is the source of training differences between the US and Australia. Many commentators have suggested that binding occupational minimum wages and narrowly defined award classifications, which are features of the Australian labour market, may result in lower levels of on-the-job-training than would be forthcoming in a less regulated labour market Chapman and Tan suggest that Australian training levels seem similar to those in less regulated labour markets, thus reinforcing Pergamit's earlier comments about the difficulty of establishing links between minimum wages, training and future job prospects.

Since training increases the level and growth of wages paid to the individual, we need to determine who should bear the costs of training. What proportion should be borne by the individual in the form of lower wages or training fees, and what proportion should be borne by the government or employer? When government is involved in financing, can there be too much training?

The Australian government subsidises on-the-job training in various ways—through apprenticeships, youth traineeships and employment subsidies for those who were previously long-term unemployed. However, the largest increases in expenditure over the last decade have been directed towards increasing retention rates in high school and tertiary institutions. Between 1980-81 and 1990-91 Commonwealth expenditure on schools has grown in real terms at 1.8 per cent per annum, at the same time that the numbers of school age young persons have declined as a proportion of the population The outlays for student assistance have grown at 6.9 per cent per annum in real terms. How can we decide whether these levels of government expenditure are about right?

In one example Pergamit discusses the proposition that not all training may be worthwhile. He considers whether time spent training in the US army increases the skill base for those with low aptitudes. By contrasting the economic success of low aptitude army recruits, after they leave the army, with a similar low aptitude sample drawn from longitudinal data bases researchers found that those who *never* served in the army appear to be better off in terms of employment status and educational attainment.

Income differences between the two groups showed non-veterans with annual incomes $5000 to $7000 higher

This work naturally prompts the question as to whether the large increases in Australian school and tertiary retention rates are a profitable investment as many who are now staying in the education system an extra year or two may have lower aptitude than previous cohorts. Vella and Gregory make a start on a new methodology to utilize the ALS data to address this question.

An important part of the economic analysis of education investment is the calculation of the rate of return to education. Putting aside education costs, this involves comparing the income levels of similar groups and attributing the observed income differences to education differences To be valid this comparison depends on the groups being identical in all other respects. But suppose that those who have most to gain by staying longer in the education process do so already, and that those who have least to gain leave the education process early. This behaviour pattern would suggest that comparison of the average earnings of graduates with those of non-graduates might prove to be a poor guide to the additional earnings that might be expected by those who fill the places created by the expanded university system. It may be particularly misleading if those who have achieved tertiary admittance due to the expansion would previously have been early leavers. Extra education may appear a worthwhile activity on the basis of the average rate of return—calculated by comparing the average earnings of those who went to university with those who did not—but may be very unattractive at the margin—calculated from the earnings of the *additional* university entrants with what they would have earned without tertiary qualifications

The Vella and Gregory statistical results are subject to considerable variability but they indicate that those who are likely to have the greatest economic returns from further education are disproportionately represented in education institutions and that on completing tertiary studies new entrants will not do as well in economic terms as the average. The results suggest that quite a large adjustment may need to be made to the average rate of return calculation so as to better approximate the return to education for a new entrant, and it is possible that return may be negative or extremely low. This would seriously call into question the policy of attempting to increase education levels across-the-board and indicates an urgent need for further and more detailed research on what new entrants gain from further education.

The pay of men and women

In all countries men earn more per hour than women. When young men and women begin full-time employment at 16 and 17 years hourly pay rates differ by less than a few per cent. By twenty five to thirty four years of age the earnings gap has increased to 18 per cent for full year full-time workers. Why does the earnings gap increase so quickly as young people become older? Most research indicates that about fifty per cent of the earnings gap can be explained by different endowments of human capital, such as labour

force experience and education The other fifty per cent is unexplained and is often attributed to discrimination.

The role of employment separations

There is little evidence to date that differential access to on-the-job training or different quality training, plays an important part in explaining different wage growths for men and women in this age group The Chapman and Tan results seem to suggest that differential *access* to training is not sufficiently large to generate the earnings inequalities that emerge. Nevertheless, perhaps the *nature* of training is different between men and women and this has an effect. For example, young women have only one tenth of the male access to apprenticeships, which are perhaps the most important source of on-the-job training and which significantly affect the quality of future employment and wage growth.

To the extent that there are gender differences in training incidence and quality the most commonly accepted view is that women receive less training because of interrupted employment careers It is argued that employers believe women are more likely to leave the firm than men and there is less time for the employer to gain a return on the training investment In addition, women seek to invest less in training because they believe they will have less time in full-time employment to reap training rewards.

Lewis and Shorten focus upon the earnings effect of employment separations and provide indirect information on the potential for interrupted careers to affect training. They find that one quarter of all 15-25 year olds were continuously employed for the four year period 1985-88, with the proportion being significantly higher for males. However, males and females were *equally* likely to have one or more employment interruptions and therefore at the point of hiring females do not have a significantly higher propensity to leave the current job These results suggest that employment separations do not seem to be an important factor which can explain the widening wage differential as young people become older Regardless of the number of impending employment interruptions males had higher hourly wages than females in 1985 and this advantage increased over the next four years.

Although the incidence of employment interruptions are similar, their effect seems to be different for males and females. For both groups real wages increase as a result of one employment separation, but for males real wage growth is enhanced and for females retarded as the number and length of employment interruptions increase. This asymmetry is not yet explained but may be related to the reasons for separation. Perhaps males are more likely to leave employment for further education whereas females leave employment for home duties?

It is surprising that the wage growth of males who worked continuously was not greater than those with employment interruptions. This result does not conform with US findings. The authors conjecture that the Australian experience may be the result of the award pay system which, in this age

group, builds in automatic pay increases according to age and, relative to the US pay structure, less account is given to length of service in the job.

The role of self perceptions in the labour market

In a fresh approach to explaining the underlying reasons for the gender wage gap, Vella distinguishes between employer discrimination and self discrimination on the part of women He suggests that society encourages women to develop attitudes that lead them to under invest in education and employment effort, since they are likely to spend spend time in the home. As a result, their future income earning ability is restricted. The ALS includes questions which enabled Vella to construct an index of attitudes towards gender roles.

Vella finds that women with more traditional views acquire significantly less education. For example, they have a 24 per cent chance of proceeding beyond grade 10 compared with a 61 per cent chance for women who hold less traditional views. Furthermore, education acquired by women with traditional views brings a lower rate of economic return Among women with ten years of education, those with the most traditional attitudes achieve a rate of return of 16.5 per cent while those with the least traditional attitudes receive 21 per cent. Women with traditional attitudes work less hours.

Vella explores the processes that lead to attitude formation and finds that females with traditional attitudes are more likely to come from households in which both parents were present when the child was 14 years old and where both parents have less education. He finds that women from larger families and those that are foreign born have less traditional views. If a more equal distribution of earned income between men and women is to be achieved it is important to encourage society, and women in particular, to take a broader view as to what might be regarded as 'appropriate' gender roles.

Child care

It is well known that the presence of young children in the family adversely affects the earnings of women relative to those of men and substantially reduces female labour force participation. Where women undertake paid employment it is primarily on a part-time basis. Would greater provision of child care increase the relative earnings of women and bring about a more gender-equal distribution of income?

Teal discusses the relationships between child care cost and paid employment and focuses on two questions: what is the effect of child care costs on the decision to participate in paid employment and what is the effect on hours worked? He estimates that a child care subsidy of 45 per cent would raise the likelihood of the mother's labour force participation by 6 percentage points by the time the child is aged 4 years, and he suggests that these effects are quite small. By comparison, the effect on participation of a degree relative to no high school certificate, is four times greater. Teal also suggests that the primary effect of increasing child care subsidies would be to increase the number of hours worked in part-time employment, but would

have little effect on participation in full-time work. A 45 per cent subsidy is estimated to increase hours worked per week by eight hours. This is a particularly important result which highlights the need to understand better the links between full and part-time employment. If the growth in female earnings is affected by lack of full-time work experience then greater use of child care will not lead to women working in higher paying full-time jobs. The major effect of child care subsidies would be to enable women to work part-time and increase their income when the child is young.

Part-time employment

The rapid growth rate of part-time work during the past two decades has been concentrated among married women and young people. The inter-relationships between part-time work, education and subsequent labour market success are particularly interesting and are examined by McRae and by Wooden, Robertson and Dawkins.

In a typical year about 60 per cent of school students aged 15 years and over would have undertaken some part-time work. However there is considerable employment turnover so that the proportion employed at any one time is about 25 per cent. The proportion in part-time work increases with schooling levels and the typical work week is about eight hours. As family income increases the probability that the student will have a part-time job increases but the number of hours worked tends to fall marginally. Young men in part-time work tend to earn more per hour than young women in similar part-time work

A disturbing and largely unexplained result of Wooden et al is that the links between part-time employment and education transition seem to be very different for men and women. Part-time employment while at school appears to increase the probability that a male will attend a tertiary institution, but decrease the probability for a female. An average year 12 high school male student working 7.5 hours per week has a 15 percent higher probability of attending a tertiary institution in the next year than a student who is not employed. For a female the probability of attending a tertiary institution the next year falls by about one third if she is employed part-time.

Students who worked part-time did not exhibit greater job finding ability when they entered the labour market full-time but they were more likely to stay longer in their first full-time job and therefore more likely to be employed. There is little evidence that earnings in the first full-time job were affected by previous part-time employment

On balance, part-time employment while at school seems a good thing for young males but perhaps not for young females. Why should part-time employment be associated with a *reduction* in transition rates from school to tertiary institutions for young women? Is this a reflection of the ideas discussed by Vella? Perhaps young women are more likely to accept a full-time job similar to their part-time job if the opportunity arises, but young men may be planning better employment opportunities which need a tertiary education. Perhaps there is a larger fraction of young women in school who do not want to be there so that when the opportunity for a full-

time job arises it more likely to be accepted This behaviour pattern links back to the issues discussed in Vella and Gregory.

Unemployment, poverty and health

Pergamit's survey did not focus upon unemployment research Over the last two decades teenage unemployment in the US has not increased very much. Perhaps the most important change in Australia over the last two decades has been the creation of a large pool of long term unemployed. At August 1971 the total number of those unemployed more than twelve months was about three thousand. By August, 1991 that number had increased to two hundred thousand The pool of long term unemployed has rapidly increased in every recession since the early seventies and has been slow to decrease in the recovery period.

Not everyone who becomes unemployed joins the ranks of the long term unemployed. There is considerable movement into and out of unemployment. For example, in the ALS sample in 1985, there was a ninety per cent chance, upon becoming unemployed, that the unemployment spell would last less than a year and only a five per cent chance that it would last at least eighteen months.

Chapman and Smith ask whether it is possible, at the start of an unemployment spell, to predict who is at risk of long term unemployment. If government could predict who is at risk of long term unemployment, it should help to better target unemployment programmes and to reduce the length of the unemployment spell. Chapman and Smith find that unemployment duration is associated with measurable characteristics of individuals. For example, a male with low education living in a rural area tends to be unemployed for a long time, whereas a female with good education and living in a city tends to be unemployed for a short time One encouraging result is that, all other things being equal, being unemployed for a long period does not reduce the chance of finding a job. It is more likely that individual characteristics affect job finding success.

A special feature of the ALS data is that it is possible to follow individuals through time and the Chapman and Smith results can be made more relevant by asking whether the probability of multiple unemployment spells is related to the length of unemployment duration. If those with short unemployment duration experience a higher incidence of further unemployment spells then differences between the long and the short term unemployed would diminish.

This issue is investigated by Junankar and Wood who find that, over the four years, three quarters of male unemployment is accounted for by those with more than one spell. It is therefore not a good characterisation of unemployment to think only of two groups, those with a short spell and those who are long term unemployed. The number who experience recurrent spells exceeds those who experience long term unemployment by a factor of four or five Of those males who had one unemployment spell in 1985, 26 per cent had more than one spell in 1986 and 6 per cent had more than one spell in 1987. The authors find that those who are likely to have

experienced one or less unemployment spells are likely to be married, be a union member and to have earned a high income in the previous year.

This research indicates clearly that there is considerable turnover in the youth labour market and static measures are unlikely to capture the essence of unemployment There is a further issue in that conventional definitions may not measure the extent of labour underutilisation which includes those persons undertaking tertiary studies who would prefer employment if it were available, and those in part-time work who would prefer full-time employment if it were available.

The paper by Ross shows that labour underutilisation is extensive in Australia and highest among females, the young, the overseas-born and those with lowest levels of educational qualifications. Those who receive government cash transfers are on average more underutilised than others and are more likely to be underutilised in the next year.

An important aspect of unemployment and underutilisation is the associated income reduction and increased probability of poverty. One of the most troubling problems in poverty research is the distinction between life time poverty and poverty over a short period. Many people who earn high life time incomes may nevertheless experience low income periods. Poverty depends not only upon income relative to the poverty line but also upon the period a person stays or expects to stay, below that line.

The ALS enables us both to follow the fortunes of those who, from the evidence of a cross section survey, appear to be poor, and also to document the extent to which current poverty, as measured by annual income, is an indicator of long term poverty. Bell, Rimmer and Rimmer ask, what can be learnt about poverty in the age group represented in the ALS? Among the population at large, the poor are less well educated But, as measured by weekly income, poverty in the ALS age group is not closely related to educational attainment. This is because many of those in the low income category are still within the education system and not yet earning the professional wages they might expect in the future Nevertheless a number of interesting results are forthcoming from the Bell et al study Perhaps the most interesting is that while 50 7 per cent of the sample might be measured as poor in *at least one* of the four years, only 4 7 per cent of the sample is poor *in each* of the four years. As might be expected, the continuing poor have low employment rates and the group is dominated by sole parents.

The authors look at labour market experience of the seldom poor and find that in the years they are not poor they have high employment rates and below average unemployment rates. This suggests that most of those with low income in this group are involved in a trade off between lower current income and higher future income The temporary state of low income emphasises the importance of targeting measures to relieve poverty. To target on income alone will capture large numbers of people who will have high incomes over most of their lifetime and who are in no need of help. Bell et al suggest that perhaps the most efficient way to relieve poverty is to target children living in poverty.

There is a long history of research which finds that unemployment and diminished levels of psychological well-being are positively associated. There is also a widely held belief that any job will lead to better mental health than unemployment. Graetz investigates the relationship between psychological well-being and changing labour market status in a dynamic context which enables him to sort out more clearly whether unemployment leads to higher levels of health disorder or whether higher levels of health disorder increase the probability of unemployment.

Graetz focuses on psychological well-being, such as general satisfaction with life, level of confidence and ability to sleep He confines the sample to those primarily studying, working full-time or seeking full-time work and finds that the employed report higher levels of psychological well-being than students and the unemployed. These differences are largely unaffected by demographic attributes, socio-economic status, living arrangements or immediate labour market experience. However, once the employed are divided into the 80 per cent who report that they are satisfied with their job and the 20 per cent who report that they are not, he finds that the group with the highest level of psychiatric disorder are not the unemployed or students but those who are employed and who report job dissatisfaction

He also finds lack of well-being associated with unemployment depends crucially on the individual's experience before the unemployment period A movement from full-time study to unemployment does not generally lead to a decrease in well-being. Both full-time study and unemployment seem equally stressful. Furthermore, whether a loss of employment leads to an increase in well-being depends on the nature of the job preceding the unemployment spell. If the job was unsatisfying then the individual can report increased well-being upon becoming unemployed. A movement to unemployment from a job only has detrimental health consequences for workers previously satisfied with their job For dissatisfied workers unemployment may improve well-being. Similarly, well-being may not improve upon entering employment if the job is unsatisfying From the perspective of well being it is not true that any job is better than no job at all

Graetz is also able to determine that changes in health status come after a change in labour market state and health deterioration does not lead generally to unemployment This naturally prompts questions as to how an individual responds to an unsatisfactory job. Does the attitude towards the job change? Does the individual change jobs without incurring unemployment? Does the nature of the job change? It is fairly obvious that Graetz has begun important research which will lead to greater understanding of the interplay of an individuals well-being and the operation of labour markets.

Finally, Graetz finds that women tend to report lower levels of well-being than men but that married women employed full-time report better mental health than employed, never married, women Unemployed married women report lower levels of well-being

Concluding Remarks

This overview has only skimmed the surface of the research presented here. Read in full the papers will provide many insights into the functioning of the youth labour market and enhance understanding of policy development in that area. These studies also demonstrate the richness of the ALS data as a basis for research into emerging policy problems, and for the description and analysis of the Australian youth labour market.

The studies in this volume cover the data period 1985-1989, a period of relative stability in the labour market for young people. Many of the relationships discussed will still hold in general terms during the current period of dramatic job loss for young people In addition, however, there will be a range of new questions to be investigated as the ALS data are used to discover how different groups of young people cope with such a severe recession It is hoped that the papers in this volume stimulate that research.

Section I

The Use of Panel Data in the US

Some Recent Governmental Uses of the National Longitudinal Surveys (NLS)

Michael R. Pergamit

A Longitudinal Analysis of Young Entrepreneurs in Australia and the United States

David G Blanchflower and Bruce D Meyer

Some Recent Governmental Uses of the National Longitudinal Surveys (NLS) in the USA

Michael R. Pergamit

Introduction

The purpose of this paper is to give some recent examples of uses of the National Longitudinal Surveys (NLS) by the United States government. The National Longitudinal Surveys were begun in the mid 1960s with the drawing of four samples. Young Men who were 14-24 years old in 1966, Young Women who were 14-24 years old in 1968, Older Men who were 45-59 years old in 1966, and Mature Women who were 30-44 years old in 1967. Each sample originally had about 5000 individuals with oversamples of blacks In the early 1980s, the Young Men and Older Men surveys were discontinued The two women's surveys continue and are currently on a biannual interview cycle. The interviews and retention rates for each of these original cohorts are found in Table 1.

In 1979, a new cohort was begun with a sample of over 12 000 young men and women who were 14-21 years of age on 1 January 1979 It included oversamples of blacks, Hispanics, economically disadvantaged whites, and youth in the military.[1] This survey which we call the Youth Cohort, or NLSY, has been interviewed every year since it began. After eleven waves of interviewing, we had a retention rate of 91 4 per cent of the original sample, probably the highest retention rate of any longitudinal survey after such a long time We are now completing our twelfth wave of interviewing and as of 24 November 1990, we have completed interviews with 88.1 per cent of the original sample with about two weeks remaining in the field period. Retention rates by year for the NLSY are found in Table 2.

The NLS program was originally begun by the Office of Manpower Policy, Evaluation, and Research of the United States Department of Labor. This agency was combined with others to form the Employment and Training Administration where the NLS was administered through 1986. The NLSY, in particular, was begun in order to evaluate the Comprehensive Employment and Training Act Over time the NLS developed into a more general purpose data set for the study of labor market behavior. It was determined that it fit better into the mission of the Bureau of Labor Statistics (BLS) and was transferred to BLS in October 1986. In the four years BLS has overseen the NLS program, we have been developing a multi-dimensional approach toward regular usage of the data.

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1 The military oversample was discontinued after the 1984 survey. Present plans are for the economically disadvantaged white oversample to be interviewed for its last time in 1990

Table 1 Interview Schedules and Retention Rates[a], Original Four Cohorts

	Original Four Cohorts											
	Older Men 45-59 in 1966			Mature Women 30-44 in 1967			Young Men 14-24 in 1966			Young Women 14-24 in 1968		
	Type of Interview	Total	Retention Rate	Type of Interview	Total	Retention Rate	Type of Interview	Total	Retention Rate	Type of Interview	Total	Retention Rate
1966	Personal	5034[b]	100 0	-			Personal	5225	100 0	-		
1967	Personal	4751	94 4	Personal	5083	100 0	Personal	4790	91 7	-		
1968	Mail	4661	92 6	Mail	4910	96 6	Personal	4318	82 6	Personal	5159	100 0
1969	Personal	4388	87 2	Personal	4712	92 7	Personal	4033	77 2	Personal	4930	95 6
1970	-			-			Personal	3993	76 4	Personal	4766	92 4
1971	Personal	4182	83 1	Personal	4575	90 0	Personal	3987	76 3	Personal	4714	91 4
1972	-			Personal	4471	88 0	-			Personal	4625	89 6
1973	Telephone	3951	78 5	-			Telephone	4014	76 8	Personal	4424	85 8
1974	-			Telephone	4322	85 0	-			-		
1975	Telephone	3732	74 1	-			Telephone	3977	76 1	Telephone	4243	82 2
1976	Personal	3487	69 3	Telephone	4172	82 1	Personal	3538	67 7	-		
1977	-			Personal	3966	78 0	-			Telephone	4071	78 9
1978	Telephone	3219	63 9	-			Telephone	3695	70 7	Personal	3923	76 1
1979	-			Telephone	3812	75 0	-			-		
1980	Telephone	3001	59 6	-			Telephone	3438	65 8	Telephone	3801	73 7
1981	Personal	2834	56 2	Telephone	3677	72 3	Personal	3398	64 9	-		
1982	-			Personal	3542	69 7	Discontinued			Telephone	3650	70 8
1983	Telephone	2634	52 3	-						Personal	3545	68 7
1984				Telephone	3422	67 3				-		
1985				-						Telephone	3720	72 1
1986				Telephone	3335	65 6				-		
1987				Personal	3241	63 7				Telephone	3639	70 5
1988				-						Personal	3510	68 0
1989				Personal	3104	61 1						

[a] Retention rate is defined as the per cent of the base year respondents who were interviewed in any given survey year Included in the calculations are deceased and institutionalized respondents as well as those serving in the military

[b] Data are avilable on a total of 5,020 respondents For a complete explanation, see the section on sample representativeness in this book

Source Table 2 from NLS Handbook 1990

Table 2: Interview Schedules and Retention Rates: NLSY
NLSY Youth 14-21 on 1 January 1979

		Civilian Sample		Military Sample		Total Sample	
Year	Type of Interview	Total	Retention Rate[a]	Total	Retention Rate[a]	Total	Retention Rate[a]
1979	Personal	11,406	100 0	1,280	100 0	12,686	100.0
1980	Personal	10,948	96.0	1,193	93.2	12,141	95.7
1981	Personal	11,000	96 4	1,195	93 4	12,195	96.1
1982	Personal	10,912	95 7	1,211	94 6	12,123	95.6
1983	Personal	10,995	96 4	1,226	95.8	12,221	96.3
1984	Personal	10,854	95 2	1,215	94.9	12,069	95.1
1985	Personal	10,708	93.9	186[b]	92.5	10,894[c]	93.9
1986	Personal	10,472	91 8	183	91.1	10,655	91.8
1987	Telephone	10,306	90 4	179	89.1	10,485	90.3
1988	Personal	10,291	90.2	175	87.1	10,466	90.2
1989	Personal	10,424	91.4	181	90.0	10,605	91.4

[a] Retention rate is defined as the per cent of the base year respondents within each sample type who were interviewed in any given survey year.

[b] A total of 201 military respondents were retained from the original military sample of 1,280

[c] The total number of civilian and military respondents in the NLSY at the initiation of the 1985 survey was 11,607

Source: Table 5 from NLS Handbook 1990

The purpose of this paper is to illustrate governmental uses of the NLS data in the US. I will focus almost exclusively on uses of the NLSY since it is the most similar to the Australian Longitudinal Survey (ALS), for which I understand it served as a model. The examples discussed in this paper come from a variety of uses made by the US government. Some were requested to help prepare specific legislation, some as general background for a body of legislation, some were special government reports, and others were part of our extramural research program. In each example I hope to illuminate different uses that have been made of the data within the US. Excluding the extramural research, most of the uses do not involve sophisticated econometrics, but try to provide insight into specific questions. I have attempted to choose examples which fully exploit the longitudinal nature of the data.

I have chosen six different areas of research to demonstrate usage of the NLSY and discuss some of the findings. These areas are recent minimum wage legislation, wage paths of young people; the transition from school to work; work and the family; training; and the effects of military experience on post service success of low-aptitude recruits. Each of these areas is discussed in a separate section and is composed of one or more studies. The final section provides some concluding remarks

1. Minimum Wage Legislation

The minimum wage in the United States was raised to $3.35 in January 1981 It was held nominally fixed from that time until 1989. Several times over the nine years in between, there were attempts to increase the minimum wage. At the same time, there were also attempts to create a special subminimum wage for youth. The latter was proposed under the premise that this made young people more attractive to businesses After acquiring a job at subminimum wage, the youth would 'have a foot in the door' and learn job skills which would allow him or her to advance in the labor market.

All of these attempts failed until a new law was passed in November 1989 (amending the Fair Labor Standards Act). This law provided for an increase in the minimum wage to $3.80 beginning 1 April 1990 through 31 March 1991, then another increase to $4.25 beginning 1 April 1991. In addition the law provided for a 'training' wage of $3.85 or 85 per cent of the prevailing minimum wage for any worker under 20 years old. This "training" wage could be paid for up to six months under certain conditions.

In response to specific requests regarding this legislation, the NLSY was used in two different ways First, NLS staff attempted to examine the question, 'Do minimum wage jobs provide a means of entry into the labor market or are they essentially dead-end jobs?' While cross-sectional data from the Current Population Survey (CPS) can tell us how many people earn the minimum wage (or less), longitudinal data are required to see whether or not people get out of those minimum wage jobs.

Beginning with the 1981 NLSY survey respondents were placed into one of three groups: those who were not working at the time they were

surveyed; those who were employed and earning the minimum wage or lower; and those who were employed and earning above the minimum wage. We then looked at flows among the three groups one year, two years, five years, and six years later. Table 3 presents the results. After six years, 60 per cent of those who had been earning the minimum wage or less were earning above the minimum wage. The average wage of this group rose from $2 84 in 1981 to $7.31 in 1987, representing an increase of 157 per cent compared to an increase of 65 per cent over the same period for the group initially earning above the minimum wage. The general conclusion of this simple analysis is that those who enter the labor market in minimum wage jobs are not condemned to remain there.

The second set of NLSY information provided to those preparing the new minimum wage legislation related to analyzing the likely effects of a proposed 'training' wage. In early consideration of the bill, it was proposed that a 'training' wage be adopted but only apply to workers with less than a specified amount of cumulative work experience. While one could use retrospective questions in a cross-section survey to ascertain total lifetime work experience, more reliable information comes from a longitudinal survey, particularly one like the NLSY which collects job information in a work history format. Each job's start and stop date is collected over time, giving us a fairly precise measure of total number of weeks worked over any length of time. Since it is likely that people with small amounts of cumulative work experience tend to be young, the NLSY was appropriate to use for this exercise.

Using the entire NLSY sample in each year from 1981 to 1987 the total number of weeks ever worked to date was calculated. This was tabulated for categories 0-13 weeks, 14-26 weeks, and 27 or more weeks. The results are presented in Table 4 As you would expect, the numbers in the lowest category fall over time while those in the highest category rise as these young men and women gain work experience. The two different cutoffs shown here (13 weeks and 26 weeks) were under consideration. In 1981 when the youths were 16-23, 6,757,000 had less than 26 weeks of work experience with all employers. By the time they were 22-29 in 1987, only 641,000, about two per cent of the age group, still had less than 26 weeks of work experience. This is a surprisingly small number given it includes women who began families and never really entered the labor force.

One final consideration was to place an extra condition that to receive the 'training' wage, a person could never have worked at a single job for more than four weeks . This eliminated a significant portion of those with little work experience. In fact, everyone with over 13 weeks of total work experience had held at least one job for over four weeks.

The final law passed with a 'training' wage but without any restrictions concerning past cumulative work experience, perhaps because few individuals would have been affected by such a provision. Undoubtedly, enforcement of such a provision would also be problematic.

Pergamit

Table 3 Wage Rate Transitions Following the Job Held During Survey Week 1981 Persons 16-23 in 1981; Data From NLS-Youth Surveys 1981-1987

Attributes of First Job Held During a Survey Week	Wage During Survey Week 1981 Relative to Existing Minimum: Not Working in Survey Week 1981	Job Was At or Below the Minimum Wage	Job Was Above the Minimum Wage
Per cent in Wage Category	41 2	32 6	26 2
Number of Persons in Wage Category[1]	11,680,555	9,389,311	7,555,961
Average Wage for Job by Category	N/A	2 84	5 34
Per cent Learning Skill Useful in Getting a Better Job	N/A	71	76
Subsequent[2] Wage Rates Relative to Initial Minimum Wage			
One Year Later			
Per cent Not Working	64	23	19
Per cent At or Below Minimum	15	41	9
Per cent Above Minimum	21	36	72
Average Wage of Those Working	4 70	4 27	5 89
Two Years Later			
Per cent Not Working	55	23	21
Per cent At or Below Minimum	17	35	12
Per cent Above Minimum	28	42	67
Average Wage of Those Working	4 93	4 82	6 32
Five Years Later			
Per cent Not Working	35	19	14
Per cent At or Below Minimum	15	23	11
Per cent Above Minimum	50	58	75
Average Wage of Those Working	6 50	6 50	8 10
Six Years Later			
Per cent Not Working	31	16	14
Per cent At or Below Minimum	14	24	13
Per cent Above Minimum	55	60	73
Average Wage of Those Working	7 31	7 31	8 84

Notes 1 Based upon sampling weights
2 Calculations made only when persons responded in the indicated survey week
3 . All wage rates measured in current dollars

Source Unpublished BLS data from the National Longitudinal Survey - Youth Cohort

Table 4: Number of Persons Aged 14-21 as of 1 January 1979

Year (as of 1 Jan.)	Age of Sample Members	Weeks Ever Worked to Date	Held Job ≥ 4 Weeks	Never Held Job ≥ 4 Weeks	Total
1981	16-23	0-13	1,660,000	3,193,000	4,853,000
		14-24	1,904,000	--	1,904,000
		27 or more	26,383,000	--	26,383,000
1982	17-24	0-13	1,223,000	1,692,000	2,915,000
		14-26	1,405,000	--	1,405,000
		27 or more	28,822,000	--	28,822,000
1983	18-25	0-13	913,000	1,001,000	1,914,000
		14-26	1,030,000	--	1,030,000
		27 or more	30,198,000	--	30,198,000
1984	19-26	0-13	639,000	583,000	1,222,000
		14-26	777,000	--	777,000
		27 or more	31,142,000	--	31,142,000
1985	20-27	0-13	452,000	341,000	793,000
		14-26	521,000	--	521,000
		27 or more	31,827,000	--	31,827,000
1986	21-28	0-13	325,000	220,000	545,000
		14-26	349,000	--	349,000
		27 or more	32,246,000	--	32,246,000
1987	22-29	0-13	257,000	97,000	354,000
		14-26	287,000	--	287,000
		27 or more	32,500,000	--	32,500,000

Source National Longitudinal Surveys of Labor Market Experience - Youth Cohort, Bureau of Labor Statistics.

2. Wage Paths of Young People

Considerable attention has been given recently to the question of whether the income distribution is becoming more disparate The premise is that most newly created jobs have been low-wage jobs. Most analysts are realizing that questions dealing with the income distribution require access to longitudinal data, at least as complementary to cross-sectional or aggregate data.

At a panel discussion on 'What Are the Real Trends in Wages and Employment', Manser (1987) investigated a variety of issues using different BLS data. Of interest here is her use of three different NLS cohorts to compare earnings in the first five years out of school She compared the men in the NLSY to those in the Young Men's cohort and the women in the NLSY to those in the Young Women's cohort. The earnings measure was taken as of the week preceding the interview. The sample was restricted to those not in school over the five years studied who were employed at the time of each survey. The earnings paths for men are shown in Figure 1 and for women in Figure 2. The data for the Young Men refer to the period 1967-71, while the data for the Young Women are for the period 1969-73. The data for the NLSY refer to 1980-84 In both cases the youth from the later cohort fared worse. The earnings paths appear nearly parallel, especially for women, the earnings of the later cohort are always below the earnings of the earlier cohorts. We cannot conclude whether it is cohort size effects or general business conditions which have caused the downward shift in the earnings profiles Nor can we generalize to the entire career paths of these individuals or to those who stay in school longer. However, the results here are consistent with findings from other data

In a related example, the Ways and Means Committee of the US House of Representatives was preparing a variety of welfare legislation and sought information from the NLSY as background. NLS staff examined the wage paths in the early years out of school (1980-1984) for the NLSY sample by sex and graduation status. To be included in the sample, the individual could not be in school in the years studied and had to be employed in the survey week in each year. Tables 5a and 5b show the results for nominal and real weekly wages; tables 5c and 5d show the same for nominal and real hourly wages. The sample restrictions reduce sample sizes so that caution must be used in interpreting the results, especially for female dropouts

Looking at Table 5a showing nominal weekly wages, we see that males always earn more than females and graduates earn more than dropouts within each sex. The interesting finding is the slopes of the wage paths. Taking percentage changes from 1980 to 1984 for each group shows that wages grew similarly for male and female graduates (51.85 per cent and 50.91 per cent respectively) Wages grew more slowly for dropouts, but about the same for each sex (38.81 per cent for male dropouts, 36.77 per cent for female dropouts).[2]

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2 In all groups except female dropouts, wages rose monotonically. I have chosen to treat the 1983 number for female dropouts as an aberration caused by the small sample size

Figs 1 and 2

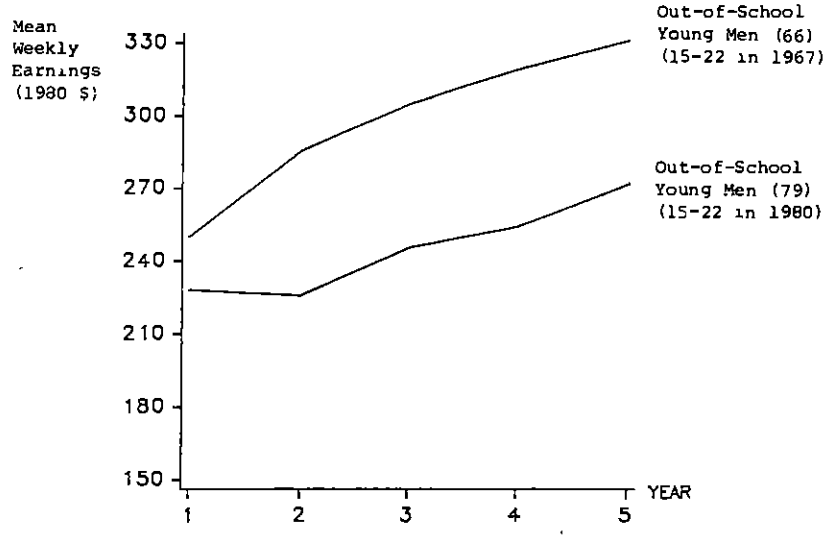

FIGURE 1 Mean Weekly Wage
Two National Longitudinal Survey Cohorts

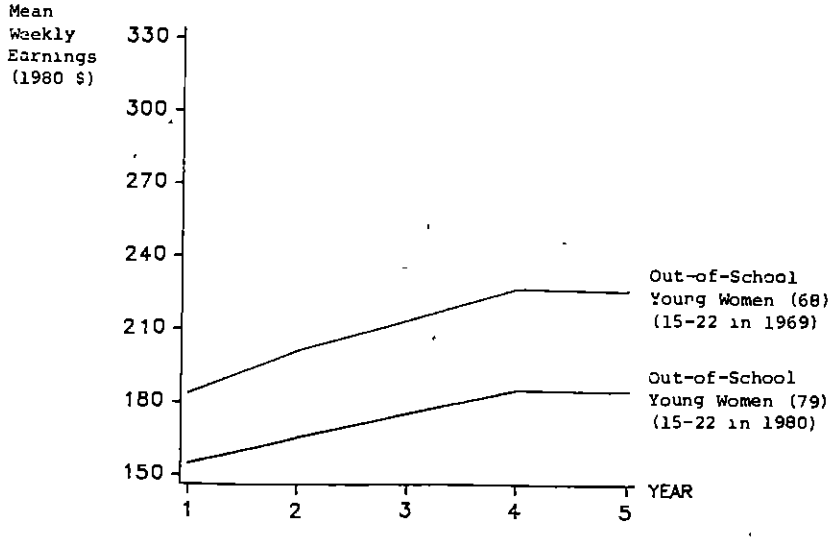

FIGURE 2 Mean Weekly Wage
Two National Longitudinal Survey Cohorts

Source: Figure 1 Figure 11 from Manser (1987)
Figure 2 Figure 12 from Manser (1987)

Table 5a: Nominal Average Weekly Wages for Youth* Early Years Out of High School by Sex and Graduation Status

(Weighted)

Year	Male Graduates	Male Dropouts	Female Graduates	Female Dropouts
1980	234.20	198 82	156.76	114.69
	(86 06)	(72 23)	(62 12)	(36 36)
1981	257.36	210.61	185.38	128.05
	(100.83)	(77 31)	(66.96)	(51 43)
1982	297 05	241.97	207.89	152 01
	(119 67)	(90.99)	(74.56)	(47 21)
1983	320.64	242.95	224 29	215 02
	(124 59)	(87.02)	(77 71)	(186.89)
1984	355 64	275.98	236 56	156.86
	(136.59)	(92 75)	(90 42)	(60 06)
Sample Size	361	115	374	29

*Notes: Wages are for the week in which the individual was surveyed Standard errors are in parentheses.

The sample includes (1) youths aged 14 to 21 at the time of the 1979 interview who were (a) not enrolled in school in 1979-1984; and (b) employed during the survey week in each year 1979-1984; and (2) youths aged 15 to 22 at the time of the 1980 interview who were (a) enrolled in school in 1979, (b) not enrolled in school in 1980-1984, and (c) employed in the survey week in each year 1980-1984

Source: National Longitudinal Survey of Labor Market Experience-Youth, conducted by the Center for Human Resource Research at the Ohio State University for the Bureau of Labor Statistics

Table 5b: Real Average Weekly Wages for Youth* Early Years Out of High School by Sex and Graduation Status

(Weighted)

(Deflated by Average Annual CPI-U, 1967=100)

Year	Male Graduates	Male Dropouts	Female Graduates	Female Dropouts
1980	94 89	80.56	63.52	46 47
1981	94 48	77.32	68 05	47.01
1982	102.75	83 70	71.91	52 58
1983	107.45	81.42	75 16	72 06
1984	114.32	88.71	76.04	50 42
Sample Size	361	115	374	29

*Notes: Wages and hours are for the week in which the individual was surveyed

Sample: As for Table 5a

Source See Table 5a.

Table 5c: Nominal Average Hourly Wages for Youth* Early Years Out of High School by Sex and Graduation Status

(Weighted)

Year	Male Graduates	Male Dropouts	Female Graduates	Female Dropouts
1980	5.64	4.68	4.17	3.30
	(2.12)	(1.45)	(1.40)	(0.91)
1981	6 29	5 00	4.88	3.46
	(2.53)	(1.59)	(1.60)	(0.95)
1982	7.14	5.69	5.34	3.78
	(2.78)	(2.11)	(1.79)	(1.08)
1983	7 72	5.72	5.96	5.46
	(2.97)	(1 99)	(2.24)	(4.63)
1984	8 48	6 64	6.16	4.04
	(3.79)	(2 27)	(2.19)	(1.36)
Sample Size	361	115	374	29

*Notes Wages and hours are for the week in which the individual was surveyed. Standard errors are in parentheses.

Sample. As for Table 5a

Source. See Table 5a.

Table 5d: Real Average Hourly Wages for Youth* Early Years Out of High School by Sex and Graduation Status

(Weighted)

(Deflated by Average Annual CPI-U, 1967=100)

Year	Male Graduates	Male Dropouts	Female Graduates	Female Dropouts
1980	2 29	1.90	1.69	1.34
1981	2 31	1.84	1.79	1.27
1982	2 47	1.97	1.85	1.31
1983	2.59	1 92	2.00	1 83
1984	2 73	2.13	1 98	1.30
Sample Size	361	115	374	29

*Notes: Wages and hours are for the week in which the individual was surveyed.

Sample· As for Table 5a.

Source See Table 5a.

There was no gain in female wages relative to male wages, a result also obtained in the Manser study Graduating from high school made an important difference both in terms of starting wages and wage growth implying that completion of high school creates long term effects in relative wages.

Hourly wages show a similar story except that female dropouts lag all groups considerably. In fact, while the other three groups show increases in real hourly wages over the period of between 12 11 per cent and 19.21 per cent, female dropouts actually show a 3 per cent decline.

3. Transition From School to Work

As part of the material described above on wage paths prepared for the Ways and Means Committee, NLS staff also investigated other aspects of youth leaving school. In particular, we presented information on labor force characteristics in the first four years after leaving school Tables 6a, 6b, and 7 were included to show various averages and durations of employment and unemployment for school leavers by graduation status, race, and sex.

Consider high school dropouts first Blacks, males and females, had the highest average of weeks unemployed and the lowest average of weeks employed regardless of the duration since leaving school (except for Hispanic males in the second year). Hispanic and white males were fairly similar with respect to both unemployment and employment weeks.

Hispanic females were similar to white females in terms of unemployment weeks, but they had significantly less weeks worked. Table 6b cumulates these first four years since leaving school. It shows that in the four year period black male high school dropouts spent 19 5 per cent of those weeks unemployed, 54.5 per cent employed, and 26 0 per cent out-of-the-labor-force. Compared with black males, Hispanic males were less likely to be unemployed (16.5 per cent), more likely to be employed (62 2 per cent) and less likely to be out-of-the-labor force (21.3 per cent) White males spent the least time unemployed (15.5 per cent), the most time employed (68 8 per cent) and the least time out-of-the-labor force (15 7 per cent).

Black females differed even more greatly from their Hispanic and white counterparts. They were more than twice as likely to experience unemployment, and worked a considerably smaller percentage of weeks than Hispanic or white females.

As seen in both tables 6a and 6b, high school graduates had a better employment experience Looking at Table 6a first, male high school graduates had about one-half as many unemployment weeks as high school dropouts. Male graduates also worked about ten more weeks each year than dropouts. Both the unemployment and employment differences between graduates and dropouts applied similarly to within-race comparisons. Female high school graduates also had less unemployment than dropouts, but the difference was smaller than for males However, the difference in weeks worked was substantially larger than for males, over 15 weeks. Again, qualitatively the results are similar within the race groups.

Table 6a: Labor Force Characteristics in the First Four Years After Leaving School of 16- to 19- Year Olds Who Left School Between 1977 and 1981 by High School Completion, Race and Sex

(Weighted)

	At Least One Week of Unemployment (%)		At Least Six Months of Unemployment (%)		At Least One Week of Employment (excluding military weeks) (%)		At Least Six Months of Employment (excluding military weeks) (%)		At Least One Week of Employment (including military weeks) (%)		At Least Six Weeks of Employment (including military weeks (%)		Average Weeks Unemployed		Average Weeks Employed (excluding military weeks)		Average Weeks Employed (including military weeks)	
H.S. dropout	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
First Year																		
Total	55 3	53 2	11 8	5 2	91 3	82 4	74 5	51 3	96 0	83 5	80 8	52 4	8 4	5 6	30 0	19 4	33 0	19 9
Hispanic	62 7	33 9	9 0	0 0	93 6	60 0	77 4	31 4	96 7	62 5	81 5	34 0	8 3	2 2	29 9	13 5	31 8	14 5
Black	58 5	57 1	18 6	12 6	89 0	71 5	66 1	32 5	96 7	71 5	77 5	32 5	11 2	8 7	22 6	9 4	27 5	9 4
Other	53 2	56 7	10 4	4 0	91 6	88 6	76 5	58 5	95 7	89 1	81 7	59 7	7 5	5.3	32 3	22 6	34 9	23 2
Second Year																		
Total	54 1	49 8	14 4	5 7	85 9	80 9	72 4	52 5	96 3	82 0	82 2	53 6	8 6	5 5	27 7	21.5	32 9	22 0
Hispanic	60 7	35 5	16 0	8 3	91 4	68 2	74 1	50 7	95 6	70 8	78 2	53 3	11 1	5.1	27 3	19 2	29 5	20 1
Black	53 1	62 4	19 3	13 1	80 5	76 7	63 2	35.5	91 9	76 7	74 6	35 5	10 4	9 4	20 9	10 1	26 9	10 1
Other	53 3	48.5	12 6	3 5	86 6	83 6	74 9	57 0	97 7	84 8	85 1	58 1	7 7	4 5	29 8	24 6	35 2	25 1
Third Year																		
Total	52.5	43 1	10 4	4 4	90 6	77 5	74 6	52 9	97 2	77 5	85 3	53 7	8 4	4.5	29 9	21 2	34 8	21 6
Hispanic	47.5	30 2	5 0	1 4	89 7	66 6	75 1	40 2	93 8	66 6	80 3	40 2	6 4	2 5	32 1	18 6	34 6	18 6
Black	59 2	55 4	13 2	12 1	87 3	63 8	61 9	27 7	96 9	63 8	72 7	27 7	9 6	8 1	23 8	7 8	29 3	7 8
Other	52 0	41 6	10 4	2 8	91 8	82 2	78 3	60 7	97 9	82 2	89 8	61 9	8 3	3 9	31 4	24.9	36 5	25 4
Fourth Year																		
Total	50 8	43 5	12 1	6 7	92 3	76 0	78 0	52 9	95 5	76 0	84 9	52 9	8 8	5 5	31 6	30 6	34 7	20 6
Hispanic	47 5	35 8	12 2	8.3	91 4	68 4	81 1	42 0	93 6	68 4	86 3	42 0	8.5	5 1	31 1	16 0	33 4	16 0
Black	58 6	59 2	14 0	17 4	89 8	77 9	69 8	42 3	93 0	77 9	75 6	42 3	9 3	9 5	36 5	11 4	29 7	11 4
Other	49 1	40 7	11 6	3 9	93 1	76 5	80 0	56 9	96 5	76 5	87 4	56 9	8 7	4 5	33 2	23.5	36 4	23.5

(Continued on next page)

Table 6a Continued

HS graduate	At Least One Week of Unemployment (%)		At Least Six Months of Unemployment (%)		At Least One Week of Employment (excluding military weeks) (%)		At Least Six Months of Employment (excluding military weeks) (%)		At Least One Week of Employment (including military weeks) (%)		At Least Six Weeks of Employment (including military weeks (%)		Average Weeks Unemployed		Average Weeks Employed (excluding military weeks)		Average Weeks Employed (including military weeks)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
First Year																		
Total	31 5	39 6	4 2	4 5	93 6	94 9	87 1	83 4	99 1	95 3	95 0	83 8	3 8	4 4	39 8	36 8	43 5	37 0
Hispanic	32 6	41 4	5 5	1 7	93 1	89 4	83 0	66 7	89 0	90 1	92 4	69 4	4 8	3 6	37 4	30 8	42 2	32 1
Black	47 1	53 8	5 6	11 5	87 8	90 5	74 5	65 3	89 5	92 7	90 8	67 4	6 6	8 0	30 2	25 6	38 0	26 8
Other	29 2	37 5	3 9	3 7	94 4	95 9	89 1	86 8	99 3	95 9	95 7	86 9	3 4	4 0	41 3	38 7	44 3	38 7
Second Year																		
Total	32 9	36 7	5 7	3 5	91 8	94 0	86 6	84 0	99 2	94 6	95 6	84 9	4 1	3 8	39 3	37 4	43 7	37 9
Hispanic	29 6	39 0	2 9	3 5	88 9	93 0	80 8	74 8	99 1	95 7	92 8	77 5	2 6	3 3	38 6	32 9	44 8	34 3
Black	41 9	47 9	10 3	11 4	76 8	91 0	66 9	71 1	98 0	93 6	89 7	74 2	6 7	7 7	27 5	28 4	39 1	30 0
Other	31 9	34 9	5 3	2 4	94 1	94 5	89 6	86 3	99 4	94 7	96 5	86 8	3 8	3 3	41 0	39 0	44 2	39 2
Third Year																		
Total	33 7	27 7	6 2	2 7	93 2	92 0	87 6	79 0	99 2	92 8	96 0	79 9	4 9	2 9	39 4	37 6	43 5	38 1
Hispanic	29 5	22 2	5 4	2 1	88 2	83 8	82 5	68 9	99 0	86 5	95 2	71 6	3 9	1 8	37 6	33 9	44 1	35 3
Black	41 7	44 1	9 2	9 1	78 2	86 8	67 6	70 8	97 6	89 4	91.5	73 8	7 3	6 6	27 3	29 4	39 3	31 0
Other	32 8	25 5	5 9	1 8	95 6	93 1	90 7	80 7	99 5	93 6	96 6	81 2	4 7	2 4	41 2	39 0	44 0	39 2
Fourth Year																		
Total	30 3	27 5	3 9	3 9	93 8	90 5	88 9	76 7	98 9	91 2	96 0	77 4	3 9	3 1	41 0	36 3	44 6	36 6
Hispanic	29 6	13 3	2 4	0 0	91 8	90 6	89 4	79 5	99 1	93 2	99 1	80 3	2 5	1 2	41 8	37 9	46 9	38 7
Black	36 6	41 0	7 4	8 4	77 2	88 6	70 9	71 0	97 1	90 5	92 6	73 1	5 7	5 9	30 3	30 2	41 4	31 3
Other	29 5	26 1	3 4	3 4	96 2	90 8	91 4	77 4	99 2	91.3	96 3	77 9	3 7	2 8	42 5	37 1	44 9	37 3

Sample Size	High School Dropouts Unweighted	High School Dropouts Weighted	High School Graduates Unweighted	High School Graduates Weighted
Male	308	627665	697	2205626
Hispanic	71	72894	95	103160
Black	91	126585	178	257833
Other	146	428186	424	1844633
Female	289	639606	799	2339201
Hispanic	61	59021	86	92076
Black	80	115055	201	287304
Other	148	465530	492	1959821

Source. National Longitudinal Survey of Labor Market Experience-Youth, conducted by the Center for Human Resource Research at the Ohio State University for the Bureau of Labor Statistics

Table 6b: Per cent of Weeks Spent Employed, Unemployed, and Out-of-the-Labor Force in First Four Years After Leaving School for 16-19 Year Olds Who Left School Between 1977-1981 By Race, Sex, and High School Completion

	Per cent of Weeks Unemployed		Per cent of Weeks Employed		Per cent of Weeks Out of Labor Force	
	Male	Female	Male	Female	Male	Female
H.S. dropout						
Hispanic	16 5	7.2	62 2	33.3	21.3	59.5
Black	19 5	17 2	54.5	18.6	26.0	64.2
Other	15 5	8 8	68.8	46.8	15 7	44.4
H.S. dropout						
Hispanic	6 6	4 7	85 6	67 5	7 8	27.8
Black	12 6	13.6	75.9	57 3	11.5	29.1
Other	7.5	6.0	85.3	74.2	7.2	19.8

Source· National Longitudinal Survey of Labor Market Experience-Youth; conducted by the Center for Human Resource Research at the Ohio State University for the Bureau of Labor Statistics.

Table 6b reveals a larger race differential for high school graduates than for dropouts, particularly for males. Black male graduates spent 1.7 times as many weeks unemployed as did white male graduates and 1 9 times as many weeks as did Hispanic male graduates. They also spent considerably more time out-of-the-labor force and worked fewer weeks. Hispanic males and white male graduates looked similar in their cumulative employment and unemployment. Black female graduates also experienced much greater unemployment, worked fewer weeks and spent more time out-of-the-labor force than either Hispanics or whites. However, unlike males, Hispanic female graduates worked less, had less unemployment, and were out-of-the-labor force more than female white graduates.

Table 7 shows the distribution of unemployment weeks for the same four year period by graduation status and sex. In the first year after leaving school, 63.2 per cent of the males and 57.5 per cent of the females experienced no unemployment.

An additional 12.8 per cent of the males and 15.9 per cent of the females had between one and four weeks of unemployment. Thus, approximately three-quarters of these youth had less than four weeks of unemployment during the first year after leaving school. At the other extreme, 2.3 per cent of the males and 1.9 per cent of the females were unemployed most of the year, between 40 and 52 weeks. The distribution remains relatively stable in

Table 7: Distribution of Unemployment Weeks in Each of the First Four Years Since Leaving School for 16-19 Year Olds Who Left School, by Sex and by High School Graduation Status

(Weighted)

		Weeks of Unemployment					
		0	1-4	5-13	14-26	27-39	40-52
All							
1st year	Male	63.2	12.8	10.4	7.8	3 5	2.3
	Female	57 5	15.9	15.3	7 1	2.4	1.9
2nd year	Male	62.4	12 1	12 0	6 5	4 8	2.2
	Female	60.5	14 7	14 7	6.3	2 4	1 3
3rd year:	Male	62.2	9 5	11.4	10 0	3.8	3 1
	Female	69 0	13.1	9 8	5.3	1 4	1.4
4th year:	Male	65.1	8 9	11.5	9.2	2.4	2.7
	Female	69.1	11 8	10.1	5 1	2.5	1.7
H.S. Dropouts							
1st year:	Male	44.7	16 6	14.8	12.3	7.0	4.6
	Female	46.8	19.2	17.3	9.5	2.6	1 7
2nd year:	Male	50 2	10.4	18.4	6.9	8.1	6 0
	Female	50 2	16.2	21.5	6.6	4.0	1.5
3rd year	Male	47 5	11.0	16.0	15.2	6.4	3 9
	Female	56.9	16 3	15.8	7 3	2.3	1.3
4th year:	Male	49.2	7.7	18.8	12 6	15.7	6 0
	Female	56.5	13 9	14.9	8 2	4 8	1.7
H.S. Graduates							
1st year.	Male	68.5	11.7	9.1	6.5	2 5	1.6
	Female	60.4	14.2	14.8	6.4	2 3	1 9
2nd year	Male	67.1	11.4	10 2	6.4	3 8	1.1
	Female	63.3	14 3	12.8	6.3	2.0	1 3
3rd year:	Male	66.3	9.1	10.1	8.5	3 1	2.9
	Female	72.3	12 2	8.1	4.7	1.2	1 4
4th year:	Male	69 7	9.3	9.5	8 3	1.5	1 9
	Female	72 5	11.2	8.8	3 9	1.7	1 7

Sample Size	Unweighted	Weighted
Male	1005	2833290
H.S. dropouts	308	627665
H.S. graduates	697	2205625
Female	1068	2978806
H.S. dropouts	289	639605
H S graduates	779	2339201

Source: National Longitudinal Survey of Labor Market Experience-Youth; conducted by the Center for Human Resource Research at the Ohio State University for the Bureau of Labor Statistics

each of the subsequent three years, although for females there is a marked increase in the proportion experiencing no unemployment.[3]

The distribution of unemployment differs significantly by high school graduation status. In the first year after leaving school, only 44.7 per cent of male high school dropouts had zero weeks of unemployment while this figure was 68.5 per cent for the male graduates. The difference was somewhat less pronounced for females, 46 8 per cent for dropouts and 60.4 per cent for graduates. The difference at the other extreme is observed only for males. Of the male dropouts 4.6 per cent were unemployed over 40 weeks, while of the male graduates only 1 6 per cent experienced such sustained unemployment. For females the figures for dropouts and graduates are almost identical (1.7 per cent and 1.6 per cent, respectively). As with the overall population, the distribution is relatively stable for dropouts and for graduates over the entire four year period Again, however, females with zero unemployment weeks increased relatively for both dropouts and graduates.

In a study funded by BLS, Cameron, Gritz, and MaCurdy (1989) looked at the effects of unemployment insurance benefits on the unemployment of youths. Using the NLSY they found that eligibility of young men for unemployment insurance increases with both age and education while utilization of unemployment insurance increases with age but not necessarily with more education. For young women eligibility increases with education, but not with respect to age. Utilization patterns for young women are similar to those of young men except for the lowest education group where there is no apparent relationship between the insured rate and age Overall, men have higher eligibility and utilization rates than women.

Using a variety of measures, Cameron et al. estimate the effects of increasing the amount of weekly benefits and the number of weeks of eligibility on the lengths of non-employment spells and the amount of these spells reported as spent in unemployment. By looking across states, they were able to use the differences in state Unemployment Insurance (UI) programs to look at behavioral differences.

Their findings imply that weekly benefit amounts paid by programs have essentially no effect on the durations of nonemployment spells. On the other hand, the number of weeks of eligibility offered does increase the length of time spent between jobs This effect, though, is not uniform. There is no influence on the short durations of either non-employment or unemployment, but it leads to an expansion of the longer durations with the longest durations being stretched out the most. In particular, an extension of weeks of eligibility from 26 to 39 generates only about a one-week lengthening of unemployment duration for the median individual, but unemployment lengthens by as much as eight weeks for those persons experiencing the longest durations.

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3 This is not due to women spending more time out-of-the-labor force and registering zero weeks of unemployment Summing the columns in average weeks unemployed and average weeks employed in Table 6a to get average total weeks in the labor force shows a very stable rate over the four year period.

The results for men and women are similar with only slight exception In particular, while weeks of eligibility matter for both sexes, changes in the amount of benefits have slight effect for men but no effect for women. Otherwise, UI policies influence women's experience between jobs in non-employment and unemployment in the same pattern as with men, although the magnitudes of the various effects differ.

4. Work and the Family

The relationship between work and family life has become one of the most important areas in current policy planning.

Considerable attention has been given lately in the United States to a variety of legislation dealing with parental leave, child care, and related subjects. It is therefore important to understand the behavior of women in coordinating their work and family life and how policy changes will influence that behavior. To better understand the issues involved, BLS has sponsored several studies.

In a study funded by BLS, Falaris and Peters (1989) examined whether women are influenced in their choice of timing of their first child by the size of their cohort. Their theoretical approach allows women to choose when to have their first birth and when to return to work to mitigate the effects of the size of their own cohort on their wage profiles If large cohorts depress wages, then a woman born into such a cohort can choose to have a child early and enter the labor force later with a smaller cohort. If she is born into a small cohort, she is likely to work early in her adult life, having her first child later. This sort of adjustment allows them to enter the labor market when wage profiles are to their greatest advantage.

Falaris and Peters estimated hazard rate models using data from the Mature Women, Young Women, and NLSY. These three data sets pooled gave them information on women born during different phases of the demographic cycle: 1918-37, 1942-53, 1957-64. These periods represent a baby boom, bust, and boom, respectively Falaris and Peters also controlled for the woman's choice of schooling, something which also can be affected by the size of the cohort.

In support of their theory, women who were born during the upswing of the demographic cycle were found to have their first birth earlier and to return to work more quickly than would women who were born during the downswing of the demographic cycle.

In another study funded by BLS, Leibowitz, Waite, and others (see Leibowitz, Klerman, Waite, and Wittsberger (1989); and also Desai, Leibowitz, and Waite (1989) investigated young women's labor force participation and employment during pregnancy and following birth. Their objective was to analyze changes in women's labor force behavior during pregnancy and after the birth of a first child, and in particular to examine the timing of labor-force exit during pregnancy, the timing of return to work after childbirth; and the effects of age, education, occupation, race, and ethnicity on departure and re-entry times. Because the NLSY began as a sample of teenagers, the mothers tend to be young and therefore the results

may not be representative of women who do not have their first child until later.

Using the NLSY, the authors could combine the fertility histories with the work histories to determine when a women left work during her pregnancy and when she returned to work after giving birth. Table 8 shows the unweighted combinations of when young mothers left work and when they returned to work. The rows of this table show the week during pregnancy that the woman left work, divided by trimester. The last row for the 39th week represents women who work up until the week of the delivery Most women who left early during the pregnancy did not return to work for a considerable period of time, if ever. Over 28 per cent of all women in the sample did not leave work before the week of delivery. Women who worked this far into their pregnancy tended to return to work very quickly.

Table 8 indicates that approximately one-fifth of the sample took no more than one week off from work. This does not seem realistic and is probably a result of the way the questions are worded in the survey As in all labor force surveys, time on paid vacation or paid sick leave is considered as time employed. Therefore, a woman is employed though she is actually on maternity leave.[4] In 1983, the NLSY investigated this specifically. The woman was asked whether her employer offered maternity leave, the date at which she began maternity leave, and the age of her child when she returned to work. Using these questions,

Leibowitz et al. were able to look at women who had births in 1983 and appear to have worked continuously through childbirth. Only one-quarter of these women report that their maternity leave began with delivery. Three-quarters of these women appear to have worked into the week of delivery, yet obviously began their maternity leave earlier.

Similar results are found for work after delivery in the 1983 data. Only 9 per cent of the women who appear to be employed in the week before delivery actually returned to work in the week following delivery as compared to nearly 74 per cent found by merging the event histories. Nevertheless, the 1983 data show that these women do return to work relatively quickly. Eighty-two per cent returned to work within the first three months

Using multivariate hazard models, Leibowitz et. al. found that opportunity costs play the strongest role in predicting labor supply near childbirth Women with more education and higher wages remain in the labor force later into pregnancy and return to work sooner after delivery.

Women who were not married at the time of the child's birth were more likely to withdraw from the labor force in the first six months of pregnancy and to return to employment more slowly after the birth. this may be due to the receipt of Aid to Families with Dependent Children (AFDC), which acts

4 Beginning in 1988, respondents were asked about paid leave taken because of the birth of a child. This will permit separating time at work from time on paid leave for employed women.

Table 8: Week of Leaving Work in Pregnancy and Week of Return to Work After Delivery

Week Left in Pregnancy		Week of Return to Work Following Birth: Within First Week	2-13	14-52	53-367	Total
1-13	N	0	35	79	130	244
	Row %	0 00	14.34	32 38	53 28	100 00
	Col %	0 00	12 46	24.76	38 12	20 44
14-26	N	0	31	79	90	200
	Row %	0.00	15 50	39 50	45.00	100 00
	Col %	0.00	11.03	24 76	26.39	16 75
27-38	N	2	164	133	111	410
	Row %	0.49	40 00	32 44	27.07	100 00
	Col %	0 79	58.36	41.69	32.55	34.34
39	N	251	51	28	10	340
	Row %	73.82	15.00	8 24	2 94	100 00
	Col %	99 21	18 15	8 78	2 93	28 48
	Total	253	281	319	341	1194
		21 19	23 53	26 72	28 56	100 00
		100 00	100 00	100 00	100.00	100.00

Source Table 2 from Leibowitz et al (1989b)

as an income support for single women in all states, but for married women in only about half of the states

The age of the woman affects when she withdraws from and returns to the labor force. Teenagers are significantly less likely to work until the end of pregnancy or to return to work immediately after childbirth. Women 20-27 are less likely to withdraw from the labor force in the last trimester of pregnancy and are more likely to return to work shortly after giving birth.

Education plays an important role in this story College education reduces the chances that work-committed women leave their job in the first two trimesters of pregnancy, but has no such effect for women with low work-commitment [5] College-educated women are no more likely to return to work during the first quarter after giving birth than are women with a high school diploma; however, they are more likely to return to work in the 3-11 month time period after the birth of their first child (given that they did not return earlier).

5 Work commitment is determined by the answer to the question, 'What would you like to be doing when you are 35?' Those who responded 'working' were deemed to have a high degree of work commitment; those who responded otherwise a low degree of work commitment.

In general, the various covariates have effects only in the first two trimesters. By the third trimester, only the wage effect is statistically significant. This also holds true for after the delivery. Women who remain at work into the third trimester are primarily influenced by their wage.

In the hazard model, Leibowitz et al. again find a strong correlation between late withdrawal in pregnancy and early re-entry after birth, controlling for observable factors. This holds true even when excluding the women who appear to have continuous employment at the time of childbirth.

To analyze how occupational characteristics influence labor supply during pregnancy and after delivery, Desai et al linked occupational characteristics derived from the Current Population Survey and the Dictionary of Occupational Titles to the NLSY data. Holding personal characteristics constant, they found that women in jobs which require less training or more physical strength were more likely to quit work early. Women whose occupations require higher levels of specific vocational preparation were more likely to continue working during the first two trimesters of pregnancy and to return to work within the first quarter following the birth

Attributes of the occupation, such as larger numbers of part-year workers and larger numbers of co-workers who are mothers, lead women with low work commitment to return to work earlier.[6] Women who are more work-oriented are not influenced by these factors; wage rates and education are the primary factors predicting their timing for return to work.

As part of a bigger study on support for adolescent mothers, the Congressional Budget Office (CBO) (1990), an agency of the US Congress, used the NLSY to study the patterns of welfare use among adolescent mothers, focusing on the likelihood that adolescent mothers will start and stop receiving AFDC[7] benefits within the first few years after giving birth They attempted to investigate only the characteristics associated with different patterns of welfare receipt, not the causes of different welfare experiences. Some of these characteristics are no doubt correlated with the causes, but it is important not to interpret them in this way. Since only teenagers are examined in this study, the results may not generalize to older mothers

Table 9 from the CBO report shows the cumulative entrance rates onto AFDC accounting for the mother's marital status, age at first birth, and race. Twenty-eight per cent of all adolescent mothers receive AFDC within the first year after giving birth. Nearly one-half are receiving it within five years after giving birth. While it appears that mothers aged 15-17 receive AFDC with much higher frequency than mothers aged 18-19, and blacks receive AFDC with much higher frequency than whites, it is marital status that

6 Desai, Leibowitz, and Waite use characteristics of the occupation. It would be more appropriate to use the attributes of the job with a given employer. Although these data are not available in the NLSY, it is not clear that occupation is a useful measure.

7 Aid to Families with Dependent Children (AFDC) is one of the largest welfare programs in the United States.

Table 9: Cumulative AFDC Entrance Rates for Adolescent Mothers, by Mother's Marital Status and Age at First Birth, and Race (per cent)

Characteristic of Mother	Cumulative Proportion Who Started Receiving AFDC[a]: By Birth of First Child[b]	By 12 Months After Birth of First Child	By 60 Months After Birth of First Child
All	7	28	49
Marital Status at Birth of First Child			
Married	2	7	24
Unmarried	13	50	77
Age at Birth of First Child			
All mothers			
15 to 17	5	30	58
18 to 19	9	26	43
Mothers who were unmarried when they first gave birth			
15 to 17	8	47	77
18 to 19	19	53	76
Race			
All mothers			
White	7	22	39
Black	9	44	76
Mothers who were unmarried when they first gave birth			
White	17	53	72
Black	10	49	84

Source. Congressional Budget Office tabulations of data from the National Longitudinal Survey of Youth (1979-1985). (Table 13 from Congressional Budget Office, 1990)

Notes: Entrance rates for the Aid to Families with Dependent Children program refer to the proportion of adolescent mothers who first started receiving AFDC payment in the specified period Adolescent mothers are defined as all women who first gave birth when they were between the ages of 15 and 19 The results for married adolescent mothers of different ages and races are not included separately because of the small sample size.

These findings are based on relatively small samples and therefore should be taken as indicative of general patterns of behavior rather than as precise estimates, particularly for the period furthest from the birth

[a] These estimates reflect the total number of adolescent mothers who entered the program for the first time, regardless of their subsequent exits from or reentries into the program Thus the values do not relate to the proportion receiving benefits in any particular period

[b] States have the option of providing assistance to pregnant women, beginning in the sixth month of medically verified pregnancies

Table 10: Cumulative AFDC Exit Rates for Adolescent Mothers, by Mother's Marital Status and Age at First Birth, and Race (per cent)

Characteristic of Mother	Cumulative Proportion Who Started Receiving AFDC[a]		
	Within 6 Months After First AFDC Receipt	Within 12 Months After First AFDC Receipt	Within 48 Months After First AFDC Receipt
All	31	49	76
Marital Status at Birth of First Child			
Married	60	69	94
Unmarried	23	43	71
Age at Birth of First Child			
All mothers			
15 to 17	30	45	70
18 to 19	32	52	82
Mothers who were unmarried when they first gave birth			
15 to 17	23	39	66
18 to 19	24	48	76
Race			
All mothers			
White	40	57	82
Black	19	40	66
Mothers who were unmarried when they first gave birth			
White	27	48	77
Black	19	40	66

Source Congressional Budget Office tabulations of data from the National Longitudinal Survey of Youth (1979-1985) (Table 16 from Congressional Budget Office, 1990)

Notes: Exit rates for the Aid to Families with Dependent Children program refer to the proportion of adolescent mothers receiving AFDC payments who left the program for the first time within the specified period. Adolescent mothers are defined as all women who first gave birth when they were between the ages of 15 and 19. The results for married adolescent mothers of different ages and races are not included separately because of the small sample size.

These findings are based on relatively small samples and therefore should be taken as indicative of general patterns of behavior rather than as precise estimates, particularly for the period furthest from the birth.

[a] These estimates reflect the total number of recipients who left the program for the first time, regardless of subsequent reentries or reexits. Thus the values do not relate to the proportion receiving benefits in any particular period.

makes the key difference. Unmarried women are three times as likely to receive AFDC as married women [8] When age and race are interacted with marital status the differences for these two variables diminishes or even disappears. This reflects the different marriage patterns in these groups. In particular, young black mothers are much less likely to be married than young white mothers (11 per cent compared to 67 per cent).

Table 10 shows the cumulative exit rates from AFDC for teenage mothers, by age of the mother at first birth, marital status, and race. In this table an exit is considered to be a period of three or more months not receiving AFDC. Periods of one or two months were not considered as exits because frequently these result simply from the family's failure to comply with program rules The sample used in this table includes only those receiving AFDC and thus reflects a smaller sample size than Table 9 Since some of the cell sizes get small, these numbers should be considered more indicative than precise

Nearly one-third of all adolescent mothers leave AFDC within six months after they first receive it, three-quarters leave within four years Once again the pattern differs by age, marital status, and race. Married women are more likely to exit AFDC than unmarried women, mothers 18-19 more likely than those 15-17; and whites more likely than blacks. In this case marital status does not fully mitigate the differences for age or race

Two possible explanations can be suggested for why 'older' teenage mothers tend to leave AFDC more quickly. One is simply that they are older and therefore are more likely to find jobs The younger mothers would find jobs as they grow older, inducing longer welfare spells The second explanation is the difference in education leading to difference in ability to become self-sufficient. In the NLSY sample used here, 21 per cent of younger single teenage mothers getting AFDC had graduated from high school or had GEDs within roughly two years after the birth of the child, compared with 58 per cent of the group who were 18-19 when they became mothers

The racial difference appears to be somewhat affected by the different marriage patterns of blacks and whites. However, the difference remains distinct. Another possible factor accounting for this difference may be the birth of additional children. While white adolescent mothers were more likely than black adolescent mothers to have additional children within a few years after first giving birth, they were also more likely to get married before having those children. Among young mothers who remained single during the survey, blacks were twice as likely as whites to have second children within four years after first giving birth

Table 11 shows rates of receipt of AFDC for adolescent mothers in each one-year period for four years after giving birth This combines the patterns of entry and exit from AFDC examined previously Though some differences appear by age and race, these are mostly accounted for by marital status.

8 Married women are eligible for AFDC in approximately only half of the states

Table 11: Adolescent Mothers Receiving AFDC (per cent)

	Time Between Birth and Receipt of AFDC (Months)			
Characteristic of Mother	**0 to 12**	**13 to 24**	**25 to 36**	**37 to 48**
All	27	28	29	30
Marital Status at Birth of First Child				
Married	7	8	12	14
Unmarried	48	49	50	49
Age at Birth of First Child				
All mothers				
15 to 17	29	32	39	38
18 to 19	26	25	23	24
Mothers who were unmarried when they first gave birth				
15 to 17	45	49	57	52
18 to 19	51	49	42	44
Race				
All mothers				
White	21	21	22	23
Black	42	46	50	47
Mothers who were unmarried when they first gave birth				
White	52	49	45	47
Black	46	51	56	52

Source Congressional Budget Office tabulations of data from the National Longitudinal Survey of Youth (1979-1985). (Table 15 from Congressional Budget Office, 1990)

Notes. Adolescent mothers are defined as all women who first gave birth when they were between the ages of 15 and 19.

These findings are based on relatively small samples and therefore should be taken as indicative of general patterns of behavior rather than as precise estimates, particularly for the period furthest from the birth

There is a fairly constant proportion of adolescent mothers receiving AFDC over time. The welfare population, however, is not static. There is considerable mobility onto and off of AFDC. During any given period many young mothers leave the program while others enter or re-enter. Despite this mobility, the proportion on AFDC remains fairly stable. This result demonstrates the usefulness for longitudinal data over cross-sectional data in understanding welfare receipt. A repeated cross-section showing AFDC would reveal this roughly constant proportion and would mask the underlying movements onto and off the program.

5. Training

Training the nation's labor force has always been an important issue. Recently it has risen to the forefront as critical. Many people believe that the entrants into today's workforce are not equipped with the skills required. BLS has formed a task force to investigate what we know about training and to make recommendations on what additional data are needed to better understand the role training plays in the development of the workforce. The NLSY contributed to this task force in several ways. Separately the NLSY has been used to examine several issues dealing with private sector training.

BLS has funded several studies which are currently in progress. One study by Lynch (1990) has produced some interesting results. She uses the NLSY to analyze the determinants of the probability of receiving different types of private sector training and the effect of training on the wages and wage growth of young workers who are not college graduates Issues addressed include the relative importance of training and tenure for wage determination and the rate of return to company-provided training programs compared to the rate of return to training received outside the firm from 'for profit' proprietary institutions and schooling Also investigated is the portability of company training from one employer to another and the existence of differentials in the returns to training by union status, race, and sex.

Other studies of training have suffered from a variety of data limitations. Some of these are the lack of complete employment, training, and schooling histories on individuals in the various surveys; difficulties in measuring the amount of private sector training the individual received, and difficulties in distinguishing firm-specific from general types of training. Through 1987, the NLSY only allowed for measuring formal spells of training of one month or more[9], but does allow reconstruction of the entire formal training history (for programs of one month or more) for individuals from the moment they enter the labor market including the occurrence and duration of each training spell. The NLSY data are also useful in distinguishing between different sources of private sector training including company provided training, training from 'for profit' proprietary institutions, and apprenticeships.

Lynch finds that private sector training plays a significant role in the determination of wages and wage growth for young workers in the US who do not graduate from college (approximately 70 per cent). Women and non-whites are much less likely to receive training from their employer, either in a company training program or in an apprenticeship program. More educated workers have a higher probability of acquiring off-the-job training and apprenticeships, but there is little effect of post secondary school education on receipt of firm provided on-the-job training.

9 Beginning in 1988, all training programs of any duration were captured.

In her estimation of the effect of training on wages, Lynch finds that all training increases wages significantly, including off-the-job training from proprietary institutions. The impact of the training variables is larger than the impact of tenure on wages. While tenure still plays a role in wage determination, this implies that equations estimated without training variables are allowing the tenure variable to capture some of the effect of training.

Finally Lynch finds evidence that on-the-job training provided by an employer is usually specific to the firm. There appears to be no effect of training with a previous employer on current wages.

Leigh (1989), in a study for the US General Accounting Office, used the NLSY to examine similar issues dealing with training. He also investigated who received different kinds of training and what were the effects of these types of training on wages and earnings.

Table 12 shows his unweighted tabulations of receipt of at least one training program from 1979-86, disaggregated by type of training, race and sex. From this table we see that more people obtain training in proprietary schools than in other types of training and only a small percentage are in apprenticeship programs. Females of all races receive more training from proprietary schools than males whereas the differences by sex are not substantial for any other type of training. The patterns by race are mixed Whites generally get more training of any type than either blacks or Hispanics except that Hispanic males receive more training from proprietary schools than either white or black males

Table 12: Percentages of Respondents Who Completed at Least One Training Program, by Provider, Race/Ethnicity, and Sex

	Whites		Blacks		Hispancs		
Provider	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**All**
Proprietary school[a]	8.7	13.9	7.4	12.8	9.5	11.4	10.7
Bus. coll	0.6	2 8	1 2	2 8	1 4	1.6	1 7
Nurses prog.	0 2	2.2	0.1	2 6	0.2	1.4	1.1
Vo-tech	6 9	8.3	5.2	6 1	7.4	6.0	7 0
Barber/beauty	0 2	0.7	0.2	1 0	0 2	2.2	0.6
Flight school	0 4	0.1	0.2	-	0.3	-	0.2
Correspondence	0.7	0.6	1.2	1 0	0 3	0.8	0.8
Apprenticeship	1.5	0.6	0.9	0 2	1.2	1.0	1.0
Company prog.	6.6	7 0	4 6	5.4	5.7	4.8	6.1
Other	3.6	4.2	2.1	2.9	2.6	3.0	3.4
No. of obs.	2,349	2,083	954	882	661	502	7,431

[a] Subtotals do not add to totals because respondents may have completed a training program in more than one of the categories of proprietary school programs.

Source: Table 1 from Leigh (1989).

BLS produced related tables for its training task force which focused exclusively on company training programs. These are presented as Tables 13a-c. The numbers in these tables differ from Leigh's in that they come from different sample restrictions and are weighted, yielding somewhat higher estimates of the amount of training received for all groups except Hispanic females These tables show that over 9 per cent of the sample completed at least one company training program in the 1979-86 period. Consistent with Leigh's finding, these tables show that whites receive the most company training, followed by blacks and Hispanics Also consistent are the results by sex. Men receive more company training than women for all races.

These tables also present breakdowns for education and job trained for Results for the former show receipt of company training increases monotonically with amount of education for both sexes. In examining job trained for, different patterns emerge for men versus women. While clerical positions are the jobs most trained for overall, this type of training is much more prevalent for women. Second highest for women is professional/technical. Managerial and skilled manual occupations are significantly lower Men, on the other hand, are more evenly represented in each type of training with professional/technical and skilled manual more prevalent than managerial and clerical. The highest category is 'other', a conglomeration of all occupational categories not represented by the four shown.

In addition to Table 12, Leigh uses more sophisticated econometric procedures to study various training issues He finds some contrasting results with the study by Lynch. Consistent with Lynch (and other studies), he finds that women are less likely than men to gain access to apprenticeship programs and more likely to participate in proprietary school programs. In contrast, however, he finds women are no less likely than men to participate in company-sponsored training. He also does not find that Hispanics or blacks are less likely to receive training.

Leigh finds a similar, but stronger correlation of education with acquisition of training. More educated workers are found to be more likely to receive training from all types of providers While Lynch found this relationship for company provided training to apply only to high school graduates, Leigh finds the likelihood of receiving this type of training to increase even further with additional schooling. This is consistent with the BLS tables.

In his investigation of the effect of training on wages and earnings, Leigh finds that company training and apprenticeships both increase wages and earnings. Proprietary schools appear to increase earnings but not wages (Lynch found an increase for wages). Leigh suggests that this type of training works more to increase employment stability than to raise wages.

Table 13a: NLS Tables on Private Sector Training

Per cent of NLSY Sample Completing at Least One Company Training Program, 1979-1986		
Total	9.12	(0.30)
Race		
Whites	9.81	(0.39)
Blacks	6.87	(0 51)
Hispanics	5.78	(0 58)
Job Trained For		
Professional/Technical	2 77	(0.09)
Managerial	1 36	(0.05)
Clerical	6 35	(0.21)
Skilled Manual	1.67	(0.06)
Other	2.66	(0.09)
Sex		
Male	10.50	(0.45)
Female	7 70	(0.40)
Education		
<12	3 05	(0 41)
12	8 61	(0 43)
13-15	11.15	(0.72)
16+	12 06	(0.82)

Notes. Categories may not add to total because of rounding, missing values, multiple programs for a person, or multiple responses. Numbers in parentheses are estimated standard errors assuming homogeneity within categories

Source: Unpublished BLS data from the National Longitudinal Survey - Youth Cohort.

Table 13b: NLS Tables on Private Sector Training

Per cent of NLSY Sample Completing at Least One Company Training Program, 1979-1986 Men		
Total	10.50	(0 45)
Race		
Whites	11 29	(0 58)
Blacks	7 74	(0 76)
Hispanics	7.11	(0 92)
Job Trained For		
Professional/Technical	3.10	(0 14)
Managerial	2.41	(0 11)
Clerical	2.15	(0.10)
Skilled Manual	3.04	(0.14)
Other	3.30	(0 15)
Education		
<12	3.39	(0.59)
12	10.69	(0.65)
13-15	12.71	(1.13)
16+	13.10	(1.19)

Notes and Source: As for Table 13a

Table 13c: NLS Tables on Private Sector Training

Per cent of NLSY Sample Completing at Least One Company Training Program, 1979-1986 Women		
Total	7 70	(0.40)
Race		
Whites	8.28	(0.52)
Blacks	5.99	(0.67)
Hispanics	4.31	(0 68)
Job Trained For		
Professional/Technical	2.43	(0.13)
Managerial	1.19	(0.06)
Clerical	3.79	(0.20)
Skilled Manual	0.26	(0 01)
Other	2.00	(0 11)
Education		
<12	2.59	(0 55)
12	6 47	(0.54)
13-15	9 77	(0.91)
16+	10.98	(1 12)

Notes and Source: As for Table 13a

The differences in findings for these two studies can be explained primarily by two differences in the measures and data used. First, Leigh uses dummy variables for the presence of each type of training received while Lynch uses the actual number of weeks spent in each type of training. Second, Leigh uses data through 1987 while Lynch only uses data through 1983. Because of the ages of the sample at that time (18-25), the cell sizes for college graduates are small. As a result, Lynch does not include college graduates in her study. Table 13a shows a strong correlation between amount of education and the receipt of company training. In fact, adding additional years of data to Lynch's data set and including college graduates makes her results more similar to Leigh's. The only exception is the effect of proprietary training on wages which Lynch still finds to be strongly positive More investigation would be needed to understand why these results differ

6. Effects of Military Experience

With the decline in the size of the cohorts reaching the age of eligibility for military service there is considerable pressure to fill military manpower requirements by accepting lower aptitude recruits. In addition, there have been suggestions that a way to train tomorrow's work force is for the Department of Defense (DOD) to admit disadvantaged and low aptitude youth. By providing these youth with training and discipline, it is suggested they will be able to better participate in the labor force

In a 1985 study sponsored by the DOD, the Human Resources Research Organization (Laurence et al., 1985) examined the demographic differences between low aptitude military and non-military youth. The DOD followed

up on this study by again sponsoring HumRRO (Laurence et al. 1989) to study the effects of military experience on the post-service lives of low aptitude recruits.

The Armed Services Vocational Aptitude Battery (ASVAB) is administered to all recruits before entering military service. A subcomponent of this exam is the Armed Forces Qualification Test (AFQT), which comprises verbal and mathematical sections. The percentiles are grouped into AFQT categories I-V (with category III divided into two parts, IIIA and IIIB) Category I is the highest, comprising the 93-99 percentiles. Category V is the lowest, comprising the 1-9 percentiles Each of the Armed Services determines its own standards. In general, individuals within categories I-IIIA (50 per cent and above) are actively sought. Category IV recruits are accepted only sparingly (limits are actually placed on their enlistment) and those in category V are excluded by law.

Only twice has the military accepted a large number of category IV recruits (10-30 percentiles). The first was in the 1960s during Project 100,000. In response to Lyndon Johnson's 'War on Poverty' and because of the increasing manpower requirements of the Vietnam War, Project 100,000 was launched Its stated primary goal was to provide a means of upward mobility for the economically and educationally disadvantaged by admitting 100,000 low aptitude and medically remedial men into the military annually. More than 320,000 men enlisted under Project 100,000. These men had scored in AFQT category IV.

The second time low aptitude men were admitted into the Armed Forces in large numbers came in the period from January 1976-September 1980. Due to a miscalibration in the newly designed ASVAB exam, there was an inflating of scores for lower ability recruits. Many individuals thought to be of average aptitude were, in fact, in category IV. By the time the errors were detected and verified, and new correctly normed and more technically sound forms of the ASVAB were introduced in October 1980, over 300 000 category IVs had been incorrectly admitted into the Military. Unlike Project 100 000 this more closely resembles a natural experiment.

After discovering the errors in the ASVAB norms, the DOD needed a large nationally representative sample of military-aged youth to whom they could administer the test to create new norms. In the second wave of the NLSY (1980), DOD funded administering the ASVAB to the entire NLSY sample (15-23 years old in 1980). Respondents received $25 for their participation and local testing sites were established. Approximately 94 per cent of the total baseline sample completed the ASVAB, providing DOD with the sample it required to renorm the test. It is the results of that effort which created the norms that have been used by the Armed Services for the last decade [10]

To determine the effect of serving in the military, the HumRRO study located and surveyed samples of the Project 100,000 youth and the low

10 In addition, researchers have benefited greatly by the presence of a standardized IQ type measure for nearly the entire NLSY sample.

aptitude youth admitted during the period of ASVAB misnorming. The NLS Young Men was used as a comparison group for the Project 100,000 men of the 1960s and the NLSY for comparison with the group admitted in the late 1970s. Weighting schemes were derived to account for demographic differences in the two veteran samples and the two NLS non-veteran samples. Analyses were carried out to determine if having served in the military provided the veterans advantages over their non-veteran low aptitude counterparts. Aptitude for the NLS Young Men was determined by using school records and creating percentiles for the respondents.

The comparison of the Project 100,000 veterans, many of whom probably served in Vietnam, with the non-veterans of the NLS Young Men showed that these low aptitude veterans did not fare better than their non-veteran counterparts. Those who never served in the military appear to be better off in terms of employment status, educational attainment, and income. Veterans were more likely to be unemployed and to have an average level of education significantly below the nonveterans. Income differences between the two groups showed non-veterans with incomes of $5000 to $7000 higher, depending on the sources included. Veterans were less likely to be married and more likely to be divorced than non-veterans.[11]

The comparison of the misnormed group from the 1970s with the NLSY also did not fare better than their nonveteran counterparts. In this case, they were similar in their employment status (see Table 14), occupational category, and average income (see Table 15). However, the veterans had acquired significantly less formal education. Veterans had higher marriage rates than nonveterans, but also had higher divorce rates.

In conclusion the HumRRO report states:

> In terms of the central question of interest in this study, therefore, the results are unequivocal. These data provide no evidence to support the hypothesis that military service offers a 'leg up' to low aptitude and disadvantaged youth as they seek to overcome their cognitive and skill deficits and compete successfully in the civilian world.

7. Conclusion

This paper has attempted to demonstrate several different ways in which the National Longitudinal Surveys, in particular the Youth Cohort, have been used by the US government, and a wide variety of topics is represented While a large number of findings have been presented, the emphasis is intended to be on the uses themselves. They vary from small, quick-turnaround tables presented in support of specific legislation, more complex tables to provide background material for preparing various legislation, reports on specific topics, and long-term outside studies on issues of continuing importance.

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11 Fifty-six per cent of the Project 100 000 veterans served in Vietnam. It is not clear what effects this service may have had on these individuals. Such an experience may have negated the positive effects of the military.

Table 14: Employment Status for Potentially Ineligible and NLS 1979 Samples

Sample	Full-Time N[a]	Full-Time %	Part-Time N[a]	Part-Time %	Not Working N[a]	Not Working %	Total N[a]	Total %
Employment Status								
Veteran								
PI Separated[b]	218	77.0	26	9 3	39	13.8	283	100
PI Separated and Active Duty	243	78 8	26	8.5	39	12.6	308	100
Nonveteran								
NLS 1979 in 1985	670	77.2	45	5.2	153	17 6	868	100

	Chi-Square Statistics		
	Effective Sample		
	Full-Time	Part-Time	Not Working
PI Separated	165	19	29
PI Separated and Active Duty	185	19	29
NLS 1979 in 1985	495	34	111

PI Separated vs. NLS	
Working vs Not Working	1.6^{ns}
Full-Time vs Part-Time vs. Not Working	5.1^{ns}
Full-Time vs. Part-Time	2.6^{*}
Full-Time vs Part-Time and Not Working	0.04^{ns}
PI Separated and Active Duty vs. NLS	
Working vs. Not Working	3.5^{*}
Full-Time vs. Part-Time vs Not Working	5.5^{*}
Full-Time vs. Part-Time	1.6^{ns}
Full-Time vs. Part-Time and Not Working	0.5^{ns}

[a] Weighted frequency produced by domographically equating the military and civilian samples. The percentages may not sum to 100 due to the effects of weighting and rounding.

[b] Includes those serving in the reserves

* = < .10

ns = Not Significant

Source: Table 63 from Laurence, et. al. (1989).

Table 15: Adjusted Annual Income From Wages for Potentially Ineligible and NLS 1979 Samples

		Adjusted Annual Income From Wages[a]			
Sample	**Employment Status**	**N[b]**	**Mean**	**Median**	**Standard Deviation**
Veteran					
PI Separated[c]	Full-Time[d]	202	14,564	13,000	9,229
	All[e]	277	12,859	11,592	9,194
PI Separated and	Full-Time	227	14,433	13,000	8,707
Active Duty	All[e]	301	12,899	11,760	8,796
Nonveteran					
NLS 1979 in 1985	Full-Time	637	15,181	12,252	9,881
	All	833	12,862	10,124	9,920

	t-Test Statistics			
	Effective Sample	**Standard Deviation**	**Degrees of Freedom**	**t Value**
Full-Time Workers				
PI Separated	153	9,183	621	-0.7[ns]
NLS 1979 in 1985	470	9,334		
PI Separated & Active	171	8,778	640	-0.9[ns]
NLS 1979 in 1985	470	9,629		
All				
PI Separated	209	9,100	822	-0.0[ns]
NLS 1979 in 1985	615	9,952		
PI Separated & Active	228	8.797	454	-0.1[ns]
NLS 1979 in 1985	615	9,952		

a In dollars.

b Weighted frequency produced by demographically equating the military and civilian samples.

c Includes those serving in the reserves

d Includes only full-time workers who reported income

e Includes full-time, part-time and not working, excluding full-time and part-time workers who did not report income.

ns =Not Significant

Source Table 70 from Laurence, et. al. (1989)

The transfer of responsibility for the NLS to the Bureau of Labor Statistics represented not only a move to a new agency, but a transition in data usage. Our plans are still developing, but initial implementation has begun. Our plan includes goals that cover projects of various lengths.

We are developing the ability to respond quickly to requests from Congress and various government officials with useful information which meets their immediate needs. Second, we are developing a quarterly publication which provides 'results' from the data of general interest. Third, we plan at least one analytical study to be published each year on an important topic. Fourth, we will continue to fund projects on issues which are of continuing importance and which require long-term research using sophisticated techniques. These issues, such as training, youth unemployment, and work and the family, require the development of a body of literature before a good understanding of them can be provided for policy makers

Some studies currently in progress at BLS include several aspects of child care and work (e g. patterns of child care usage, by characteristics of mothers, for employed women; child care problems which have caused women to become unemployed or nonemployed); drugs in the work place; and changes in earnings inequality. Others will be developing in the near future.

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Comment

Paul W. Miller

Applied labour economists are often warned that research findings obtained from the traditional study of cross-sectional data may not inform of how individuals will perform over time. Cross-sectional analysis involves comparing individuals who possess a certain attribute (e.g., training) with those who do not in order to assess the impact on labour market performance of the attribute under consideration. An alternative means of assessing labour market performance is to follow individuals through time, that is, to use longitudinal data. This permits 'before and after' comparisons. The analysis of longitudinal data is often promoted as a means of reducing the statistical problems associated with both unobserved heterogeneity (such as ability differences) and the selectivity bias inherent in many labour market phenomena. Finally, dynamic considerations of the labour market are often simply more informative that static considerations (e.g., flow analysis of unemployment provides a richer set of findings compared with study of the distribution of unemployment at a point in time).

What new insights have longitudinal data provided?

The research findings derived from the US National Longitudinal Survey (NLS) referenced in Michael Pergamit's paper suggest ways in which longitudinal data can be exploited to improve understanding of labour market processes. He outlines six broad areas where NLS panels have been used. I will not dwell upon the first or the last of these. The last considers the effects of military experience on post-service labour market success. However, the role of service in the Armed Forces in Australia on subsequent labour market outcomes has not been prominent in policy debate. The first topic concerns the impact of minimum wages. But given the plethora of award rates of pay, this issue is not tractable using Australian data Nevertheless, it should be noted that the general methodology that Pergamit outlines in the section on minimum wages is relevant to some possible uses of the Australian Longitudinal Survey (ALS). It is applicable, for example, to discussion of wage mobility (out of dead-end jobs) in general, and to more specific applications such as the computation of the probability of escaping repayment contributions under the Higher Education Contribution Scheme in particular years.

The second topic discussed by Pergamit shows how the NLS panels have been used to study the wage paths of young people. The analyses reviewed here are interesting, but do not readily inform the superiority of longitudinal data over a single cross-section. Research using the ALS suggests that a single cross-section might be useful for many purposes, such as predicting average wage growth for various groups. For other purposes, such as predicting whether low wage earners will continue in this state,

longitudinal data have obvious advantages (see Bell, Rimmer and Rimmer, 1991).

Pergamit's discussion of the transition from school to work (topic three) is informative in many respects, though the work on eligibility for unemployment insurance, given the institutional arrangements for unemployment benefits in Australia, is not directly applicable to Australia. It is pertinent to note that blacks and Hispanics are over-sampled in the NLS, and that this permits informed analysis of these groups. Perhaps there are lessons to be learned here for the ALS in terms of the collection of data on minorities, such as immigrants and Aborigines.

Of the six topics covered by Pergamit, the discussion of topic four, 'Work and Family', appears to be the most fruitful in terms of indicating topics for future research in Australia. Moreover, his discussion highlights clearly the advantages of longitudinal data over cross-sectional data The issue of the timing of the first child is obviously important from the policy perspective, impacting upon labour supply, leave arrangements, and child care. This aspect of behaviour is presumably a decision that could (and should) be analysed using the ALS, though the ALS is not, at present, suited to the study of cohort effects (the warning that Pergamit issues to the effect that the results are affected by the presence in the survey of women who do not have their first child until later, would need to be kept in mind). The work reviewed on the timing of return to work after child birth is another area of research where some in-roads could be made using the ALS. Finally, the discussion of the benefits from using longitudinal data versus repeated cross-sectional data is to be noted as a plus for the ALS - it is only with the aid of longitudinal data that the researcher can detect the considerable movements onto and off welfare schemes within the eligible population.

Pergamit's discussion of training issues is interesting for two reasons. First, where direct comparisons are possible, the conclusions from the NLS appear similar to those derived from the ALS For example, there is a positive correlation between formal education and the probability of receiving training in each country. Second, the findings reported for the US labour market are richer than the findings pertaining to the Australian labour market, suggesting that the NLS training data are superior to the ALS data. Training certainly represents one area where additional data need to be collected in Australia. Inter-country comparisons can serve a useful purpose both in terms of establishing the similarity or otherwise of labour market processes, and in indicating potential changes to the way data are collected.

Thus, the studies referenced in Michael Pergamit's paper indicate that there are many labour market issues that can be convincingly analysed only with the aid of longitudinal data. What is the Australian evidence in this regard?

One of the most powerful endorsements of the ALS in the form of research that has effectively marshalled the data to tell a compelling story is a paper by Kornfeld (1990). He sets out to establish the role of trade unions in the Australian labour market The earlier work of Mulvey (1986) and Christie (1992) suggests that trade unions increase the wages of their

members by 10 per cent or more, that the expected wage gain from union membership is important in determining whether an individual will join a union, and that taking account of the potentially endogenous nature of the union membership decision will have only a minor impact on the estimated union wage effect. These results have been queried over various omitted variables and the robustness of the econometric methodology used. Kornfeld implements a traditional cross-sectional approach, and estimates the impact of trade unions on wages for males to be 11-13 per cent. He then models heterogeneity as a time-invariant fixed effect, which enables the use of a first difference model of wage determination. The use of the longitudinal dimension of the ALS permits a 'before and after' comparison, thereby accommodating the selectivity bias problem. Thus model establishes fairly convincingly that trade unions are associated with higher wages (of 9 per cent) in the Australian labour market, suggesting that the corss-section studies provide a reasonably accurate measurement of trade union wage effects in this country, and thereby permitting researchers to move onto the next (and perhaps more intriguing) question of how trade unions achieve this wage premium. The ALS tenure and quit data derived from following individuals across time are also effectively used in Kornfeld's work to provide some new insights into the impact of trade unions that cannot be obtained from other data sources in Australia Thus, the use of the ALS in this instance has helped move a major issue in the empirical labour economics literature in Australia closer to resolution.

The papers at this Conference may also be viewed as an endorsement of the usefulness of the ALS as a longitudinal data set, particularly the papers by McRae, Lewis and Shorten, and Bell *et al.*. However, one should not be too glowing. Some of the studies appear to promote cross-sectional type conclusions as being unique whereas they are already well established from other cross-sectional studies Others attack issues which, while interesting, would be of far more interest if studied with a different population. The overlap, or lack thereof, between estimates derived from a single cross-section and the four waves of data, is rarely analysed. Finally, other than for the papers by Bell *et al.* and the hazard function papers, the estimators used do not utilise fully the panel nature of the data To be fair to some, any alleged shortfall may be attributable to the preliminary nature of the research program on which they are embarking.

Courses for horses!

Some data sets will be better suited than others to the analysis of any particular topic. Hence one should not automatically presume that the 'Longitudinal' in the ALS always renders it the superior data set. There are two concerns here: the size of the sample and the age of the sample. Consider the work conducted in relation to retention in higher education by Wooden, Robertson and Dawkins. This is based on a sample of 209 males and 214 females. Few variables are found to be statistically significant. Other surveys such as that analysed in Robertson and Sloan (1990), 'The Impact of the Higher Education Contribution Scheme (HECS) on Participation in Higher Education in Victoria in 1989', might be more useful here. Similar

comments might be applied to the analysis of particular sub-groups, such as immigrants or Aborigines. In relation to reservations associated with the age of the sample, consider the study of entrepreneurship among youth Work based on all age groups using the 1981 Census (Evans, 1989) shows that education is a significant determinant of the probability of being an entrepreneur The insignificance of the education variable in the study by Blanchflower and Myer is a puzzle. Is this due to the superiority of the approach Blanchflower and Myer implement? Or is it simply due to the age of the sample? Finally, some reservations might be expressed over the use of the ALS in estimation of models of fertility, where the dependent variable is the number of children born This is more likely to confound issues of timing and completed family size rather than be informative of either aspect of the fertility decision.

The reliability of the Australian Longitudinal Survey data

One aspect of the ALS that has been surprisingly neglected at this Conference relates to what might be termed 'unaccountable' employment growth. This issue seems to be important to the interpretation of some of the research findings Employment growth in the ALS over the period 1985-1986 exceeds that registered in the Australian Bureau of Statistics' surveys by about three percentage points Factors such as this need to be taken into account when interpreting results. It could presumably affect to some degree conclusions relating to any aspect of the transition matrix for employment states. Related to this would be issues like the measurement error discussion in the union wage effects literature, and this problem could be pursued in the design of future panels of the survey. This discussion would presumably carry over to other factors that have been investigated using the ALS, such as health status. Basically speaking, the problem of measurement error can be expected to be more acute in longitudinal data where estimated effects are derived from changes rather than from initial states.

Cross-section versus longitudinal data

The models of female labour supply presented at this conference are mainly cross-sectional in nature, even though the overseas research has shown that the inclusion of even limited information on previous labour market activity can lead to substantial improvements in the predictive ability of models of labour supply. These models might be more successful if estimated using other data sets (see Brooks and Volker, 1985). Similarly, the work by Chapman, Chia and Tan on training is essentially cross-sectional in nature. This raises the important issue of why the data have not been analysed using more sophisticated panel data models. Perhaps the answer is that there is not enough variability in the regressors, in which case the recent policy decision to delete from future waves of the survey individuals older than twenty-five years is unfortunate. It is also important that attemps be made to accumulate information on the overlap between estimates derived from the particular samples used Vella does this in his 'repeated cross-section' study of labour supply. But a comparison between pure corss-section models and models that include information on the respondent's

labour market history would be very useful The research by McCurdy (1985) is illustrative on this point.

The longitudinal survey as an aid to cross-section estimation

Researchers interested in the youth labour market are fortunate to have at their disposal a longitudinal data set. However, research findings for youth may not always carry over to the adult labour market where longitudinal data sets are not available. Hence, one of the ways the ALS can be used is to show the extent of any errors made when basing research (for adults) on cross-sectional data, and to assess the reliability of some of the expedient techniques that users of cross-sectional data often employ. Two examples can be given First, in the study of gender wage differentials, a problem that is encountered is that measures of potential labour market experience created by subtracting school leaving age from actual age are generally regarded as poor approximations of females' actual labour market experience. Some researchers have resorted to the use of behaviourly-based predicted measures of actual labour market experience (see Miller and Volker, 1987) and retrospective information (see Rummery, 1989). Longitudinal data can be used to assess the merits of these approaches, and to inform on the appropriate methodology to use in cases where longitudinal data are not available The second illustration here concerns the estimation of equations that aim to predict labour market outcomes. By following individuals through time, McRae is able to show the impact on current labour market outcomes of the respondent's labour market history. Can similar insights be gained through the use of the retrospective information collected in the 1985 Wave of the survey, where respondents were asked to report their major activity (full-time work, part-time work, looking for work, studying, other) in 1984, 1983 and 1982? What errors are introduced into analyses that utilise this information? Should such information be used (i e., are the crude indicators available in the 1985 data reasonable proxies for the information on weeks engaged in each activity that can be obtained from the longitudinal survey)?

Has the potential of the Australian Longitudinal Survey been exhausted?

The research presented at the Conference, particularly that by McRae, Bell *et al.*, and Lewis and Shorten, suggests that there are many interesting issues left to be tackled using the ALS. Moreover, these are issues that appear to be tractable in Australia only with the use of the ALS. What are the major insights that we might expect from such a study? Consider the broad area of research covered by Lewis and Shorten On the basis of analyses of the 1985 Wave of the ALS in isolation we know that males hold a slight wage advantage over females in the youth labour market, *ceteris paribus*, but that if a predicted measure of actual experience is used this wage advantage is largely eliminated. Moreover, the measure of home time derived from the predicted measure of actual experience does not appear to be related to wages in the youth labour market. Rummery's (1989) research, which covers all age groups, also identifies reduced labour market experience as the key to understanding male-female wage differentials, and suggests that, contrary to the overseas experience, time out of the labour force is not associated with a

wage penalty in Australia. As the Rummery (1989) conclusions might be termed controversial, the research program of Lewis and Shorten on the number of career interruptions, the length of career interruptions, and the wage effects of both these aspects of a discontinuous labour force participation, has obvious potential to enhance our understanding of male-female wage differentials.

Conclusion

Research using the ALS should aim to:

1 Exploit the novel aspects of the data in a cross-sectional environment. In this regard the papers presented to the conference do an excellent job.

2. Exploit the longitudinal dimension of the survey. The topics of female labour supply and unemployment duration are two which are of considerable interest here. The studies reviewed in Michael Pergamit's paper can serve as a useful guide on some of these issues.

3. Use the longitudinal data to show the merits and demerits of the traditional cross-sectional approach (which it appears applied researchers will still have to resort to in the analysis of the older age groups). The comparison of results based on retrospective information with those obtained from the short panels which characterise the ALS is certainly an area which should be investigated. Little research has been undertaken into this.

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A Longitudinal Analysis of Young Entrepreneurs in Australia and the United States

David G. Blanchflower and Bruce Meyer*

1. Introduction

There has been a recent revival of interest in entrepreneurship and self-employment. This paper examines the patterns of self-employment in Australia and the U.S.. The comparison of the two countries shows that many common forces are shaping the extent and patterns of entrepreneurship. Although the self-employment rate has historically been higher in Australia, the self-employed in both countries are clustered in the same industries and occupations. Moreover, the historical trends in self-employment rates are similar. For the most part, the same factors tend to increase the tendency of certain individuals to become self-employed. This paper explores some of these similarities and highlights some differences between the two countries.

The resurgence in interest in entrepreneurship is occuring for many reasons. Government interest in self-employment is indicated by the countries that look to self-employment as a route out of poverty or disadvantage. In Britain and France, government programs provide transfer payments to the unemployed while they attempt to start businesses.[1] In the U.S. similar programs are being started for unemployment insurance and welfare recipients.[2] In Australia a program provides loans to unemployed people with viable business ideas. Both Australia and the U.S. have several government programs to provide loans to small businesses, and both countries have exempted small businesses from certain regulations and taxes.[3] Furthermore, many states and municipalities in the U.S. have had programs to encourage minority small businesses.

Probably the greatest interest in entrepreneurship comes from a belief that small businesses are essential to the growth of a capitalist economy. While the view that small businesses are responsible for a disproportionate share

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1 See Bendick and Egan (1987).

2 See U.S. Department of Labor (1990), and Fishman and Weinberg (1990).

3 See Terry et al.(1988) for a description of government policies in Australia.

of job creation and innovation is disputed,[4] this view is a common one. It is often argued that many of the problems of Eastern Europe come from the lack of entrepreneurs.

Academics have been interested in self-employment as a safety valve where the unemployed and victims of discrimination could find jobs.[5] Interest in self-employment has also been prompted by the belief that they face a different set of economic incentives, and thus could be used to test various theories.[6]

A few studies have examined self-employment decisions using cross-sectional data.[7] Such studies can help identify the characteristics of people who are self-employed at any point in time. While this is useful, it cannot tell us about the conditions that determine whether an individual becomes self-employed. Analysis of this question requires longitudinal data so that transitions into self-employment can be observed.[8] When considering government policies to encourage new businesses, or assessing whether disadvantage encourages self-employment, then it is the transition process that must be examined. Longitudinal analyses also have the advantage of using past values of individuals' characteristics to explain transitions. We can be more confident that past values are a cause rather than a consequence of being self-employed. Similarly, examining transitions out of self-employment will allow us to study business failure rates. Since certain personal or background characteristics may affect entry and exit rates differently, this provides an important addition to cross sectional analyses.

This paper focuses on self-employment among young people in Australia and the U.S.. While self-employment rates among the young are lower, there are a number of reasons for focusing on them. First, we are able to find comparable longitudinal data for young people in the two countries Second, the young are forming views of the labor market that will shape their later choices. And lastly, the dynamics of the labor market are greater for the young as they consider alternative jobs.

Initially we assess the determinants of self-employment in Australia using data from the Australian Longitudinal Surveys (ALS) of 1985-88. We then estimate a similar set of equations for an equivalent group of young people drawn from a comparable, large scale panel study in the U.S —the Survey of Income and Program Participation (SIPP) of 1983-86. Section 2 compares and contrasts the extent of self-employment in Australia and the U.S.. Section 3 of the paper briefly describes theories of entrepreneurship Section 4 provides results for Australia and Section 5 for the U S.. Section 6 presents evidence on the probability of individuals remaining in self-

4 See Brown et al. (1990) for a critical appraisal of these schemes

5 See Light (1972), Moore (1983) or Sowell (1981).

6 See Moore (1983) and Lazear and Moore (1984).

7 See, for example, Blanchflower and Oswald (1990a, 1990b) and Borjas (1986) and Borjas and Bronars (1989).

8 Other studies that use longitudinal data to examine transitions to self-employment include Fuchs (1982), Evans and Leighton (1989), Evans and Jovanovic (1989).

employment. Section 7 compares and contrasts the findings. Section 8 provides our conclusions.

2. Self-employment in Australia and the United States

Although far fewer people live in Australia than in the U.S. (16.25 million and 243.92 million people respectively), both countries are similar in geographic size (8 million sq. km and 9 million sq. km respectively). GDP per capita is much higher in the U S. ($18,338) than it is in Australia ($12,612). Over the years 1983-1987 consumer prices in Australia increased by an average of 7 per cent while average earnings grew by an average of 5.7 per cent. This compares to 3.3 per cent and 3.1 per cent for the U.S.. Strikingly, unemployment in both countries averaged 7.2 per cent between 1978 and 1987 [9]

Participation rates are much higher in Australia than they are in the U.S.. This is especially so for the young who, in the U S. ,are more likely to be in college than they are in Australia. As can be seen from Table 1, the U S. has an overall labor force participation rate of 50 per cent compared to 61 per cent for Australia. 57.5 per cent of young men between 15 and 19 were in the labor force in Australia compared with only 43 3 per cent in the U.S.. Approximately 27 per cent of total employment in the two countries is in manufacturing: the agricultural sector is relatively more important in Australia than it is in the U.S. (5 8 per cent and 3 per cent of total employment in 1987).

The self-employment rate in Australia has historically been higher than that in the U.S..[10,11] In 1989, 14 9 per cent of paid workers in Australia were self-employed compared with 8.2 per cent in the U.S., (see Table 2). Despite this difference in means, the time series pattern of the Australian and U.S. rates show a degree of similarity. Figure 1 reports self-employment rates for the two countries. Here self-employment is measured across all sectors of the economy including agriculture. The data source used is the ILO *Yearbook of Labour Statistics*. This source has the advantage that the measures used are broadly comparable across the two countries. An individual who reports as being an employer or an own-account worker is classified as being self-employed; the incorporated self-employed are classified as wage and salary workers.[12] In both countries the number of self-employed

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9 Source. *Yearbook of Labour Statistics*, ILO, Geneva, 1988.

10 For a discussion see Norris (1986).

11 Here we define the self-employment rate as the number of self-employed divided by the self-employed plus the employed This contrasts with the definition used in some other papers such as Blau (1987) where the denominator is the labor force (i.e employed+self-employed+unemployed).

12 Despite some differences in the way self-employment is defined these estimates vary only slightly from those reported in *Employment and Earnings* and the *Monthly Labor Review*.

Table 1: Economic Activity Rates in Australia and the United States (percent)

	U.S.A			Australia		
Age	Total	Male	Female	Total	Male	Female
15-19	42 6	43.3	41.9	55.6	57 5	53.7
20-24	75.6	79.6	71.6	82.6	89.5	75.5
25-29	80.7	89.6	71.7	78.2	94 6	61.9
All over 15	49.6	57.1	42.5	61.4	74.9	48.3

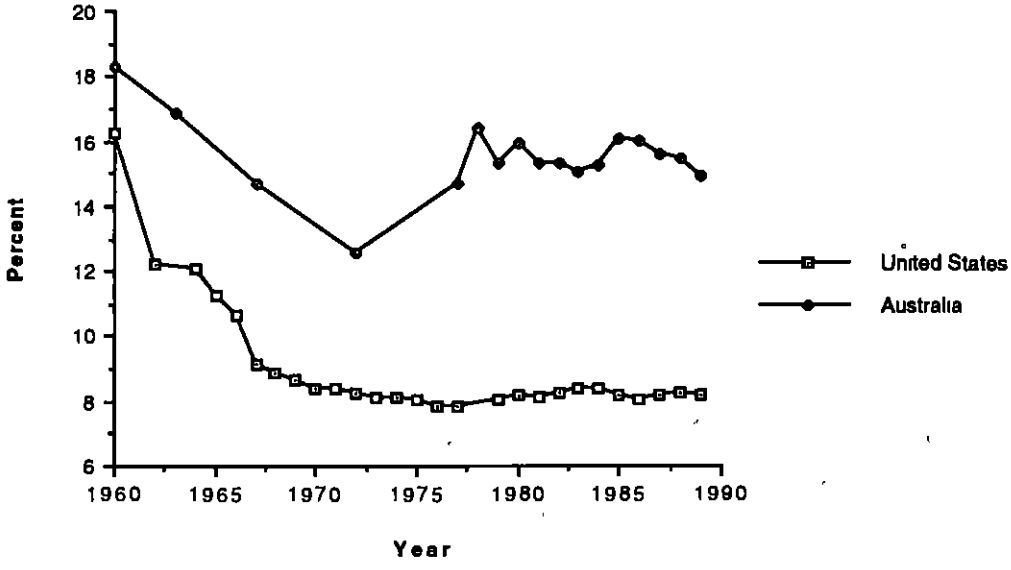
Base: Population above 15 years of age
Source *Yearbook of Labour Statistics*, ILO, Geneva, 1988.

Table 2: Self-Employment in Australia and the United States

	Employers and Own Account Workers ('000s)	Wage and Salary Earners ('000s)	Self-Employment Rate (%)
(a) Australia			
1980	9555.0	5,062.0	15.9
1981	973 4	5,397.9	15.3
1982	951 8	5,274.6	15.3
1983	970.2	5,493.3	15.0
1984	995 2	5,557.1	15.2
1985	1,059.4	5,559.1	16 0
1986	1,088.9	5,730.8	16.0
1987	1,091.9	5,921 8	15.6
1988	1,125.0	6,161.9	15.4
1989	1,143.9	6,531.1	14.9
(b) U.S.A			
1980	8,605	96,662	8 2
1981	8,897	100,277	8.1
1982	9,111	101,421	8.2
1983	9,359	102,025	8 4
1984	9,520	104,052	8.4
1985	9,460	106,186	8.2
1986	9,509	108,572	8.1
1987	9,810	110,453	8 2
1988	10,078	112,070	8 3
1989	10,167	114,228	8 2

Notes. The self-employment rate is obtained by expressing Column 1 as a proportion of the sum of columns 1 and 2.
Source. *Yearbook of Labour Statistics*, ILO, Geneva, various issues

Figure 1. Self-Employment Rates



increased during the 1980s,[13] but so did the number of wage and salary workers.[14] The Australian self-employment rate dropped through the late sixties, bottomed out around 1970, and has generally been flat since then. The rate in 1989 (14.9 per cent) was only one percentage point lower than it was in 1980 (15.9 per cent). Analogously, the U S. self-employment rate fell throughout the 1950s and 1960s, bottomed in the early 1970's, and has changed relatively little since 1970.[15] Indeed, the self-employment rate in 1989 was the same as it was in 1980 (8.2 per cent)

The industrial distribution of employees in the two countries is also similar (column 3 of Table 3). However, there is a much greater difference in the industry distribution of the self-employed In Australia a higher proportion are found in agriculture (24 per cent compared to 15 per cent), whereas Community, Social and Personal Service is especially important in the U.S . In both countries significant numbers of self-employed workers are found in Construction and Wholesale/Retail Distribution and Hotels and Restaurants. The occupational distribution of the employed is also similar across the two countries. However, a higher proportion of the self-employed

13 Between 1980 and 1989 the number of self-employed increased by 19.8 per cent in the case of Australia and by 18.2 per cent in the US (Table 2).

14 Between 1980 and 1989 the number of wage and salary workers increased by 29.0 per cent in the case of Australia and 18.2 per cent in the U.S. (Table 2).

15 See Covick (1984) for a discussion of the probable reason for this trend in Australia and Blau (1987) for an analysis for the U.S .

in the U.S. are service workers (18 5 per cent and 7.6 per cent respectively). Production and related workers are more likely to be self-employed in Australia than they are in the U.S. (see Table 4).

Table 3: Distribution of Employment By Industry - 1987

Australia	% Self-employed in Sector	% of All Self-Employed	% of All Employees in Sector
Agriculture, hunting, forestry and fishing	67.8	23.8	2.1
Mining and quarrying	-	-	1.6
Manufacturing	0.1	5 4	18.4
Electricity, gas and water	-	-	2.0
Construction	36.3	16.1	5.2
Wholesale/retail trade, restaurants and hotels	18.6	23.9	19.2
Transport, storage and communicaton	12.9	6.0	7.5
Financing, insurance, real estate and business services	17.7	10.7	10 9
Community, social and personal services	7.3	14.2	33.2
Total	**15.6**		
U.S.A			
Agriculture, hunting, forestry and fishing	43.3	15.3	1.8
Mining and quarrying	3.1	0.3	0.8
Manufacturing	1.6	3.7	19.8
Electricity, gas and water	0.1	0.1	1.4
Construction	17 4	14.6	6.2
Wholesale/retail trade, restaurants and hotels	7 5	19.1	20.9
Transport, storage and communicaton	5.1	3.5	5 7
Financing, insurance, real estate and business services	10.2	13.5	10.6
Community, social and personal services	7.8	30 0	31.3
Armed Forces	-	-	1.6
Total	**8.2**		

Note: Self-employed defined to include 'employers' and 'own-account workers'.
Source Yearbook of Labour Statistics, ILO, 1988.

Table 4: Distribution of Employment by Occupation - 1986-87

Australia - 1986	% Self-employed in Occupation	% of All Self-Employed	% of All Employees in Occupation
Professional, technical and related workers	10.8	10.9	17 2
Administrative and managerial workers	40.4	18.1	5.1
Clerical and related workers	8.1	9.2	19.8
Sales workers	15.2	8.7	9.2
Service workers	12.1	7.6	10.5
Agric: animal husbandry and forestry workers, fishermen and hunters	34 3	14.8	5.4
Prod./related workers, transport equipment operators and labourers	15.1	30.7	32.9
U.S.A - 1987			
Professional, technical and related workers	7.8	10.9	17.2
Administrative and managerial workers	10 3	14.3	11.1
Clerical and related workers	1 5	5 4	16.9
Sales workers	12.9	2.9	11.1
Service workers	6 6	18.5	13.8
Agric: animal husbandry and forestry workers, fishermen and hunters	40 1	12 7	2.0
Prod./related workers, transport equipment operators and labourers	7.0	21 5	28.4
Armed forces	-	-	1 6

Note. Self-employed defined to include 'employers' and 'own-account workers'.
Source: *Yearbook of Labour Statistics*, ILO, 1988.

3. Theoretical Foundations of Entrepreneurship

Any economy in which there is a significant private sector relies in the long run upon its ability to generate innovators and entrepreneurs. Economists have traditionally ignored many of the questions which this raises. Little progress has been made since Kirzner (1973) pointed to the 'virtual exclusion of the entrepreneurial role from economic theory' (p. ix). Likewise, the other social sciences, notably sociology and psychology, have failed to develop any widely recognised systematic theory of

entrepreneurship, despite an extensive empirical literature on small firms, leadership and attitudes toward risk.

Economists' writings on entrepreneurship go back at least to Cantillon (1755), who viewed the entrepreneur fundamentally as a bearer of uncertainty who might or might not own capital.[16] This view of the entrepreneur was extended by a number of subsequent authors, most notably Knight (1921). For Knight, responsibility for bearing uncertainty and the exercise of control over business decisions are inseparable. However, Knight gives no straightforward definition of entrepreneurial activity, although he did seem to believe that the entrepreneur was more than an individual with low aversion to risk. He uses the terms (chapter 9) 'courage', 'ability', 'initiative', 'self-confidence' and 'willingness' to describe entrepreneurial qualities. He tells the reader (p.281) that an individual becomes an entrepreneur if he believes that his own use of productive services can yield more than the price fixed on them by others. He argues that the capacity for forming correct judgements is the principal characteristic of successful businessmen.

The notion of entrepreneurship as akin to, or dependent on innovation is not a clear theme in Knight's writings. In contrast, Schumpeter defines the entrepreneur as one who carries out innovations Innovation, which is not synonymous with invention, includes many activities.

> Technological change in the production of commodities already in use, the opening up of new markets or of new sources of supply, Taylorization of work, improved handling of material, the setting up of new business organisations such as department stores—all these are instances of what we shall refer to by the term innovation. (Schumpeter 1939, p.84).

Schumpeter concludes that there is an essential difference between the entrepreneur and the manager The latter is an organiser, the former is creative· he or she perceives unexploited opportunities

According to Kirzner (1973), the entrepreneurial element in human decison-making is 'an element of alertness to possibly worthwhile goals and to newly available resources' (p. 35). He contrasts this with the mechanical forms of behaviour studied in conventional economic theory, and argues that those who set up their own businesses should not be thought of as maximisers, but as human beings exploiting hitherto unnoticed opportunities Kirzner appears to treat the entrepreneur both as a kind of innovator and as a risk-bearer These are not, however, given equal weight The author views the decision to set-up in business as predominantly the result of a new opportunity observed. This Schumpeterian theme is not found in most modern models. For exceptions see Blanchflower and Oswald (1990a) and Holmes and Schmitz (1990).

Some of the major recent theoretical works are Kanbur (1979), Kihlstrom and Laffont (1981) and Grossman (1984). This latest generation of analysis

16 See Johnson (1986), pp. 15-19.

differs in form and substance from the bulk of the early literature. Kanbur, for example, develops an essentially neoclassical approach in which he makes a number of assumptions. First, that productive business opportunities are *ex ante* feasible for, and visible to, all individuals (most simply choose not to exploit them). Second, that there is an objective probability distribution governing business risk, and everyone knows that distribution Third, that entrepreneurs receive the same expected utility as their workers, and fourth that the entrepreneur is likely to be someone with unusually low risk-aversion (see especially Khilstrom and Laffont, 1981).

These are different from the main assumptions and arguments of classic sources such as Schumpeter (1939), Knight (1921) and Kirzner (1973). In contrast to modern theory, based upon the four points above, the classic writings about the nature of the entrepreneur stressed the following:

(i) most individuals are not sufficiently alert or innovative to perceive business opportunities;

(ii) there is no objective probability distribution governing business risks;

(iii) an innovative entrepreneur may receive higher expected utility than he or she would as a regular worker;

(iv) attitude to risk is not the central characteristic which determines who becomes an entrepreneur.

Rees and Shah (1986) propose a theory of the choice between self-employment and wage and salary work that is an extension of the simple two-sector model of labor supply that has been used in many contexts. This model predicts that individuals will choose to work in the sector which has the highest expected return. An individual would choose to become self-employed if he would earn more in his own business than as a wage and salary worker. This model needs to be adjusted for the greater riskiness of self-employment. This modification is probably more warranted in the case of self-employment versus wage and salary work than in other contexts, since the variance of self-employment income is so much higher than that of wage and salary income [17]

The relative return to an individual in self-employment would depend on that person's human capital endowments and information about opportunities It is not obvious which types of human capital would have a higher return in self-employment. However, in the U.S. it seems that most formal education does have a higher return for the self-employed. Meyer (1990) using U.S. data finds that the return to the number of years of education in a log(wage) equation is more than twice as high for the self-employed. It seems plausible that knowledge of specific manual skills as indicated by previous work in industries such as construction, agriculture, or repair services are likely to be associated with self-employment. Similarly, having been an apprentice is also likely to have imparted skills that would be especially useful in self-employment. It might also be expected that

17 The much larger variance of self-employment income is documented below for the U.S.

knowledge of business opportunities will increase over time as an individual ages, making transitions to self-employment more likely by increasing the expected return. The increased information might include the likelihood of success of various business opportunities as well as their presence. Increased knowledge of the likelihood of success of different businesses would reduce the variance of self-employment income and thus make self-employment more attractive.

4. Empirical Results - Australia

The data used in this section is drawn from the Australian Longitudinal Survey (ALS) of 1985-88. The ALS is a panel of young people who were between the ages of 16 and 25 in 1985. It covers the whole of Australia (except for the very sparsely settled areas) and was based on a sample of dwellings. All people in the given age range living in the selected dwellings were included in the sample. The survey started in 1985 with 8998 participants. Subsequent sweeps of the survey achieved 7871 responses in 1986, 7110 in 1987 and 6151 in 1988.[18] Who are the young self-employed and where do they work?[19] Table 5 provides the evidence. Here we use the first wave of the survey in 1985 to explore the differences between the employed and the self-employed. The young self-employed in Australia are disproportionately males: they are also somewhat older than employees (average age 22.36 years and 20.88 years respectively). The typical young Australian entrepreneur has a skilled manual occupation and works in either construction or agriculture. Significant proportions are also to be found in Wholesale and in Retail Trade and Recreation, Personal and Other Services. The distribution of the young self-employed across industries is similar to the overall distributions reported in Tables 3 and 4 In comparison with the overall distribution of self-employed across occupations, a relatively high proportion of the young self-employed worked in manual occupations. The self-employed are twice as likely to have completed an apprenticeship as the employed.

Tables 6, 7 and 8 provide information about labour market transitions for the years 1985-86, 1986-87 and 1987-88 respectively. Labour market status is defined at the time of each survey. The raw numbers of individuals in each of four labour market states are reported—employment, self-employment, not in employment (whether unemployed or out of the labour force or labor market status not reported) and attrition—those who do not respond to the subsequent survey It is clear from these tables that there are

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18 The main source of information on the data file is a special volume of the *Australian Journal of Statistics*, 'Youth Employment and Unemployment', Special Volume 31a, August 1989) which contains a series of articles which use these data files

19 We classify individuals as being self-employed on the basis of responses to the following question 'In your main job do you work for wages or salary with an employer, are you self-employed in your own business, or do you work in some other capacity?'

Table 5: Distribution of Australian Employment and Other Key Variables 1985

	Wage and Salary	Self-employed
(a) Male - %	53 0	71.0
(b) Occupation - %		
Managerial and supervisory	4.1	15.5
Professional	7.6	6.2
(c) Industry - %		
Agriculture	2.3	18.4
Mining	0.9	0.0
Manufacturing	18 6	8.7
Construction	4.8	21.3
Wholesale/retail trade	25.3	22.1
Transport/storage/communication	5.5	5.3
Finance/property/business services	11.6	3.8
Public admin./defence	7 9	0.0
Community services	13.1	4.3
Recreation/personal/other Services	10.0	16.1
(d) Average age (in years)	20.88	22.36
(e) Apprenticeship - %	11.4	23.9
(f) Self-employment rate	4 31%	

Base: 5472 employees and 247 self-employed (unweighted).

Notes Weights applied to calculate these estimates.

Source· 1985 ALS Tape

considerable dynamics in this labour market. For example, 614 individuals who were employees in 1985 were not working in 1986, while 1100 who were not working in 1985 were working as employees in 1986 In an earlier study using these data, Dunsmuir, Tweedie, Flack and Mengersen (1989) have modelled transitions between employment states. In this paper we focus on a slightly different issue that they did not touch upon—the transition from employment to self-employment. As can be seen from Tables 6-8, this is the main entry mechanism to self-employment. Over two-thirds of the people entering self-employment are employed the previous year in a wage and salary job rather than unemployed or out of the labor force. In this paper we are interested specifically in the two groups of individuals found in the first two cells of the first row of the matrices.

Table 6: Transition Matrix: Australia - 1985/1986

1985 \ 1986	Employment	Self employment	Not employed	Attrition	All
Empt.	4175	98	614	679	5566
SE	54	134	23	36	247
Not employed	1100	39	1634	412	3185
All	5329	271	2271	1127	8998

Table 7: Transition Matrix: Australia - 1986/1987

1986 \ 1987	Employment	Self employment	Not employed	Attrition	All
Empt.	4117	87	511	614	5329
SE	62	161	22	26	271
Not employed	714	35	1224	298	2271
Attrition	118	5	54	950	1127
All	5011	288	1811	1888	8998

Table 8: Transition Matrix: Australia - 1987/1988

1987 \ 1988	Employment	Self employment	Not employed	Attrition	All
Empt.	3750	109	361	791	5011
SE	48	177	14	49	288
Not employed	580	37	876	318	1811
Attrition	142	9	48	1689	1888
All	4520	332	1299	2847	8998

We estimate probit models for transitions from wage and salary work to self-employment. More formally, a probit model assumes that the underlying tendency to become self employed, y^* can be written as a linear function of explanatory variables x and a normally distributed error term:

$$y^* = x\beta + \varepsilon \tag{1}$$

However, we do not observe y^*, just whether y^* is greater than or equal to zero. In other words, we observe a variable y which equals 1 if $y^* \geq 0$ and a person becomes self-employed; y equals 0 if $y^* < 0$ and a person stays a wage or salary worker. Given that in (1) ε is distributed normally, the probability that a person becomes self-employed is

$$\Phi(x\beta) \equiv \int_{-}^{x\beta} \frac{1}{\sqrt{2\pi}} \exp\{\frac{-u^2}{2}\} du \tag{2}$$

Table 9 reports the results of estimating a series of probit equations with the dependent variable set to 1 if the individual was employed in the initial period and self-employed in the subsequent period, and zero if he or she was an employee in both periods.[20] That is to say, individuals in the first two cells of the first row of the transition matrices in Tables 6-8. These equations allow us to examine some of the differences suggested by the means of Table 5. Data from the 1985-86, 1986-87 and 1987-88 transitions were pooled to give a total sample size of 12,052 cases[21] after exclusion of observations with missing values. Table 9 also reports the mean of each of the variables. We also examined transitions to self-employment over the two-year periods 1985-1987 and 1986-1988 and the three-year period 1985-88. The results were very similar to the 1 year transitions obtained here and consequently are not reported.

Specification 1 includes only five variables—sex, age and its square and two (1, 0) year dummies to identify the relevant time period. Age enters in a non-linear way—as in Blanchflower and Oswald (1990b) and Meyer (1990)—older workers were more likely to be self-employed than younger workers. This higher transition rate may reflect the greater knowledge of business opportunities that is available to older workers. Males were more likely to be self-employed than females. The coefficient of the 1986-87 year variable was significantly negative whilst that for the last transition is insignificant, for which we have no explanation.

Specification 2 includes a series of state dummies (New South Wales is the excluded category). The probability of being self-employed appears to be highest, *ceteris paribus*, in Western Australia.

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20 Variable definitions are given in Appendix A.

21 4,190 cases from 1985-86, 4,014 from 1986-87 and 3,758 from 1987-88.

Table 9: Probit Equations - Australia

	(1)	(2)	(3)	(4)	Variable Mean
Personal controls					
Male	0.3139	0.3193	0.2982	0.1838	.544
	(0.0589)	(0.0596)	(0.0631)	(0.0753)	
Age	0.4356	0 4629	0 5197	0 6128	21.33
	(0.1773)	(0.1799)	(0.1924)	(0.2111)	
Age squared	-0.0082	-0.0088	-0 0098	-0 0116	463 1
	(0 0039)	(0 0040)	(0.0043)	(0.0047)	
Apprentice			0.2031	0 1576	.126
			(0.0740)	(0.0912)	
Union			-0.2072	-0.1375	.436
			(0.0636)	(0.0690)	
Tenure ≥ 3 yrs			-0.2575	-0 2644	273
			(0.0691)	(0.0760)	
Year dummies					
1986	-0.1748	-0.1816	-0.1845	-0.1864	.341
	(0.0697)	(0.0720)	(0.0759)	(0 0829)	
1987	-0.0389	-0.0372	-0.0363	-0.0462	.312
	(0.0667)	(0.0677)	(0.0709)	(0.0771)	
Number of workers					
1 worker			-0.0065	0 0271	.085
			(0 1242)	(0.1346)	
2-5 workers			-0.3165	-0.2583	.407
			(0.1065)	(0.1182)	
6-9 workers			-0.5294	-0.4295	.210
			(0.1220)	(0.1351)	
10-14 workers			-0 5495	-0.4605	.119
			(0.1409)	(0.1538)	
15-19 workers			-0.6175	-0.5034	.048
			(0.1964)	(0.2135)	
≥ 20 workers			-0 7492	-0.6774	.085
			(0.1698)	(0.1939)	
Occupation dummies					
Managerial				-0.1431	.051
				(0.1364)	
Professional				-0.1207	095
				(0.1403)	
Para-professional				-0.2352	.055
				(0.1867)	
Clerical				-0.3696	.250
				(0.1322)	
Sales				-0.3236	.123
				(0.1383)	
Service				-0.6248	.067
				(0 2037)	
Trades/skills				-0 1881	.184
				(0.1094)	

Table 9 continued

	(1)	(2)	(3)	(4)	Variable Mean
Occupation dummies cont.					
Skilled agriculture				-0.0677	.007
				(0.2832)	
Plant operators				-0 1014	.020
				(0.2020)	
Processing				-0.5760	.050
				(0.2223)	
Industry dummies					
Mining				-0.7025	.011
				(0 4492)	
Food/chem				-0.4456	.109
				(0 1787)	
Metal/elec				-0.4584	.070
				(0 2082)	
Construction/distrib.				-0.1797	.289
				(0.1710)	
Transport				-0.5619	.053
				(0.2580)	
Finance				-0 3382	.129
				(0.1941)	
Public admin.				-0.7986	.080
				(0.2375)	
Community services				-0.6346	.147
				(0.2015)	
Recreation				-0 0927	.089
				(0.1832)	
Region dummies					
Victoria		0.2687	0.2755	0.2708	.248
		(0.0723)	(0.0757)	(0.0812)	
Queensland		0 1661	0 1304	0.1064	.151
		(0 0887)	(0.0956)	(0 1022)	
South Australia		0.1847	0.1869	0 1877	.105
		(0.0961)	(0.0999)	(0 1086)	
Western Australia		0.4195	0.4302	0 4257	.081
		(0 0959)	(0.1001)	(0.0171)	
Tasmania		-0 1448	-0 1541	-0.1637	.037
		(0 1920)	(0 2015)	(0.2628)	
Constant	-7 7234	-8.2080	-8.4777	-9.0558	
	(1 9539)	(1.9781)	(2.1240)	(2.3182)	
Likelihood ratio	104 1553	132.9590	236 9321	318 6206	

Notes: Number of observations = 12,052
Omitted categories are New South Wales and Tasmania; 0 workers other than the respondent; basic manual occupations and occupations not elsewhere classified; agriculture and 1985-1986 transition.

Standard errors in parentheses.

Specification 3 includes a range of variables that may be regarded as potentially endogenous: whether he/she had an apprenticeship qualification; was a member of a union; the number of people the respondent worked closely with each day; and a variable to identify individuals who had been employed at least three years in their job in the first period. The first two of these variables worked in the expected way (see Blanchflower and Oswald, 1990a). High tenure and union membership probably indicate that the wage and salary opportunities for these individual were quite good, so that it would not maximize expected income for them to become self-employed. The more people the respondent worked closely with, the less likely it is that he or she would move to self-employment in the next period. The probability of moving to self-employment was highest if the individual worked alone or with one other. The higher transition rates for those from the smallest businesses may reflect the fact that these individuals learned the skills needed to run the very small businesses that most self-employed start. Similarly, trade apprenticeships appear to be important in imparting the kind of skills that are particularly suited to self-employment—electricians, carpenters and plumbers are the obvious examples that come to mind.

Finally, Specification 4 includes a series of industry and occupational dummies. It is encouraging to find how stable the main results are to these changes in specification. Individuals are particularly likely to have moved to self-employment if they were employed in basic manual occupations in the first period. Those in clerical, sales, processing and service occupations were less likely to make such a move. Analogously, individuals employed in farming in the first period were especially likely to move to self-employment in the next. As one might expect, *ceteris paribus*, those working in public administration or community service had lower probabilities of making such a transition. We also included variables for level of education, years of schooling, marital status and race[22] but none of these ever achieved significance, and the coefficients were small and hence were excluded.

The probability of moving to self-employment appears to be higher if the individual was male, older, held an apprenticeship, worked with few others in period 1, lived in Western Australia, had been employed for less than three years, had been in a 'Basic Manual Occupation' or a 'Skilled Agricultural Occupation' and/or had been employed in agriculture

The probability of moving to self-employment was lower, *ceteris paribus* if the individual was in a clerical occupation, was a union member and/or worked in public administration or mining in period 1.

22 The categories examined were: Aborigine; Torres St Islander; English/European; Asian; Other.

5. Empirical Results - U.S.A

The data file used in this section is the U.S. Survey of Income and Program Participation (SIPP), which is a longitudinal survey conducted by the U.S. Bureau of the Census. We use the 1984 Panel which interviewed approximately 20,000 households (50,000 people of all ages in total) nine times over a three year period. The interviews took place between October 1983 and August 1986.

Each interview asks information about earnings and other income sources during the previous four month period. Detailed information is given about the two most important wage and salary jobs and two most important self-employment jobs that an individual had during those four months. Supplementary surveys provide detailed information about job characteristics and assets.

Even though SIPP includes individuals of all ages, we restrict our analysis to youths to ease comparisons with the Australian results. See Meyer (1990) for an analysis of the entire SIPP sample We use a slightly older sample in the U.S. because we believe that it will make the individuals more comparable to the Australian sample As many more young people attend college in the U.S., the two samples will be more comparable in terms of the number of years since leaving school. The sample is those aged 17-28; when we examine transitions from one year to the next, the sample is those 17-28 in the first year

We classify an individual as working if he or she works at least five hours per week An individual is classified as self-employed if he or she worked the most hours in self-employment.[23] The vast majority of those working had self-employment hours or wage and salary hours and not both.

Table 10 reports some differences in mean characteristics between the self-employed and wage and salary workers. The Table uses the 1984 cross-section from Wave IV of SIPP. The self-employed are much more likely to be male, are on average two years older and have one-half a year more of schooling. They are 20 percentage points more likely to be married and less likely to be black The self-employed are also concentrated in different industries. They are much more likely to be in agriculture, construction, repair businesses, and personal services.

The pattern of the earnings of the self-employed relative to wage and salary workers can also be seen in Table 10. If one examines mean earnings, one sees that the self-employed appear to earn about 25 percent more. However, the picture reverses if the logarithm of earnings is examined. This measure suggests that the earnings of the self- employed are on average about seventy-five percent lower. The reason for this anomaly is that self-

23 SIPP classifies as self-employed people who work in their own sole-proprietorship, partnership, incorporated business, or farm. It does not include as self-employed people who are unpaid workers in a family business or farm or persons working on commission or for a piece-rate. Overall, about three-quarters of the self-employed are sole-proprietors or partners.

Table 10: Distribution of U.S. Employment and Other Key Variables - 1983

	Wage and salary	Self-employed
(a) Male (%)	52.7	66.1
(b) Industry (%)		
Agriculture	2.9	16.1
Mining	1.0	0
Manufacturing	19.5	3.1
Construction	5.7	19.2
Wholesale/Retail Trade	29.8	16.9
Transport/Storage/Communication	4.9	2.2
Finance/Insurance/Real Estate	6.5	4.5
Public Administration/Defence	4.1	0
Business or Repair Services	5.1	12.9
Personal Services or Entertainment	5.5	16.1
Professional Services	14.9	8.5
(c) Married (%)	33.5	55.8
(d) Years of schooling	12.7	13.2
(e) Average age (in years)	22.8	24.8
(f) Black (%)	9.1	1.8
(g) Annual earned income	$11,217	$14,054
(h) Natural log annual earned income	$9.0	$8.2
(i) Self-employment rate (%)		3.7

Base: 5856 employees and 224 self-employed (unweighted).

Source: SIPP tape 1983.

employment earnings are much more dispersed. The variance of self-employment earnings is over four times as great using either earnings measure. While it is possible that misreporting of self-employment income could lead to the much greater variance of self-employment earnings, it would require a great deal of under-reporting especially for those in the middle of the income distribution. It is more likely that the numbers indicate the greater degree of risk in relying on a business for one's livelihood. This supports the view that entrepreneurs are individuals willing to undertake risks.[24]

24 The greater riskiness of self-employment could be more fully documented by examining the difference in the variances of self-employment and wage and salary earnings after controlling for individual characteristics and industry.

Table 11: Transition Matrices - U.S.A

(a) Age 17-28; 1983-1984

	1984				
1983	**Employment**	**Self e mployment**	**Not employed**	**Attrition**	**All**
Employment	4706	68	542	2320	7636
Self Employ.	71	135	25	89	320
Not employed	710	27	1138	1008	2889
Not answered	84	4	15	153	256
All	5571	234	1720	3570	11095

(b) Age 17-28; 1984-1985

	1985				
1984	**Employment**	**Self employment**	**Not employed**	**Attrition**	**All**
Employment	4411	69	441	935	5856
Self Employ.	60	124	13	27	224
Not employed	582	26	984	330	1922
Attrition	148	5	55	1066	1274
All	5201	224	1493	2358	9276

Transition matrices for two time periods are reported in Table 11. The first matrix is for Wave I to Wave IV (1983-84) and the second is for Wave IV to Wave VII (1984-85). The matrices give the number of people at two points in time that are in the four states: working wage and salary; working self-employed, not working, attrition; or not answer. The 1983-84 matrix shows about 1.42 percent of the salary workers in 1983 are self-employed one year later if they are still working The 1984-85 matrix shows a slightly higher transition rate of 1.54 percent. In both years, employment is the main entry point to self-employment. As was observed in Australia, more than two-thirds of those entering self-employment were employed in wage and salary jobs the previous year. In both of the transition matrices, the number of people entering self-employment is very close to the number leaving self-employment for a wage and salary job In the two periods, 137 people enter self-employment while 131 leave.[25] A striking difference between the Australian and U.S. transition matrices, is that in Australia they indicate that many more people enter than leave employment and self-employment, whereas in the U.S. the upper left 3x3 part of the matrices is much closer to symmetric. Tables 12a and 12b report a series of probit equations that explain why certain individuals became self-employed.[26] Table 12b also

25 The high attrition in the 1983-84 transition is largely due to the sample coverage being reduced by 20 per cent in the second year to reduce the costs of the survey.

26 Variable definitions are given in Appendix B.

Table 12a: Probit Equation U.S.A

	(1)	(2)	(3)
Personal controls			
Male	0.2776	0.2832	0 2962
	(0.0717)	(0 0720)	(0.0728)
Years of schooling			0.0346
			(0.0164)
Age	0.0379	0 0372	0.0220
	(0.0105)	(0 0106)	(0.0124)
Married			0.1437
			(0 0771)
Black			-0.2409
			(0.1545)
1984	-0 0311	-0 0344	-0.0349
	(0 0679)	(0 0682)	(0.0685)
Region dummies			
North East		-0 1351	-0.1318
		(0.1077)	(0.1081)
South		0 0860	0.1014
		(0.0876)	(0.0887)
West		0 1180	0.1112
		(0.0981)	(0.0987)
Constant	-3 2148	-3.2289	-3.3825
	(0.2588)	(0.2638)	(0 3094)

Note: Sample size = 9254
Standard errors in parentheses

Table 12b: Probit Equation U.S.A

	(4)	(5)	(6)	Variable Means
Personal controls				
Male	0.2355	0.3261	0 2638	.5331
	(0.0859)	(0.0750)	0.0872)	
Years of schooling	0 0414	0.0405	0.0445	12 702
	(0.0198)	(0.0166)	(0.0199)	
Age	0.0254	0.0347	0.0350	22.9391
	(0.0131)	(0.0130)	(0 0135)	
Married	0 1808	0.1672	0.1970	.0522
	(0 0803)	(0.0787)	(0.0815)	
Black	-0.1642	-0.2630	-0.1822	.0845
	(0.1582)	(0.1565)	(0.1597)	
1984	-0.0354	-0.0550	-0 0536	5159
	(0.0706)	(0.0693)	(0.0713)	
Log of income		-0.1375	-0.1184	8.9572
		(0 0314)	(0.0337)	
Log of hours		0.1437	0 0969	3.6324
		(0.0914)	(0.0930)	

Table 12b continued

	(4)	(5)	(6)	Variable Means
Industry dummies				
Agriculture	0.7251		0.6356	.0273
	(0 3510)		(0.3536)	
Mining	0.1493		0.1615	.0107
	(0.3527)		(0.3552)	
Construction	0.5584		0.5280	.0521
	(0.2289)		(0 2304)	
Non-durable manufac.	0.0182		-0.0237	.0907
	(0 2455)		(0.2471)	
Durable manufacturing	0.1063		-0 1087	.1093
	(0 2371)		(0 2385)	
Transportation, comm.	0.1552		-0 1496	.0487
	(0 2839)		(0.2847)	
Wholesale trade	0 4518		0.4352	0388
	(0.2371)		(0.2387)	
Retail trade	0.2309		0.1906	2597
	(0.2083)		(0.2102)	
Finance, insurance, etc	-0 1974		-0 2066	0674
	(0.2892)		(0 2906)	
Business and repair	0 4872		0.4494	.0482
	(0 2292)		(0 2308)	
Personal services	0.6372		0.5765	0474
	(0.2339)		(0 2358)	
Professional services	0 0991		0.0575	.1562
	(0.2173)		(0 2194)	
Occupation dummies				
Manager	0 2147		0 2544	.1437
	(0.1462)		90 1477)	
Technician	0 1307		0.1545	3481
	(0.1278)		(0 1289)	
Services	0 1289		0.12133	.1627
	(0 1466)		(0.1477)	
Farmer	-0.0688		-0 0682	.0298
	(0.3220)		(0 3213)	
Production	0 3297		0.3587	.1026
	(0.1272)		(0.1283)	
Region dummies				
North East	-0.1261	0.1241	-0.1209	.2164
	(0.1110)	(0.1088)	(0.1114)	
South	0.0772	0.0997	0.0724	.3134
	(0.0923)	(0.0894)	(0.0927)	
West	0 0697	0 1146	0 0765	.1859
	(0 1022)	(0.0994)	(0.1027)	
Constant	-3 8882	0 0693	-3.4511	
	(0.4136)	(0.4043)	(0.5012)	

Notes Sample size = 9254.
Variable definitions etc are in Appendix B.
Standard errors in parentheses

reports the mean of each of the variables. These equations allow us to examine some of the differences suggested by the means in Table 10. Here we can examine the effect of one variable, holding the others constant. We also look at the relationship between the variables and the decision to become self-employed. This approach has the advantage that the characteristics we examine are measured prior to self-employment, and thus are less likely to be a function of the decision to become self-employed

The specifications reported here pool the data from the two transitions, 1983-84 and 1984-85 summarized above in Table 10. The sample used is those who are wage and salary workers in the first period, and who are working as an employee or as self-employed in the second period. The dependent variable is 1 if an individual becomes self-employed. The first specifications include few variables, but the variables are ones that are less likely to be a reflection of a decision to become self-employed some time in the future. Several effects are apparent in the first few specifications and continue to appear in the equations with more variables.

Older, married, more educated, white, male workers are more likely to become self-employed. The coefficients on age and education accord with the idea that those with more skills and with more time to recognize business opportunities are more likely to become self-employed. Region of residence and year do not seem to be important. In the later specifications it appears that wage and salary workers in agriculture, construction, wholesale trade, repair and personal services are more likely to leave their jobs to become self-employed. These jobs may provide certain manual trades skills that make self-employment more attractive. The log income variable in specifications 5 and 6 suggests that people whose earnings have been low in the past are more likely to become self employed. This result fits with the Rees and Shah (1986) idea that comparative advantage should drive the decision to be self-employed. If a person had earned less in wage and salary work in the past, controlling for variables like age and education, then they would be more likely to have relatively higher earnings in self-employment.

Several other probit transition specifications were tried, but are not reported below. The variables net worth, union member, tenure on old job, and workplace size (defined in the Appendix) are only available for the 1984-85 transition While net worth had the expected positive sign and was significantly different from zero, the other variables were all insignificant in this small sample. We examined transitions to self-employment over a longer (20 month) period. The results were very similar to the twelve month transitions reported here.

6. Transitions From Self-Employment

We have also estimated probit equations for the probability of leaving self-employment In Table 13 we report estimates for the U.S. of the probability of moving from self-employment to employment over a one year period.[27] In all, 428 people are examined, 39 percent of whom had left self-employment one year later. Entrepreneurs who are older, white, and males are all significantly more likely to succeed. There is also some tendency for those in agriculture, professional services, finance, insurance and real estate to stay in business, while those in personal services do not tend to succeed.

Table 14 reports the results for Australia of estimating the probability of leaving self-employment for employment in period t+1, conditional on being self-employed in period t Out of the 636 cases in Tables 6-8 that made the relevant transition, after excluding those with missing values, we have 527 cases across the three sets of transitions. Of these 144 moved from self-employment to employment (27 3 per cent unweighted) while the remainder stayed in self-employment.

As in the case of the U S , the younger the individual, the higher the probability of moving out of self-employment We found evidence that those with low levels of schooling (10 years) and the most qualified (with bachelor or higher degrees) were especially likely to leave self-employment Workers in service and professional occupations had a higher probability of leaving We also found evidence of regional effects· as we noted above, workers in Western Australia had a relatively high probability of entering self-employment. Table 14 suggests that, once in that labour market state, they had a relatively low probability of leaving Probabilities of leaving self-employment were relatively high in New South Wales, Victoria and South Australia We also included variables for gender, industry sector, marital status and race but none were significantly different from zero and hence were omitted.

Probably the most interesting finding in Table 14 is that the longer the individual had been self-employed, the less likely he or she was to leave self-employment in the next period Newer firms are more likely to die than older firms This mirrors a recent result of Holmes and Schmitz (1991) using U S. data from the Characteristics of Business Owners Survey of 1982

7. Comparison of the Australian and U.S. Results

There is a strong similarity between the Australian and U S. results, but there are some differences. Overall, the Australian data suggest a one-year transition rate to self-employment of 2.38 percent (294 out of 12,336 workers—see Tables 6-8) while the comparable U.S. number is a much lower 1.48 (137 out of 9254 observations—see Table 11) The effect of various explanatory variables in the probit equations is also very similar. In both

27 We do this by pooling those who were self-employed in Wave 1 or Wave 4 of SIPP. We then determine whether the individual was still self-employed or an employee one year later in Wave 4 or Wave 7.

Table 13: Transitions from Self-Employment in the U.S.

		Variable Means
Personal Controls		
Years of schooling	0.0186 (0 0347)	12.848
Age	-0.1140 (0.0279)	24 7383
Married	-0.1729 (0.1560)	.6005
Male	-0 2571 (0.1520)	.6402
Black	1.1945 (0.4960)	0234
Industry dummies		
Agriculture	-0.6044 (0 4940)	.0701
Mining	-0 2230 (0 9223)	.0047
Construction	-0.1599 (0.4624)	.0864
Non-durables	-0.1510 (0 6253)	.0140
Durables	-5 0203 (227.1470)	0047
Transport	-0.0023 (0 6485)	.0164
Wholesale trade	-0 6186 (0.7424)	.0140
Retail trade	-0.1609 (0.4293)	.0911
Finance, insurance or real estate	-1.1017 (0.7545)	.0187
Business or repair services	-0.2771 (0.4672)	.0630
Personal services or entertainment	-0.0989 (0.4592)	.0841
Professional services	-0.8228 (0.5011)	0514
Occupation dummies		
Manager	1 0866 (0.5679)	0187
Technical occupation	0.2173 (0.4054)	.0374
Service occupation	1.2580 (0 5518)	0234
Agricultural occupation	5.7235 (323.4090)	.0023
Production occupation	5.4396 (227.5359)	.0047

Table 13 continued

		Variable Means
Region dummies		
North East	-0.0160 (0.2255)	.1168
South	-0 2069 (0.1700)	.2967
West	0.0127 (0 1758)	.2453
1984 year dummy	-0 1795 (0.3899)	.5397
Constant	2 7875 (0 8079)	

Notes. Sample size = 428.
Standard errors in parentheses.

countries, older, male workers are more likely to become self-employed, as are individuals from agriculture and the construction industries. In Australia apprenticeships seem to lead to entrepreneurship, while in the U S more general human capital measured by years of education is associated with entrepreneurship. The self employment transition rate in Australia is best described by a quadratic in age, while in the U.S. the relationship is linear.

The variables number of close colleagues, union membership and tenure on old job, are all important in Australia. In the U.S., these variables always have coefficients with the same sign as Australia, but they were not significantly different from zero. The U S. results may be partly explained by the much smaller sample for which these variables were available. In the main U.S. SIPP sample of individuals of all ages analysed by Meyer (1990), these variables have coefficients with the same signs as in the Australian results and are all significantly different from zero. Marital status, race and years of schooling were insignificant in the Australian sample but were significant for the U.S..

Many of the variables in the probit equations are quantitatively important as well as being statistically significant. The effect of changes in a variable can be measured for a 'typical' individual by the change in the probability of becoming self-employed implied by the probit model Table 15 reports predicted probabilities for Australia using the results from Specification 4 in Table 9. Our 'typical' individual is assumed to be male aged 20, with a trade or other skilled occupation, who had been employed for at least three years in his job in period 1, worked in construction, did not work closely with other workers, lived in New South Wales, was not a union member, and did not have an apprenticeship. Analogously, Table 16 reports predicted probabilities using Specification 4 in Table 12b. Here the 'typical' individual is assumed to be white, male, age 20, with 13 years of schooling, a production

Table 14: Transitions from Self-Employment in Australia

			Variable Means
Highest qualification			
10 years of schooling		0 9656 (0.2389)	.150
11 years of schooling		0.3857 (0.2739)	.140
12 years of schooling		0.4484 (0 2524)	144
12 years or more repeaters		1.1146 (0 6349)	011
Bachelor-higher degree		1.1240 (0 3819)	.134
Diploma, Certificate: CAE		1 4077 (0 5671)	.015
Trade, apprenticeship		0 3171 (0.2288)	.254
Business College Cert./Diploma		1.0770 (0.4089)	.027
Diploma, Certificate: TAFE		0.4155 (0.3180)	074
Adult Education		0.8431 (0 5384)	017
Occupation dummies			
Professional occupations		0.4584 (0 2796)	.076
Para-professional occupations		-0.5451 (0 4260)	.023
Service occupations		0.9781 (0.4535)	.013
Regional Dummies:	New South Wales	0.4360 (0 1817)	.264
	Victoria	0.5922 (0.1768)	319
	South Australia	0.4457 (0.2298)	.114
Year 1987 dummy		0.2951 (0 1427)	.300
Age		-0 0530 (0.0308)	22 336
Years of tenure		-0 1215 (0 0293)	2.679
Constant		-0 1569 (0.6797)	
N		527	
Likelihood ratio		88 4106	

Notes: Standard errors in parentheses Excluded education category is < 10 years of schooling.

Table 15: Predicted Probabilities - Australia (%)

Base Characteristics - male, aged 20, trade or other skilled occupation, tenure ≥ 3 years, 0 other workers, in construction, living in New South Wales, no apprenticeship, non-union.

1. Age and Sex			**5. Occupation**	
Age	**Male**	**Female**	Basic Manual	4.18
16	0.36	0.21	Managerial	3.07
17	0.70	0 42	Professional	3.22
18	1.22	0.73	Clerical	2.02
19	1.92	1 19	Plant operator	3.36
20	2.81	1 79	Skilled trade	2.81
21	3 75	2 50		
22	4 75	3.22		
23	5 71	3.92	**6. Industry**	
24	6.43	4 46	Construction	2 81
25	7 08	4.85	Agriculture	4.18
			Mining	0.73
2. Tenure			Food	1.46
< 3 years	4.95		Metal	1.43
≥ 3 years	2 81		Transport	1.07
			Finance	1.92
3. Number of workers close colleagues			Public administration	0.57
0 workers	2 81		Community services	0.89
1 worker	2 94		Recreation	3 36
2-5 workers	1 50			
6-9 workers	0.96			
10-14 workers	0.89		**7. Region**	
15-19 workers	0 78		New South Wales	2.81
≥ 20 workers	0.48		Victoria	5.05
			Queensland	3.51
4. Union Membership			South Australia	4.18
No	2.81		Western Australia	6.81
Yes	2.02		Tasmania	1.88

Notes: The values reported in this Table relate to the probability of moving from being an employee in period 1 to being self-employed in period 2 rather than doing wage work.

Table 16: Predicted Probabilities - U.S.A (%)

Base Characteristics - male, aged 20, production worker, married, white working in construction, living in the North East, 13 years of schooling.

1. Age and Sex			**5. Occupation**	
Age	**Male**	**Female**	Operator	2.33
16	3.92	2 33	Manager	3 84
17	4.18	2.44	Technical	3.14
18	4.36	2.62	Service	3.14
19	4.65	2.81	Agricultural occupation	2.02
20	4 85	2.94	Production	4.85
21	5 16	3 07		
22	5.37	3 29		
23	5.71	3 44		
24	5.94	3.67	**6. Industry**	
25	6.30	3.84	Construction	4.85
26	6.55	4.09	Agriculture	6 81
27	6.94	4.27	Mining	1 92
			Non-durables	1.29
2. Race			Durables	1.02
White	4.38		Wholesale	3.92
Black	3.44		Retail	2.33
			Transport	0 89
3. Years of Schooling			Finance	0 80
0	1.39		Public administration	1 32
3	1 92		Business or repair services	4.18
6	2 56		Personal services	5.71
9	3.44		Professional services	1.70
12	4.46			
15	5.82			
18	7.35		**7. Region**	
			North East	4 85
4. Marital Status			North Central	6.30
Married	4.85		South	7 21
Single	3.29		West	5.82

Notes: The values reported in this Table relate to the probability of moving from being an employee in period 1 to being self-employed in period 2 rather than doing wage work

worker, married, working in construction and living in the North East. The probability of being self-employed rises much more rapidly by age in Australia than is true for the U.S.. In both countries there is much more variation in the probability of being self-employed across industry than there is across occupation. Differences in years of schooling have large effects in the U.S., whilst differences in the number of close colleagues have a large effect in Australia.

8. Conclusions

These results suggest an interesting pattern of similarities and differences between Australian and U.S youth entrepreneurs. Overall, our judgement is that the forces which influence whether a young person becomes an entrepreneur are broadly similar in both countries. Approximately 4.5 per cent of the workers in the Australian sample were self-employed compared with 3.8 per cent in the U.S. sample. We also observed a somewhat higher rate of transition from employment to self-employment in Australia than in the U S.. The higher Australian transition rate to self-employment for youths is unsurprising given the higher overall self-employment rate in Australia, which in 1984 was 12.4 per cent compared with 7.6 per cent in the U S (OECD, 1986). These results suggest that there may be more business opportunities for youths in Australia or that Australians mature earlier. It appears that at least at a broad industry level Australians and Americans start businesses in the same areas—particularly in Agriculture, Construction, Wholesale and Retail Trade and Personal Services. In both countries skilled manual workers, males, and older workers were particularly likely to be self-employed. There were also regional differences in both countries, although these were larger in Australia.

The main difference we observed was that additional years of schooling in the U.S. had a positive impact on the probability of being self-employed; we could find no education effects in Australia. Marital status was significant in the U S but not in Australia, although quantitatively its impact was small. Union membership and job tenure were significant influences in Australia but not in the U.S .

We found few similarities in the factors influencing the probability of leaving self-employment. In both countries the probability of leaving was higher the younger the individual. In the U.S. individuals were more likely to succeed if they were white and male, whilst in Australia the individual was less likely to leave the longer they had been self-employed.

There are several issues that we would like to study further. The methods of business finance, the importance of starting out in a relative's business, and the failure rate of businesses all merit further attention.

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Appendix A

Variable Definitions - Australia

Age	=	age in years
Age squared	=	age squared
Male	=	1 if male
1 worker	=	1 if worked closely with 1 other worker
2-5 workers	=	1 if worked closely with 2-5 other workers
6-9 workers	=	1 if worked closely with 6-9 other workers
10-14 workers	=	1 if worked closely with 10-14 other workers
15-19 workers	=	1 if worked closely with 15-19 other workers
≥ 20 workers	=	1 if worked closely with ≥ 20 other workers
The omitted group worked with no others	=	'only me'!
Managerial	=	1 if managerial or supervisory (e g. legislators, supervisors, foremen)
Professional	=	1 if professional occupation (e.g. school teachers and natural scientists)
Para-Professional	=	1 if para-professional (e.g. nurses and science technicians)
Clerical	=	1 if clerical and related occupations
Sales	=	1 if sales occupations
Service	=	1 if service occupation (e g food and beverage preparation and personal service)
Trades/skills =		1 if trade and other skilled occupation excluding agriculture
Skilled agriculture =		1 if skilled agricultural occupation
Plant operators =		1 if plant operating and related occupations
Processing =		1 if processing, fabricating and related occupations

The omitted groups are basic manual occupations and occupations not elsewhere classified

1986	=	1 if transition from employment to self-employment from 1986-1987
1987	=	1 if transition from employment to self-employment from 1987-1988

The omitted group is the transition from employment to self-employment from 1985-1986

Variable Definitions - Australia (continued)

Apprentice	=	1 if possesses a trade apprenticeship
Union	=	1 if a member of a trade union or trade or professional association
Tenure ≥ 3 yrs	=	1 if employed in job in first period for at least three years
Mining	=	1 if in Australian SIC Orders 11-16
Food/chem	=	1 if in Australian SIC Orders 21-29
Metal/elec	=	1 if in Australian SIC Orders 31-37
Construction/distrib.	=	1 if in Australian SIC Orders 41-48
Transport	=	1 if in Australian SIC Orders 51-59
Finance	=	1 if in Australian SIC Orders 61-63
Public admin	=	1 if in Australian SIC Orders 71-72
Community services	=	1 if in Australian SIC Orders 81-84
Recreation	=	1 if in Australian SIC Orders 91-99

Omitted group is SIC Orders 01-04 (Agriculture, Forestry, Fishing and Hunting)

Victoria	=	1 if living in Victoria in 1985
Queensland	=	1 if living in Queensland in 1985
South Australia	=	1 if living in South Australia or Northern Territory in 1985
Western Australia	=	1 if living in Western Australia in 1985
Tasmania	=	1 if living in Tasmania in 1985

The omitted category is New South Wales and A.C.T.

Appendix B

Variable Definitions - U.S.A (in order of appearance)

Age	=	age in years
Male	=	1 if male
1984	=	1 if 1984-85 transition, 0 if 1983-84 transition

REGION DUMMY VARIABLES:

North East	=	1 if lives in the North East
West	=	1 if the West
South	=	1 if lives in the South

(the omitted category is the North Central region)

Years of schooling	=	number of years of education completed
Married	=	1 if currently married with spouse present
Black =		1 if race is Black
Log of income	=	the natural logarithm of all earnings during period 1.
Log of hours	=	the natural logarithm of hours worked per week in period 1

INDUSTRY DUMMY VARIABLES:

Agriculture	=	1 if industry is agriculture in period 1
Mining	=	1if industry is mining
Construction =		1 if industry is construction.
Non-durable manufac.	=	1 if industry is nondurable goods manufacturing
Durable manufacturing	=	1 if industry is durable goods manufacturing
Transportation, comm.	=	1 if industry is transportation or communication
Wholesale trade	=	1 if industry is wholesale trade.
Retail trade	=	1 if industry is retail trade
Finance, insurance, etc.	=	1 if industry is finance, insurance or real estate.
Business and repair	=	1 if industry is business or repair services
Personal services	=	1 if industry is personal services or entertainment.
Professional services	=	1 if industry is professional services (includes doctors and lawyers)
Public administration	=	1 if industry public administration (the omitted category)

OCCUPATION DUMMY VARIABLES:

Manager	=	1 if occupation is manager in period 1.
Technician	=	1 if has a technical occupation.
Services	=	1 if has a service occupation.
Farmer	=	1 if is a farmer.
Production	=	1 if a production worker.
Operator	=	1 if occupation is operator or labor (this is the omitted category and includes those in the armed forces)

Section II

Education and Training

An Analysis of Youth Training in Australia 1985-88: Technological Change and Wages

Bruce J Chapman and Hong W. Tan

Are We Over-Educating Young Australians? Human Capital Investment and Self-Selection

Francis Vella and R G. Gregory

Self Discrimination and Human Capital Investment: The Relationship Between Gender Roles and Female Labour Market Performance

Francis Vella

An Analysis of Youth Training in Australia, 1985-88: Technological Change and Wages

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1. Introduction

Implicit in the recent Australian debate concerning award restructuring and micro-economic reform of the labour market is the assumption that the overall training of Australian workers is inadequate However, there is little empirical evidence to support such an assumption. Apart from the analysis of Miller (1987) there is almost no micro-modelling of training.

We attempt to explore training incidence and its consequences for wages for the four available panels (1985-88) from the Australian Longitudinal Survey (ALS). The work reported is a complement to and an extension of the analyses of Miller (1987), Lillard and Tan (1986) and Tan *et al* (1991). The major contributionof this paper is an investigation of the links between formal training, technological change and wages, an area of recent and burgeoning international interest (Mincer, 1990; Tan *et al*, 1991).

Many commentators suggest that the Australian wage and industrial relations system is likely to deliver lower levels of on-the-job training (Fane, 1988; Borland, Chapman and Rimmer, 1990) because binding occupational minimum wages and narrowly-defined award classifications are likely to inhibit skill acquisition The reasons for this are canvassed in section 2.

A third section describes the data, comments on the strengths and weaknesses of the ALS for an examination of training, and considers the incidence of various types of training. Broad cross-tabulations are presented and discussed.

The results of an econometric investigation of the linkages between wages and training are reported in section 4. Perhaps the most interesting part of this exercise is the evidence which suggests significant relationships between both indirect and direct measures of training and technological change, with concomitant implications for wage structures.

Section 5, the conclusion, sets out the main lessons for theory and policy. The results support strongly the role of technological change as an important and complicating factor in the wage-training nexus.

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On the policy side, there seems to be some evidence that Australian wage and training relationships are close to what might be expected from mainstream theory. Although this might imply that the nature of our institutions does not mitigate the effects of economic forces, it is an incautious conclusion, since international comparative work suggests differences between countries in both the extent and consequences of training. Perhaps the right conclusion is that although the Australian data suggest that mainstream economic forces are at work in this country, but this does not as yet constitute strong evidence that institutional arrangements are not important.

2. The Theoretical and Policy Background

The possible effects of existing labour market institutions on the level of worker training and skill acquisition processes in Australia are now investigated. Worker training refers to structured learning activities that take place after an individual commences employment. It has been increasingly recognised in the labour economics literature that the extent of investment in worker training has important consequences for the ability of an economy to adjust to changing circumstances, and for the rapid and successful adaptation and adoption of new technology (Tan, 1980; Bartel and Lichtenberg, 1987; Mincer, 1989; Chapman and Stemp, 1989). A low level of investment in worker training may also produce skill shortages in particular industries which could later impose constraints on economic growth.

It is natural and easy to link insights from training theory to questions of work organisation and skill acquisition. We begin by considering a simple model of investment in worker training. Using this framework we then consider the effects of minimum-wage awards, job classification and, to a lesser extent, craft unions, on the static aspects of training. Possibly much more important than these are the dynamic dimensions, which are considered later in the context of multi-skilling

Conventional labour market theory places quite an emphasis on the relationship between the wage structure and provision of on-the-job training (OJT). The basic approach is one in which training is seen to be an investment, meaning that the costs of skill acquisition are recouped in benefits such as higher wages and increased labour productivity.

In many cases the acquired skills are useful in other firms so trained workers are able to command higher wages elsewhere after training is completed The theory suggests that workers will need to 'finance' the training by, for example, taking low wages in the training period, as shown in Figure 1.

Figure 1 illustrates the investment process for workers undergoing what is known as 'general' (transferable) OJT. Low training wages result in a higher skill level which is associated later with wage increases. Investment in the first period is given by the distance AB, which measures the difference between the wage received and that available in a non-training job.

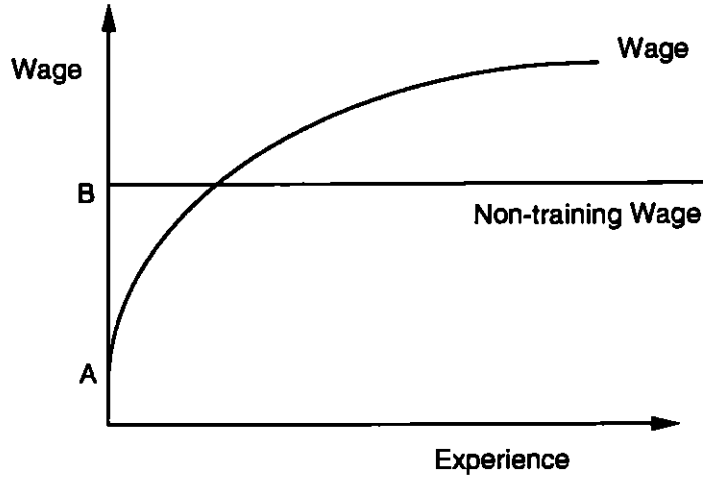


Figure 1: Worker Investments in Training

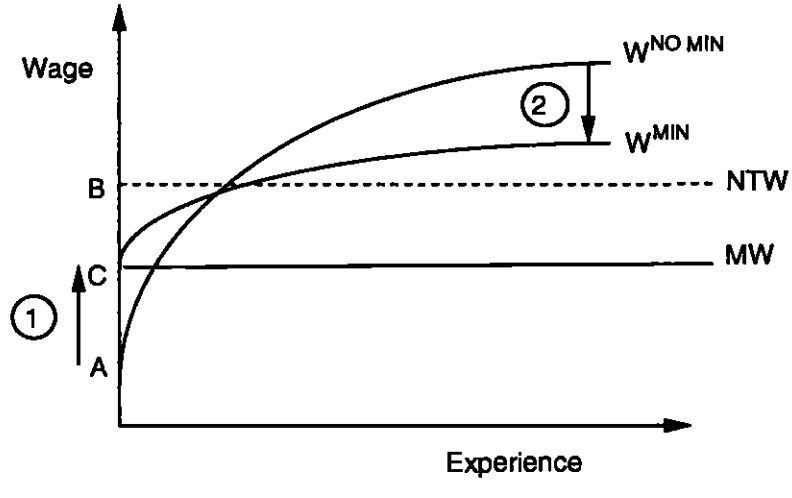


Figure 2: The Implications of Minimum Wages for Training

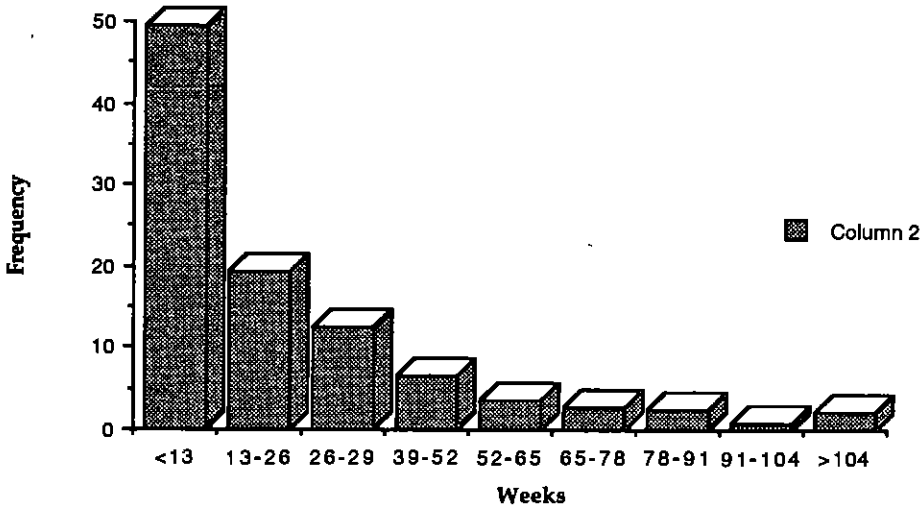


Figure 2: Relative Frequency of Spell Lengths

Training that is not transferable between employees is known as 'firm-specific', and as with general training is financed (but only in part) by workers, again through the receipt of low wages in the training period The financing of firm-specific training investments will be shared by firms and workers since both parties need to have some insurance against the other instituting job separation, which results in losses for both in returns to the investment.

This simple model can be used to analyse two related questions of importance in the current Australian debate. They concern the theoretical effect of occupation minimum wages on OJT, and whether there is evidence for the empirical proposition that the Australian labour market system results in low levels of training.

Figure 2 suggests that the imposition of binding minimum wage legislation, resulting in a legislated wage of MW, reduces worker-financed training investments of AB, at the the beginning of the job, to CB. Two empirical predictions follow starting ('training') wages increase, and subsequent wages decrease. Put differently, binding minimum wages reduce the slope of workers' experience-wage profiles.

Thus a possible cause of underinvestment in training is that pervasive and binding minimum wage awards influence workers' wage profiles so that they may be unable to pay for the costs of training by accepting relatively low wages in the training phase of their careers An obvious implication is that the imposition of binding minimum wages leads to reduced skill acquisition (Hashimoto, 1980; Leighton and Mincer, 1980) If not, firms will be paying for some part of general training, which is not consistent with profit-maximising behaviour

At the other extreme firm-specific training is also reduced by the imposition of binding minimum wages. This is because, if nothing else changes, higher training wages imply that employers will be financing a greater share than previously of the training investment, and thus will be taking a higher part of the risk than before. The rational reaction will be to reduce the total stock of training until the sharing ratios of financing the investment return to the original balance.

Tan (1980) provides an extra dimension to the training-wage nexus. In this view technological change starts in one firm and slowly diffuses through the industry, with workers acquiring technology-specific skills which are eventually useful in alternative employment. Such (eventually general) investments will be paid for in large measure by workers (by taking relatively low wages in the training period), who will be rewarded through relatively high rates of wage growth. If minimum wages are imposed, one consequence may be the reduction of incentives for firms to introduce technological change at the shop floor. This could have important long-run consequences for labour productivity growth.

Mincer (1990) has recently taken up the technological change-training nexus issue with the presentation of empirical tests of differences in wage-tenure profiles depending on the rate of total factor productivity of the industry of employment in the US. He supports the earlier work of Tan (1980) on the Japanese labour market, and the apparent complementarity found between other general skills (such as education) and technical change (Bartel and Lichtenberg, 1987). Later we offer tests on the ALS motivated in part by these results.

There is also a literature which suggests that the extent and quality of OJT are important determinants of technological progress at the firm level (for a summary, see Chapman and Stemp, 1989). Innovations need to be modified and adapted to the particular production structure of each firm (and/or industry), and trained workers are more able to assist this process. This suggests that long-run growth processes are influenced directly by labour market institutional arrangements in ways not usually suggested in mainstream theory. Indeed, it is relationships similar to these that have led a host of commentators to argue the merits of job-rotation and enterprise-identification by workers, pointing to the success of large Japanese firms, which is alleged to be in part due to such arrangements.

Indirect evidence for the proposition that labour market institutions affect the extent of OJT is available in cross-country comparisons of the slopes of experience-wage profiles, data which are readily available for a large number of labour markets, and with many observations. It is important to note that there are many such comparisons, although most use somewhat dissimilar methodologies (for a summary, see Borland, Chapman and Rimmer, 1990). The study by Daly (1991), which is particularly relevant, suggests that in the early 1980s the Australian male wage profile was flat relative to that of the US, but not greatly different to that of the UK. It is worth stressing that comparisons made between Japan and the US invariably reveal a relative steepness in the profiles of the former, which

implies that the Australian relationship is considerably flatter than that found for Japan.

Binding occupational minimum wages may not be the only reason for relatively low levels of training. The narrowness, and occupational bases, of the awards may also be contributing factors (Borland, Chapman and Rimmer, 1990). If workers are restricted to a more limited range of tasks, their training requirements will fall. To take an extreme example, if awards were to limit each worker to a single task, then each worker would need training only for that task. One constraint imposed on training by the system of job classification is, if there is a probability that any skill will be made redundant (perhaps due to a labour-saving innovation), then allowing workers to train for multiple tasks acts as a form of insurance against unemployment (Grossman and Shapiro, 1982). If workers are risk-averse they would always strictly prefer to purchase some insurance (i.e. to have multiple skills), as long as there are not increasing returns to specialisation. If awards restrict training to a single skill, or few skills only, this implies both a lower level of welfare for risk-averse workers and that there is eventually less training than is desirable.

It should be clear that recent theoretical developments offer several important guidelines with which the efficacy of Australian institutions can be analysed. While many commentators in this area focus on more or less static concerns related to the structure of unionism, possibly much more important than these are the dynamic forces related to questions of training. Theory suggests that optimal levels of training are unlikely to be achieved if binding minimum wages are imposed, and if job classifications seriously limit the number of skills workers can acquire. The significance of this is reinforced by theoretical evidence which links skill acquisition processes to technological change, and which strongly suggests that institutional arrangements have the potential to affect the speed and usefulness of innovation, which in turn necessarily implies direct linkages between work organisation and economic growth. (have the potential to delay the acquisition (introduction), of new technology, and suggests that there are direct links between between patterns of work organisaton and economic growth.

These background observations provide a sound basis for undertaking an analysis of the training experience of Australian youth. The questions are: is the modelling supported by the data and, what does an analysis of Australian youth training, and in particular its relationship to wage structures, tell us about how our labour market institutions affect the nature of training.imply about the nature of training resulting from our labour market institutions?

3. The Australian Longitudinal Survey: Data and training incidence

The ALS is a panel survey which commenced in 1985, with annual observations currently available to 1988, and is modelled on the National Longitudinal Survey (Parnes) of the US. It is focussed on youth, the 1985 sample being aged between 15 and 26 years, and seeks to investigate the educational, social and labour market experience of this group over time. The ALS is the most useful Australian microdata set for an analysis of training, as at each annual interview respondents are asked questions about their training experience. The questions are described later in this section.

It is important for this exercise that the data allow a comprehensive set of controls to be included for variables that might influence both training incidence and wages. These are the obvious human capital variables, such as schooling and post-schooling qualifications, and labour market experience, measured as time in both the labour force and with the current employer.

The data also control for variables that statistically seem to matter even though their influence on wages is unclear: marital status, health, and union membership. Table 1 presents the major statistical characteristics of the data pooled over the four panels, the criterion for inclusion being that the respondent was an employed wage or salary earner at the time of interview This selection process left us with 8279 male and 7129 female observations.

Table 1: Statistical Characteristics of the Data

	Males		Females	
Variable	Mean	Standard Deviation	Mean	Standard Deviation
LWAGE	2 058	0 42	2 0052	0 41
EDEG	0 050	0.22	0 049	0.22
EDIP	0 063	0 24	0.22	0 41
EOTH	0.068	0.25	0 067	0.25
E12	0 27	0 44	0.30	0.46
E1011	0.32	0 47	0 26	0.44
EAPP	0 16	0.36	0.020	0.14
OTIME	0 28	0 45	0.13	0.34
FTIME	0.89	0.31	0.75	0.43
TENURE	2.31	2.41	1.98	2.13
ADJEXP	5 033	3.24	4.23	3 091
HEALTH	0.076	0.27	0.068	0.25
MARRY	0.24	0.42	0.32	0.47
ESMBORN	0.069	0.25	0.074	0 26
OTHBORN	0.055	0.23	0.052	0.22
UNION	0 44	0.50	0.42	0.49

Variable definition is as follows EDEG, EDIP, EOTH, EAPP, E12, and E1011 are dummy variables for the highest level of education received, representing respectively a degree, diploma or certificate, some other form of higher education qualification, trades qualification, having graduated from high school, and having left high school in year 10 or 11 (in the estimations the omitted variable is left school before year 10). OTIME and FTIME are dummy variables respectively for having worked overtime in the previous week (from which the wage data are obtained) and being a full-time worker, defined as usually working more than thirty hours a week. TENURE is the number of years with the current employer, TEN2 its square, and ADJEXP is the number of years since first started working, ADJEXP2 its square. UNION is a dummy variable for belonging to a union

There are a number of personal characteristics variables. MARRY is a dummy variable for being married, and HEALTH is a dummy variable for whether or not health problems limit work. ESMBORN and OTHBORN are dummy variables for having been born respectively in another country which is English-speaking and another country which is non English-speaking.

The wage variable is the logarithm of hourly wages (LWAGE), derived by taking earnings divided by hours in the principal job in the week before the survey. Since we modelled relationships only for wage and salary earners, there are no problems for interpretation from the inclusion of the self-employed.

The data from Table 1 are quite similar to those available from comparable surveys, such as those used by Mulvey (1986), and for the 1981 Australian Census, as reported in Gregory and Daly (1990). As examples note that: union coverage is around 45 per cent for males in the ALS and about 46 per cent for males in the Mulvey analysis; around 18 per cent of those in paid employment have higher education compared to about 13 per cent from the Census;, and the average hourly wage of about $7.80 in 1985 is what would be expected from other analyses, noting the sample has a far lower average age and thus labour market experience than in the case for other data sets.

As far as the training data are concerned, in each year four questions were asked concerning its receipt They were:

(i) (in the year before the interview) did you attend any training classes at work?;

(ii) (in the year before the interview) did you attend any training classes away from work?;

(iii) (apart from the above) did you receive any kind of job training from your supervisor or boss?; and

(iv) (apart from the above) did you receive any kind of job training from other people at work?

In 1987 and 1988, respondents were also asked how many hours of job training, in the categories at (i) and (ii) above, they had received in the four weeks prior to the interview.

These training data have a number of strengths. They allow an examination of both the determinants and wage effects of different types of training, depreciation in the value of training, and the effects of training within and between jobs. The non-training information is sufficiently rich to enable useful testing of many training related hypotheses. But the data also have some inadequacies.

First, no information exists on the number of training events, so in our analysis persons with only one training event are treated as having the same training experience in a given year as those having, for example, five separate training events. This characteristic of the sample implies that there is less variance in the data than in reality, which may affect the estimates of the wage implications of training.

Second, apart from those who received some training in the four weeks prior to the 1987 and 1988 interviews (around 5 per cent of both sexes in both years), there is no information concerning the length of time, or other quality dimensions, of the training experience This implies that those identified as having received some training are treated equivalently, even if the extent and intensity of that training differs across individuals.

Finally, interpretation of the answers to the questions concerning whether or not repondents received training from supervisors or fellow workers is not straightforward. Some 'training' of this type could be of little or no consequence, a problem that is probably much more likely to occur in this area than would be the case for the documentation of more formal types of training. Consequently we did not analyse this variable.

Keeping these data characteristics in mind, it is useful to consider aggregations of responses to the questions of interest. The receipt of training data are organised so as to highlight the relationships between the likelihood of receiving training, on the one hand, and both education and the number of years in the labour market, on the other. They are summarised for males and females in Table 2. Because apprentices attend training classes we exclude this group in the male sample (this was not necessary for females as there are so few in apprenticeships). 'Any Training' refers to either on-the-job or off-the-job training.

To avoid double counting the data were not pooled: the number should be interpreted as the cumulative probability that individuals had received training. The results reveal that while only about a quarter of Australian youth attend in-company formal training classes in their first year of employment, after four years over half the samples of both females and males had done so, there being no obvious differences between the sexes. The responses are similar for formal training classes conducted outside the firm, although in this case far fewer females than males had such training in the early period after starting work. After that time the data are similar for males and females. This characteristic of the information could reflect the possibility that employers are relatively reluctant to provide training

opportunities for young women until it becomes clear that they are likely to remain in employment.

Table 2: Culminated Probability of Training by Source: Males and Females

Sources of Training	Time in the Labour Market (years)			
	1	2	3	4
A. Non-Apprentice Males				
Any Training	.39	55	65	69
On-the-job Training	.27	.41	50	.58
Off-the-job Training	.22	.36	.46	54
B. Females				
Any Training	.32	49	59	69
On-the-job Training	.25	39	50	60
Off-the-job Training	.13	.26	.36	52

Tan *et al* (1991) report the apparent influence of education on training incidence, in an exercise similar to that reported in Table 2 It would seem that more education is associated with a higher probability of attending both in-company and out-of-company training classes. As an example, Tan et al. note that after four years in the labour force both males and females with degrees had an 80 per cent probability of receiving in-company training compared to a 50 per cent probability for less well-educated youth.

Training determinants from the ALS sample have been tested with a probit methodology and are reported in both Miller (1987) and Tan et al (1990). The results are quite similar: training incidence seems to be associated positively with time on the current job and education level, and negatively with the length of time in the labour force. The Tan et al. study also revealed that members of unions receive more in-company training and less out-of-company training and that, for the 1988 sample, workers in relatively large establishments had more formal training of both kinds.

4. Wage Returns to Training

Our major interest is the effect of formal training on the hourly wages of individuals. In general here we follow convention (Lillard and Tan, 1986; Miller, 1987) by estimating earnings functions including various measures of whether or not individuals attended training classes, and when they did so. We also tested propositions related to the role of technological change, first suggested by Tan (1980) and tested in Lillard and Tan (1986).

Conventional Modelling

The wage implications for workers currently undergoing training are ambiguous. This is because they could be receiving returns to investments associated with current training, which would tend to increase the wage level. On the other hand, all of general and some part of firm-specific training is in theory financed by workers, which implies two things: that

wages are lowered in the period of training, and that for any given stock of current training the more transferable it is across firms the greater is the negative impact on wages.

Thus there is no clear prediction about the wage impact of having attended in-company training classes in the most recent period (an event signified by ICTRN), and having attended out-of-company training classes in the most recent period (an event signified by OCTRN). Given that the latter is more likely to represent general rather than firm-specific training, we expect that all else being the same the negative impact on wages is greater for OCTRN than ICTRN.

The human capital approach predicts that the longer the elapsed time since training, the lower is its (positive) effect on wages, because of the depreciation of the acquired skills. This suggests that there is merit in either identifying when training was received or including a measure of the time since training. We adopted the first approach by including the variables ICTRN2, ICTRN3 and ICTRN4, which are dummies, respectively representing having attended in-company training classes two, three and four years ago, with an analogous exercise being carried out for the attendance at out-of-company training classes, the respective dummies being OCTRN2, OCTRN3 and OCTRN4. From theory the coefficients on these variables are expected to be positive and to fall in absolute size as the period of time since the receipt of training increases.

Although a large part of OJT is not readily observed and will not be adequately captured by either the ICTRN or OCTRN variables, it is nevertheless likely to have consequences for wages. Thus the coefficients on ADJEXP and TENURE are additional representations of the training impact on wages. They are expected to be positive.

As well as focussing directly on these relationships we chose also to follow Miller (1987) by interacting the formal training dummies with time on the current job, the basic hypothesis being that the receipt of training increases the wage returns to tenure; that is, wage profiles are steeper for those with formal training. There is not a clear prediction concerning the relative size of the coefficients here on ICTRN and OCTRN interacted with tenure, since we have no information on how extensive (or intensive) the different types of training experience were, only that they occurred.

While the models were estimated separately for each year, the data were also pooled across all years, which required the inclusion of year dummies to take account of changes in nominal wages. The pooling approach was adopted in order to average out the wage-training effects over 1984-88 and to facilitate tests of hypotheses related to the depreciation of training.

We compared the cross-sectional results with those of the pooled approach to ascertain if the econometric difficulties, said to arise when pooling using ordinary least squares, were a problem. The cross-sections gave similar results to those from the pooling, the exception being the returns to education where in each consecutive cross-section the wage differences between education groups fell. We leave this interesting research issue for others to pursue.

The regression results are presented in the Appendix. They show that for the main variables there is a substantial degree of coefficient stability. Table 3 presents interpretive estimates of some of the major coefficients of interest derived from the most parsimonious functional form of the regressions.

Table 3: Percentage Increases in Hourly Wages from Changes in the Independent Variables

		Males	Females
EDUCATION:	EDEG	60*	53*
	EDIP	30*	31*
	EOTH	26*	19*
	E12	25*	23*
	E1011	6*	7*
	EAPP	25*	18*
	OTIME	1.8*	1.8
	FTIME	-17*	-16*
EXPERIENCE:	TENURE	0.58*	1.47
	ADJEXP	4.5*	3 5*
PERSONAL:	HEALTH	-7.7*	-5.5*
	MARRY	0.28	5.4
UNION:	UNION	15*	7*
BIRTHPLACE:	ESMBORN	2.8	3 6*
	OTHBORN	2.5	5.6*
PERIOD:	YEAR86	11*	13*
	YEAR87	22*	23*
	YEAR88	30*	32*
$\bar{R}^2$		0 38	0 32

Notes The education estimates are relative to those leaving school before Year 10, the experience estimates are calculated at five years; the country of birth effects are relative to the Australian born, and the period dummies should be interpreted as nominal wage increases from 1985.

*Significant at the 1% level.

The results tell a familiar story. Education has an important effect on wages, for example the person with a degree will have a wage level which is about 60 per cent higher than that of a person who left school before year 10; the person with a trades qualification will have a wage level about 20 per cent higher than that of a person who left school before year 10, and these differences are about the same for both males and females. The returns to general experience, and to firm-specific tenure, are about 4 and 1 per cent a year respectively after five years Union membership is associated with a wage increment of around 15 per cent for males and 7 per cent for females A health problem reduces wages by around 6 to 8 per cent, and there are

only small average differences between the Australian-born and others. Full-time workers receive an hourly wage which is about 17 per cent lower than that of part-time workers (we interpet this as the compensation required for part-time work, given the relative lack of fringe benefits paid to this group).

These findings are similar both to those reported in Miller (1987) who used the ALS data, and to those of a number of other Australian studies which used cross-sectional data (e.g. Gregory and Daly 1990).

The wage consequences of training are presented in a variety of ways, the first being in Table 4 which shows the wage level effects from ICTRN and OCTRN, both contemporaneously and in previous years, derived from model 3 in the Appendix.

In-company training received in the last year has a positive effect on wages, of the order of 6 to 7 per cent. Training of this type received two, three and four years ago apparently increases wages by around 5, 3 and 2.5 per cent for males, and 2.5, 2 and 1 per cent for females. Interpreted in a human capital context these data imply a fairly quick depreciation rate, in that after only two years the value of the training is reduced by more than half.

Having attended out-of-company training classes decreases wages if this happened in the most recent period, by about 4 and 1.5 per cent respectively for males and females, suggesting that workers have financed training that is more likely to be general. As well, for males, and consistent with theory although the coefficients are not significant, is that OCTRN received in previous years increases wages, but at a diminished rate. No significant OCTRN effects were found for females

Table 4: Wage Returns to Training (per cent)*

Training Event	Males	Females
ICTRN	7 1*	5.7*
ICTRN2	5.1*	2 4*
ICTRN3	3.2*	1 8
ICTRN4	2.5	1.1
OCTRN	-3.7*	-1.6
OCTRN2	1.5	0.89
OCTRN3	2.4	-0.86
OCTRN4	1 8	-1.1

*Significant at the 1% level.

Perhaps of more interest are the results which allow tenure effects on wages to differ depending on whether or not individuals had experienced OCTRN or ICTRN, the interactions being labelled OCTEN and ICTEN respectively. The conventional analysis implies that workers receiving formal training should experience a lower wage initially and a higher rate of

wage growth as time in the current job increases Figures 3 and 4 show some of the relationships derived from model 4 of the Appendix. The figures allow only training and tenure to vary, and set. E12=1; ADJEXP=0, and other independent variables equal to their means.

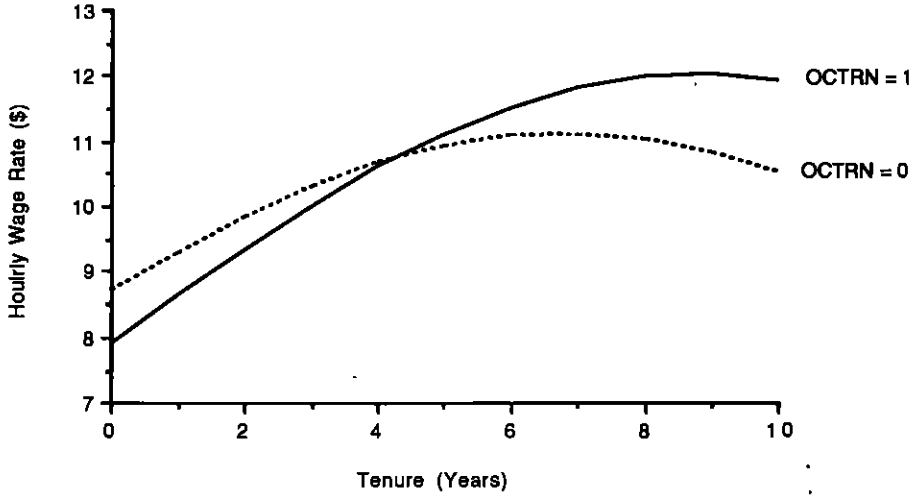
The wage relationships illustrated above suggest that males and females receiving OCTRN experience two things: a reduction in wage levels at the time of the training, and an increase in the rate at which wages grow with time on the job. In the model in which this was tested the data from the Appendix reveal that OCTRN reduces wages initially by about 9 and 3 per cent for males and females respectively.

The results seem to imply that OCTRN is an investment in general human capital accumulation, with the findings suggesting that OCTRN is paid for in part by workers. As a consequence they receive wage increments which can be interpreted to represent returns to the worker's investment in training The estimates imply that entering formal training as only a dummy in a wage equation is a misspecification, since the investment process affects both the intercept and the slope of the wage function. In-company training relationships are now illustrated, being similarly projected from the coefficients of model 4 from the Appendix.

The results with respect to ICTRN are less easy to interpret because there is no evidence that workers finance these investments through the receipt of lower wages, but it is certainly the case that having received ICTRN is associated with wage level increases. Given that the training event could have occurred at any time in the previous year, this first finding is not inconsistent with theory, but we did not expect to find that the tenure-wage slopes were similar with and without ICTRN. Thus, formal training seems to increase skills, with there being no evidence that workers pay for it. The wage increment from ICTRN is about 6 per cent for both males and females.

In summary, the conventional approach to the estimation of wage-training relationships has revealed that indirect measures of training, such as general labour market and firm-specific experience, have the expected effects on wages: the profiles are upward sloping in the range of our data. Moreover, there is compelling evidence that receiving OCTRN both reduces starting wages and increases the wage-tenure slope; ie there is cross-over in the profiles, as predicted by standard theory. The story is not strong with respect to ICTRN, as it appears that this type of training has a greater effect on wage levels than on the slope.

The ICTRN results could be because the more able persons are selected for training and/or a consequence of the complicating influence of technological change (uncontrolled for in these models). In these data nothing can be done about the first possiblity, but the the second is an issue to which we now turn.



Males

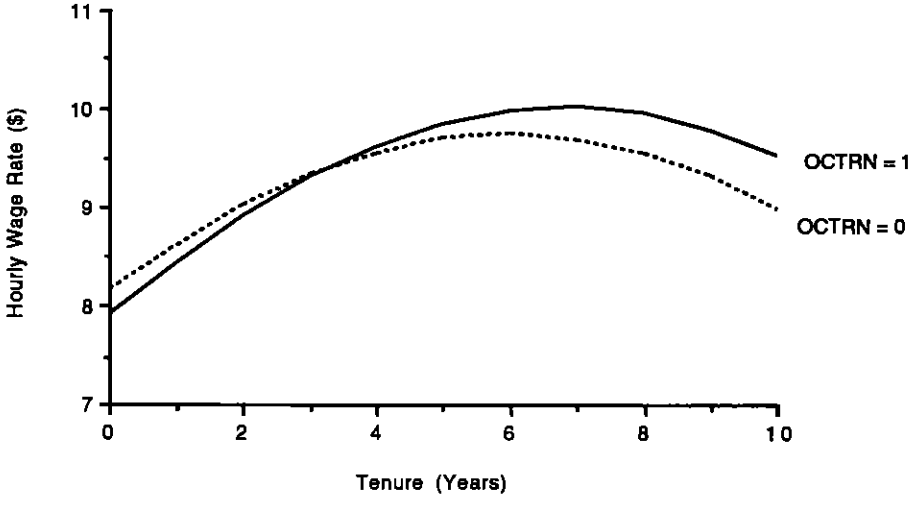
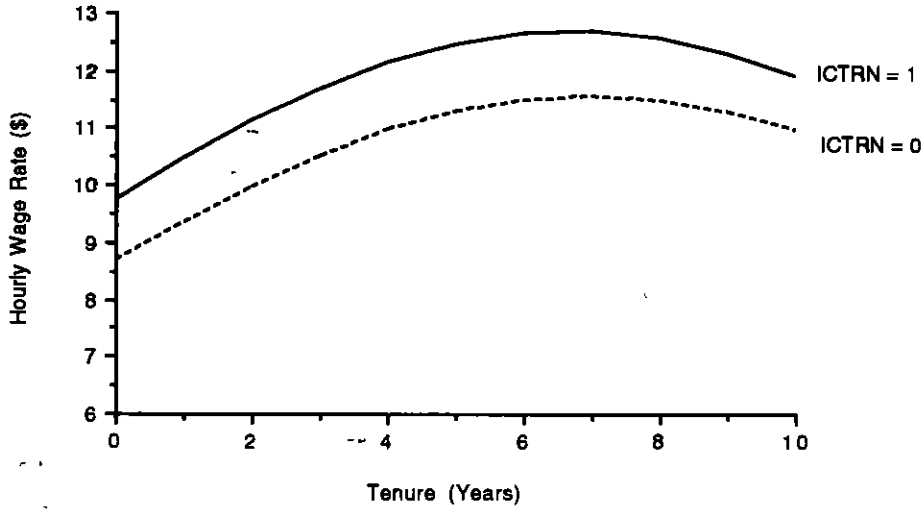


Figure 3: Training Wage Profiles: OCTRN
Females



Males

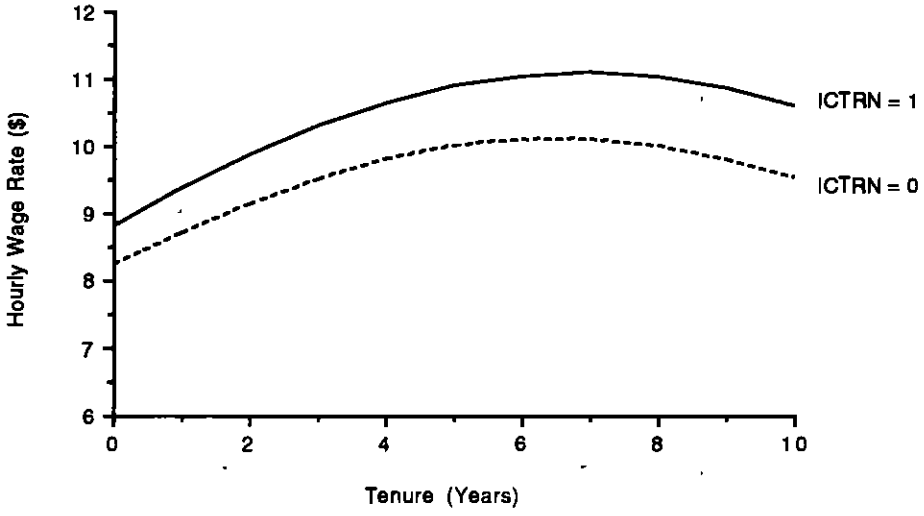


Figure 4: Training Wage Profiles: ICTRN
Females

Training, technological change and wages

In this section we explore the interactions between training, technological change and wages. In particular we are interested in the question do high rates of growth of technological change generate greater returns to training? It should be noted that the training-technological change nexus is a two-way street, implying that there is an endogeneity problem with the estimation approach. Consequently our results are indicative and descriptive at this stage.

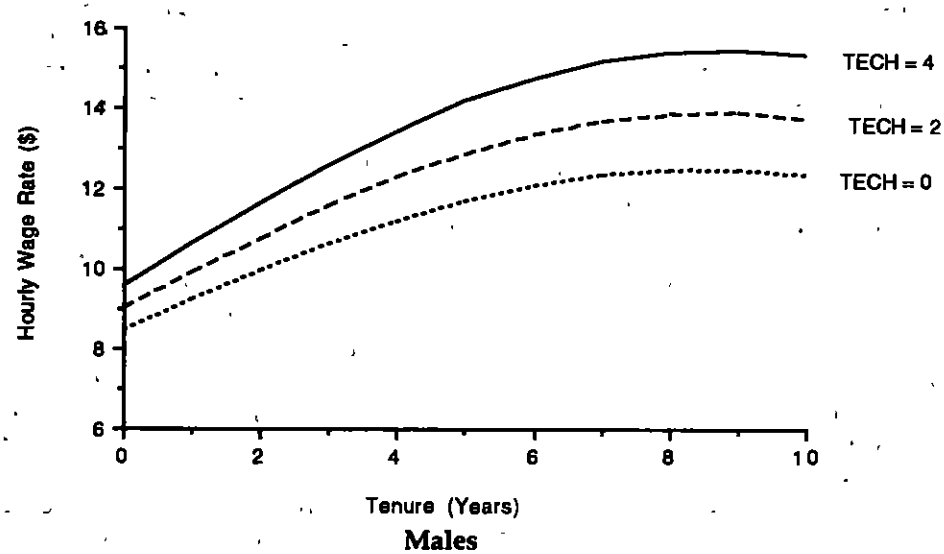
The technological change proxy (TECH) comes from Ralph Lattimore's estimates of industry-specific multi-factor productivity annual rates of change, estimated for the 1967 to 1989 period. His data covered twenty industries of varying size, and were available for just over 60 per cent of the sample. We included a dummy variable, TCMISS, for those observations where there was no information on multi-factor productivity.

The technological change data are not ideal for the following reason. While they were estimated with cyclical controls, no adjustments were included for variations in the quality of the human capital employed. Since it is unlikely that there were no differences between industries, or that this factor changed only randomly over time with respect to industry, it is probably the case that the unmeasured component of the technological change variable is positively correlated with total training incidence. This could be an issue if the formal training measures do not fully capture all the training experienced. There is little that can be done about this problem, but it needs to be kept in mind in interpretation of the results.

The most complete wage model in the Appendix, equation 8, is the estimation approach reported. It is very flexible with respect to the role of technological change in that TECH was interacted with OCTRN, ICTRN and tenure (variables respectively called OCTECH, ICTECH and TECTEN), as well as being entered as a level. Thus we have allowed TECH effects on wages to vary with measures of formal training and time on the job, a specification which appears to us to capture the essence of the theoretical modelling discussed earlier.

The main results are illustrated in Figures 5 and 6. In Figure 5, the profiles have been derived under the assumptions that ED12=1, OCTRN=ICTRN=1, and ADJEXP=0, with the other independent variables being set to their means. The profiles in Figure 6 differ from those of Figure 5 only in that there is no formal training (i.e. it is assumed that OCTRN=ICTRN=0).

The major results are as follows. First, from the regressions TECH has a positive impact on wage slopes with tenure, most clearly with respect to males, which implies that technological change is associated with unmeasured (informal) training that occurs on the job. But the effect is small. For example, a simultaneous increase in technological change of 2 per cent per annum and a one year increase in time with the current employer together imply a wage increase for males of the order of 0.8 per cent.



Males

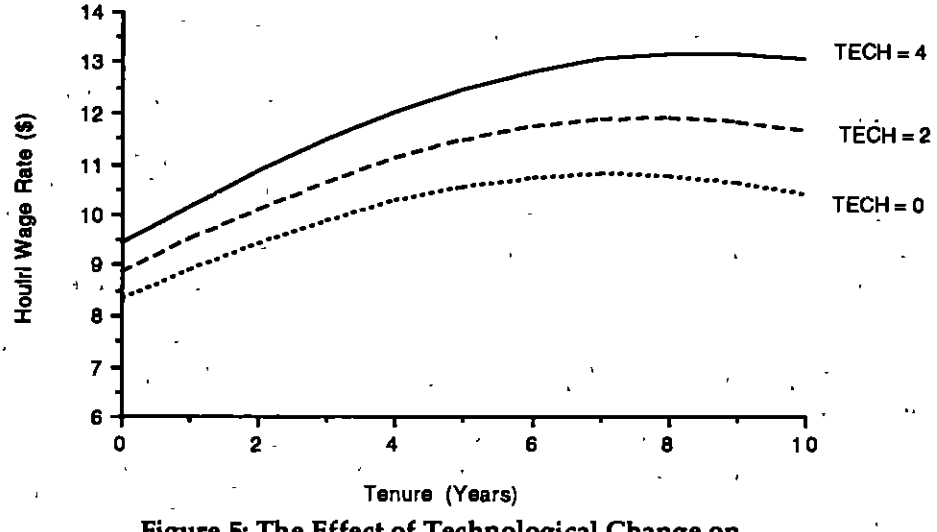
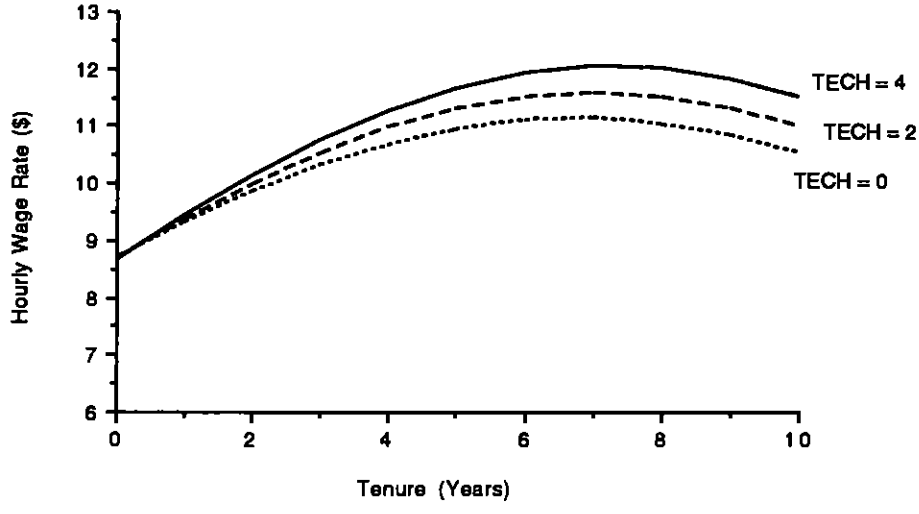


Figure 5: The Effect of Technological Change on Wage Profiles (ICTRN = OCTRN = 1)
Females



Males

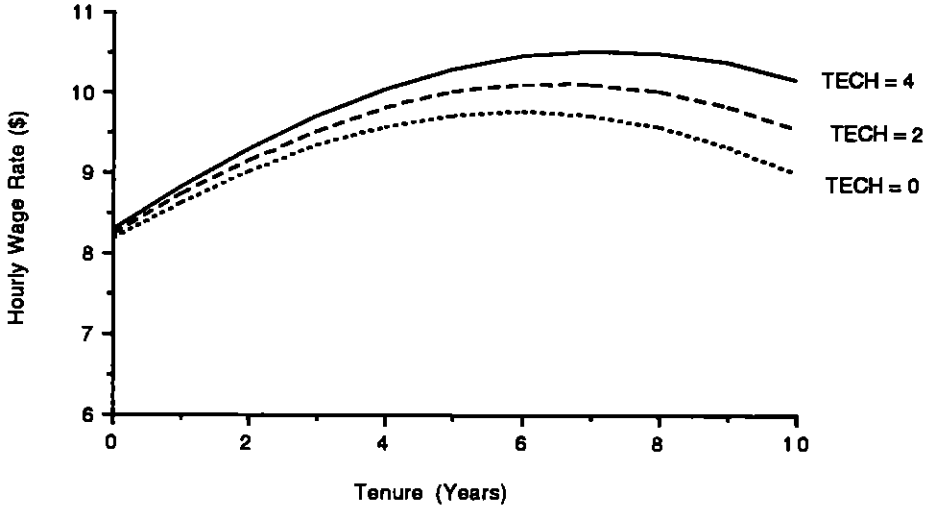


Figure 6: The Effect of Technological Change on Wage Profiles (ICTRN = OCTRN = 0)
Females

Secondly, from Figure 5 there is no doubt that technological change is positively associated with wage levels, given that respondents have formal training. The profiles are systematically higher for increases in the assumed level of multi-factor productivity, from the low level of 0 per cent per annum through to the highest level assumed of 4 per cent per annum. It is important to stress that these differences arise through the interaction of TECH with the formal training dummies, which can be readily observed from the coefficients on OCTECH and ICTECH. In other words, technological change is an important wage determinant only so long as individuals have received formal training This conclusion fits comfortably with both the theoretical conjectures offered in section 2 and the empirical evidence reported for the US economy in Mincer (1990).

5. Conclusion

We have described briefly formal training incidence, focussing on levels and changes with time in the labour market of attendance at training classes, both in - and out of the firm. Training of these types was fairly commonplace, with about three-quarters of the sample having had at least one event of both kinds after four years in the labour market.

One set of results reported the direct and indirect effects on wages of having received training. The main points are as follows.

There are indirect impacts of training on wages as interpreted from theory and as measured by the coefficients on both time on the current job and time in the labour force, a result consistently found in the Australian literature (Mulvey, 1986; Miller, 1987). A conventional interpretation of our findings is that the returns to general experience are quite high, of the order of 5 per cent a year at the mean of the data, but that the returns to current job experience are low This latter result was qualified importantly in ensuing analysis.

As well, we found that for males the receipt of out-of-company training was associated with both lower wages and more rapid rates of wage growth with time on the current job, implying that these investments are at least partly worker-financed. The 'cross-over' point from the investment occurred at about four years, and the annual wage increment given training was around two per cent. For females the hypothesised relationships were found, but they were not large.

The in-company formal training-wage relationships, however, were not as straight-forward to interpret. For both sexes in-company training has a small effect on wage slopes, but significant and fairly large apparent impacts on wage levels. Both male and female workers experienced wage increases of around six per cent from recent attendance at in-company training classes, the return falling systematically with the length of time since the training event.

Our more innovative approach to the training-wage nexus involved testing interactions between technological change and wages, on the one hand, and tenure and formal training on the other. We came up with the following.

First, formal training (of both types) has a much larger effect on wages when individuals are employed in industries experiencing rapid rates of growth of technological change, as proxied by estimates of rates of growth of multi-factor productivity. This empirical finding is novel in the international context, but is as predicted by recent advances in labour market theory. It means that there may be benefits in future analyses in allowing returns to measured training to vary systematically with technological change.

Secondly, the results suggest that returns to firm-specific experience are higher as technological change increases. This finding is consistent with the theory espoused in section 2, and has been found also in the work of Tan (1980) on the Japanese workforce and Mincer (1990) on US data.

The message is that training matters in an understanding of wage structures. Formal training increases wages generally, and in most instances impacts positively on returns to general and firm-specific experience. Technological change, formal training and wages are inextricably connected, findings supportive of recent innovations in labour market theory.

These results imply that Australian labour market arrangements deliver some of what would be expected from theory. If the constraints of our institutions stop the operation of so-called market forces, this is not obvious in the ALS. That is, even if around 85 per cent of wage and salary earners are covered by occupational minimum wages, there still appears to be some scope for employers to vary remuneration in line with training theory, probably through combinations of over-award pay and promotion rate differences. It could even be that for many industrial areas the minimum rates are not binding.

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Appendix page 1

APPENDIX

MALES

	Model No. 1		Model No. 2		Model No. 3		Model No. 4	
	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat
INTERCEP	1.43	74.81	1 43	75.10	1.46	75.46	1.46	75.46
EDEG	0.60	26.35	0 59	25.81	0.58	25.44	0.58	25.49
EDIP	0 30	14.54	0 29	14.014	0.28	13.53	0.28	13.41
EOTH	0 26	12.80	0.25	12.47	0.24	12.13	0.25	12.20
E12	0.25	14.87	0.23	13 96	0.22	13.54	0.22	13 58
E1011	0.06	3.95	0.066	4 12	0.064	4.016	0.066	4.15
EAPP	0 25	14 077	0.25	14.26	0.25	14.12	0 24	14.05
OTIME	0 018	2 17	0.022	2.63	0 023	2.72	0.021	2.57
FTIME	-0.17	-13.08	-0.18	-13.36	-0.18	-13.58	-0.17	-13.14
TENURE	0 014	2 88	0.012	2.54	0.0098	2.083	0.0063	1.31
TEN2	-0.00082	-1.54	-0.00075	-1.41	-0.00076	-1.43	-0.00049	-0.89
ADJEXP	0 10	26.77	0 10	26.65	0.10	25.33	0.10	24.57
ADJEXP2	-0.0055	-16.69	-0.0054	-16 53	-0.0050	-15.17	-0.0049	-14 61
HEALTH	-0 077	-5.59	-0 080	-5.85	-0.081	-5.88	-0.080	-5.85
MARRY	0.0028	0.29	0 00045	0.046	-0.0015	-0 15	-0.0025	-0.26
ESMBORN	0.028	1.91	0.024	1.70	0.023	1.56	0.024	1.64
OTHBORN	0 025	1.56	0 028	1 74	0.031	1.90	0.033	2 019
UNION	0 15	19.63	0.14	18 41	0.14	18.24	0.14	18.20
YEAR86	0.11	9 95	0.11	10.28	0.091	8.047	0.094	8.34
YEAR87	0.22	20.35	0.22	20.55	0 19	16.21	0.19	16.51
YEAR88	0.30	28.066	0.30	28.34	0.26	21.34	0.26	21.40
ICTRN			0.088	10.34	0.071	8.045	0.071	5.71
OCTRN			-0.027	-3.015	-0.037	-3.91	-0.091	-6.75
ICTRN2					0.051	4.82	0.063	4.12
ICTRN3					0.032	2.45	0 038	2 024
ICTRN4					0.025	1.44	0.030	1.15
OCTRN2					0.015	1.33	0.00013	0.008
OCTRN3					0.024	1.80	0.046	2.38
OCTRN4					0.018	1.006	0.041	1.61
ICTEN							-0.00030	-0.086
IC2TEN							-0.0048	-1.21
IC3TEN							-0.0028	-0.63
IC4TEN							-0.00067	-0.12
OCTEN							0.022	5.69
OC2TEN							0.0049	1.17
OC3TEN							-0.0079	-1.72
OC4TEN							-0.0070	-1.26
	Adj R^2 = 0.38		Adj R^2 = 0.39		Adj R^2 = 0.39		Adj R^2 = 0.40	

Appendix page 2

MALES

	Model No. 5		Model No. 6		Model No. 7		Model No. 8	
	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat
INTERCEP	1.45	75.29	1 44	75.082	1 47	75.71	1.47	75.66
EDEG	0.59	25 90	0 59	25 89	0.57	25 17	0.57	25 19
EDIP	0.29	13.90	0.29	13.76	0.27	13.011	0.27	12.90
EOTH	0.25	12 46	0.25	12.29	0.24	11.74	0 24	11 82
E12	0.24	14 69	0.24	14.56	0.22	13.44	0 22	13 47
E1011	0.059	3.68	0 058	3.63	0.059	3.74	0.061	3 85
EAPP	0.24	14.008	0.24	13.74	0 24	13.85	0.24	13.78
OTIME	0 019	2 30	0.022	2.60	0 025	2.98	0.023	2.81
FTIME	-0.19	-14.17	-0.19	-13 92	-0 19	-14 19	-0.19	-13.85
TENURE	0.010	2.15	0.010	2.17	0.0073	1.54	0 0048	0 99
TEN2	-0.00073	-1.33	-0.00078	-1 43	-0.00076	-1 39	-0.00048	-0 85
ADJEXP	0.11	26.97	0.10	27.024	0.10	25 59	0 10	24.85
ADJEXP2	-0.0056	-16.99	-0.0055	-16.85	-0.0051	-15.43	-0.0049	-14 90
HEALTH	-0.076	-5.50	-0.075	-5.45	-0.078	-5.76	-0.078	-5.74
MARRY	0 0018	0.18	0.0022	0 23	-0.0021	-0.22	-0.0026	-0 27
ESMBORN	0.028	1.92	0.026	1 79	0 021	1.45	0.021	1 50
OTHBORN	0.018	1.12	0 019	1.17	0.024	1.48	0.025	1.58
UNION	0.14	17.81	0.14	17.67	0.13	16 49	0.13	16.41
YEAR86	0.11	10.19	0 11	10.39	0.094	8.36	0.10	8.62
YEAR87	0.22	20.66	0.22	20.89	0.19	16.74	0.20	16.98
YEAR88	0 32	29.11	0.32	29 40	0.28	22.50	0.28	22.47
TECH	0.0039	1.29	-0.0030	-0.95	-0.0016	-0 49	-0.0011	-0.35
TCMISS	0.071	6.060	0.073	6.26	0.063	5.37	0.063	5.43
TECTEN	0 0063	2.94	0.0045	2.094	0.0044	2.066	0.0044	2.063
TECTEN2	-0.00037	-1 49	-0.00022	-0.86	-0.00022	-0.86	-0.00021	-0.83
ICTECH			0.027	6.93	0.023	5.70	0.024	5.92
OCTECH			0.0098	2.36	0.011	2.61	0 0084	1.99
ICTRN					0.061	6.95	0.068	5.55
ICTRN2					0.049	4.72	0.062	4 076
ICTRN3					0.029	2.25	0 035	1.86
ICTRN4					0.031	1.74	0.034	1 30
OCTRN					-0.042	-4.49	-0.10	-7 22
OCTRN2					0.016	1 45	0.0029	0.18
OCTRN3					0.021	1.61	0.050	2.61
OCTRN4					0.016	0.89	0.036	1.44
ICTEN							-0.0034	-0.95
IC2TEN							-0.0048	-1.22
IC3TEN							-0.0022	-0.51
IC4TEN							-0.00015	-0.027
OCTEN							0.022	5.78
OC2TEN							0.0043	1 039
OC3TEN							-0.010	-2.18
OC4TEN							-0.0064	-1.17
	Adj R^2 = 0.39		Adj R^2 = 0 39		Adj R^2 = 0.40		Adj R^2 = 0.41	

Appendix page 3

FEMALES

	Model No. 1		Model No. 2		Model No. 3		Model No. 4	
	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat
INTERCEP	1.45	78.74	1.45	78.67	1.46	77.59	1.47	77.086
EDEG	0 53	22.058	0.52	21.54	0.51	21.18	0 51	21 18
EDIP	0.31	17.64	0.31	17.34	0.30	17.10	0.30	17.069
EOTH	0.19	8 85	0 19	8 59	0.18	8.47	0.18	8.47
E12	0.23	13.89	0.22	13.33	0.22	13.00	0.22	12.94
E1011	0.072	4.23	0.072	4 22	0.070	4.12	0.070	4.089
EAPP	0 18	5.71	0.18	5.65	0.18	5.53	0.18	5.54
OTIME	0 018	1 49	0.019	1.63	0.020	1.65	0 020	1 64
FTIME	-0.16	-15.84	-0.16	-16.34	-0.17	-16.38	-0 16	-16 28
TENURE	0.011	1.94	0.010	1.85	0.0090	1.67	0.0052	0.92
TEN2	-0.00037	-0.57	-0 00033	-0.51	-0.00029	-0.45	-0.00011	-0.17
ADJEXP	0.086	20.84	0 086	20 84	0.085	20.42	0.085	20 29
ADJEXP2	-0.0051	-13.33	-0.0051	-13.27	-0.0050	-12.99	-0.0050	-12.92
HEALTH	-0.055	-3.42	-0 054	-3.37	-0.055	-3.42	-0.054	-3 38
MARRY	0.054	5.66	0.054	5.61	0.054	5 65	0 053	5 54
ESMBORN	0 036	2.33	0 036	2.32	0.036	2.34	0.035	2.31
OTHBORN	0 056	3.051	0 058	3.17	0.060	3.25	0.058	3 18
UNION	0 070	8.41	0.062	7.29	0.059	6.96	0 059	6.98
YEAR86	0 13	11.024	0.13	11.18	0 12	10.11	0 12	10 18
YEAR87	0.23	20.076	0.23	20.21	0.22	18.015	0.22	18.11
YEAR88	0 32	27 032	0.32	27.22	0.30	23 27	0.31	23 35
ICTRN			0 064	7 034	0.057	6.14	0.048	3.75
OCTRN			-0.013	-1.13	-0.016	-1.36	-0.033	-2.0090
ICTRN2					0 024	2.14	0.017	1.092
ICTRN3					0.018	1 34	0.025	1.27
ICTRN4					0.011	0 56	0.030	1.08
OCTRN2					0.0089	0.63	0.0078	0 37
OCTRN3					-0.0086	-0 48	-0.033	-1 25
OCTRN4					-0.011	-0 41	-0.0050	-0.13
ICTEN							0.0047	1.083
IC2TEN							0.0027	0.56
IC3TEN							-0.0030	-0.58
IC4TEN							-0.0069	-1.068
OCTEN							0.0080	1.42
OC2TEN							0.00029	0.044
OC3TEN							0.0086	1.20
OC4TEN							-0 0024	-0.26
	Adj R^2 = 0.32		Adj R^2 = 0.32		Adj R^2 = 0.32		Adj R^2 = 0 32	

Appendix page 4

FEMALES

	Model No. 5		Model No. 6		Model No. 7		Model No. 8	
	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat	Parameter Estimate	t-stat
INTERCEP	1 46	77 74	1.46	77.49	1 47	76 49	1 47	75 93
EDEG	0.49	20 41	0.49	20.48	0.47	19.61	0.47	19 61
EDIP	0.28	16.00	0.28	16 031	0 27	15 49	0 27	15 46
EOTH	0 18	8 34	0 18	8 40	0.17	8 026	0.17	8.021
E12	0.22	13.22	0.22	13 24	0 21	12.34	0.21	12.29
E1011	0.073	4.32	0.075	4.44	0.073	4.33	0 072	4.30
EAPP	0.20	6.21	0 20	6.39	0 20	6 20	0.20	6 19
OTIME	0.027	2 24	0 026	2.21	0.028	2 36	0 028	2 35
FTIME	-0 18	-17.42	-0.18	-17.010	-0 18	-17 55	-0.18	-17.48
TENURE	0.013	2.29	0.013	2 34	0 011	2 066	0 0079	1 37
TEN2	-0.00048	-0.72	-0.00050	-0.76	-0.00046	-0.70	-0 00026	-0.38
ADJEXP	0 083	20 13	0.083	20 14	0.081	19.68	0 081	19 54
ADJEXP2	-0 0049	-12 92	-0.0049	-12.94	-0.0048	-12.56	-0.0048	-12 50
HEALTH	-0 058	-3 65	-0 057	-3 59	-0.057	-3.60	-0.056	-3 56
MARRY	0.052	5.46	0 052	5 45	0 052	5 47	0 051	5.37
ESMBORN	0.037	2 42	0 037	2 41	0 037	2 41	0.036	2 38
OTHBORN	0 058	3.18	0 059	3 26	0.064	3.51	0 062	3 43
UNION	0.062	7 43	0 061	7.37	0.051	6.027	0 051	6 045
YEAR86	0.13	11 071	0 13	11 062	0 12	10.12	0 12	10 19
YEAR87	0.23	19 94	0 23	19 96	0 22	17.81	0 22	17 89
YEAR88	0 35	29 13	0 35	29 061	0 33	24 95	0 33	25 00
TECH	0.0084	2.19	0 0057	1 42	0.0038	0 94	0 0041	1 017
TCMISS	0.11	10.57	0.11	10 53	0.11	10 027	0.11	10 060
TECTEN	0.0014	0 43	0.0010	0 32	0.0015	0 48	0.0016	0 48
TECTEN2	0.00017	0 39	0 00021	0 47	0.00010	0.23	0 00010	0 24
ICTECH			0 0016	0 32	0.010	1 88	0.0093	1 77
OCTECH			0.018	2.81	0 019	2.96	0 018	2 80
ICTRN					0 057	6 035	0 049	3 81
ICTRN2					0.023	2.043	0 016	1 00
ICTRN3					0 021	1 55	0.031	1 59
ICTRN4					0.017	0.88	0 035	1.25
OCTRN					-0.010	-0.85	-0 030	-1.76
OCTRN2					0.013	0 89	0.013	0.64
OCTRN3					-0.0044	-0 25	-0.028	-1.055
OCTRN4					-0 0042	-0 17	0.00046	0.012
ICTEN							0.0037	0.86
IC2TEN							0.0028	0 59
IC3TEN							-0.0042	-0.81
IC4TEN							-0.0064	-0 99
OCTEN							0.0088	1 58
OC2TEN							-0.00055	-0.086
OC3TEN							0.0082	1.15
OC4TEN							-0.0021	-0.23
	Adj R^2 = 0.33		Adj R^2 = 0.33		Adj R^2 = 0.34		Adj R^2 = 0.34	

Are We Over-Educating Young Australians? Human Capital Investment and Self-Selection

Francis Vella* and R.G. Gregory

1. Introduction

The Australian educational system is currently undergoing major changes in its structure and objectives. This is reflected in the reorganisation of the tertiary education system and by the Federal Government's commitment to increase the retention rates for high school students. The primary aims of these policies appear to be an expansion in the tertiary education sector and a general increase in the level of education being obtained by those progressing through the Australian education system. In both respects the adopted policies have been extremely successful

Underlying these objectives is the assumption that increasing the level of an individual's education is desirable. Some evidence for this proposition can be found in the plethora of empirical studies (see, for example, Miller 1984, Miller and Volker 1987, Chapman and Chia 1989, Chia 1990, Vella 1990a, 1990b) which show that education has a positive impact upon the level of earnings This result is typically encapsulated in the coefficient on various measures of education which enter earnings regressions as explanatory variables As the implied rate of return to education is positive it is often assumed that increasing the stock of human capital will improve the labour market performance, as measured by the level of wages, of any individual who obtains additional education However, in addition to ignoring the economic costs of obtaining this additional human capital, such reasoning ignores one of the fundamental tenets of economics, namely comparative advantage, in that individuals may be choosing the optimal number of education years. Some individuals with particular characteristics may benefit more from leaving school at a relatively early age to obtain valuable work experience and skills rather than continuing their education to a later age. Accordingly, when estimating the rates of return to human capital it is crucial to account for the bias resulting from this selection process by which individuals invest in what they perceive is their optimal level of education This suggests the typical manner in which the returns to education are evaluated is potentially flawed as it ignores the endogeneity of

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the educational choice. It is generally agreed that failure to account for this selection bias leads to *underestimates* of the returns to education.

However this conventional approach also ignores the process by which individuals with certain characteristics locate, or are allocated to, the sector of the labor market which most highly values those features. If it is true that the different markets value individual's characteristics differently then the estimation of a single coefficient, or 'price' for each characteristic, irrespective of education level, imposes an invalid econometric restriction producing a bias in the estimate We shall refer to this as *interaction bias* as it results from the interaction between individual specific characteristics and education It is unclear how this mechanism will effect the rates of return estimates

Our primary objective is to obtain estimates of the rate of return to education which are purged of selection and interaction bias We do so by adopting the following strategy We estimate separate selectivity adjusted earnings equations for the various educational groups and, with the parameter estimates, predict the wage an individual would receive with the various levels of education. By then following individuals, and their predicted wages, as they are given increasing levels of education we can evaluate the selectivity and interaction bias adjusted implied rates of return to education

To anticipate the major results we find that correcting for the presence of selection bias *increases* the point estimates of the rates of return to education in the earnings equations However, after adjusting for the interaction mechanisms in the labour market we conclude these are *overestimates* of the rate of returns. There is, however, relatively weak evidence suggesting government policy which increases the individuals level of education may have a positive impact upon average wage levels. This is based on the increase in average wages which is predicted to result from an increase in education. These are gross wage levels however and do not account for the costs incurred in obtaining the additional capital It is likely that when the costs of obtaining the education are incorporated the net return to many of the investments will be negative

The outline of the paper is the following. Section 2 reviews the changes in the Australian education system and the relevant issues and evidence on the estimates of rates of return to education in Australia In Section 3 the model and estimation procedure are discussed. Section 4 presents the empirical results from data on males from the 1985 and 1988 waves of the Australian Longitudinal Survey. Section 5 offers some concluding remarks

2. Australian Evidence of Rates of Return to Education

National retention rates to year 12 in secondary high school years in the 1980s displayed a similar increase in aggregate school retention to the 1960's, these two periods of growth being separated by a decade of relative stability. This pattern is particularly pertinent to males as females have shown a general increase over the last three decades. The changes in the retention rates might be primarily attributed to two factors. The first is the reduction in the level of unemployment benefits. The second is the increased financial support offered to those attending educational institutions. The primary financial program, Austudy, has been extended to secondary school students and was subject to substantial increases over 1985-1988. It is expected that by 1991 approximately 36 percent of secondary students, aged 16 years and over, will receive weekly support of between $62 and $102

These increased high school retention rates have been accompanied by a significant increase in the tertiary student numbers over recent years By 1991 approximately 42 percent of tertiary students will be receiving weekly support of between $69 and $157. Several studies have recently estimated the average private rate of return to education in Australia. The method of analysis differs across study but it is evident from Table 1 that they find substantial average rates of return These real rates of return represent a sizable return on investment and are well above the real rate of interest There is some evidence that the rate of return is falling (Chia (1989)) but it is difficult to detect definite trends.

Casual observation is sufficient to indicate that not everyone of the same education level and age earns the same amount and while the mean of the rate of return has received a great deal of focus its dispersion has not. If dispersion is largely a random factor then a great deal may not be lost by focusing on the average. However, if it contains a systematic component it is potentially important For example, consider those with university degrees. Suppose lifetime earnings are influenced not only by having a degree but also, in a positive manner, by the university entry scores Under these circumstances the average return to a university degree is not a good measure of whether the number of places should be increased. New students will be drawn from those with entry scores below the previous entry level and might be expected to earn less than the average graduate.

There is a further complication. To compute the average rate of return the average earnings of degree holders is compared to the average earnings of high school graduates who did not proceed to a university degree. Suppose that high school scores also affect earnings of high school graduates such that those with above average scores obtain above average earnings for this educational group If the additional university places are filled by those with above average high school scores then the individuals may be giving up above average earnings for a high school student for below average earnings of a university degree holder.

Table 1: Estimated Rates of Return for a University Degree (Males)

Data Source	1968-69 %	1973-74 %	1978-79 %	1981-82 %	1985-86 %
Income and Housing Survey Calculated from Gross Income, full Year,Full Time Workers (Miller, 1984, Chia, 1989)	24	22	19	18	16
Income and Housing Survey Full Year, Full Time Workers					8 6[a]
Net Income Adjusted for Hours Worked					10 3[b]

Notes [a] Includes average earnings while studying for a student not receiving government income support

[b] Includes average earnings and government support for an average Austudy student

Table 2: Earnings Overlap for Degree Holders and Unqualified Males Who Work Full Time.

	Age 24 (1985)	Age 25 (1985)	Age 27 (1988)	Age 28 (1988)
Percent of Degree Holders who earn less than the top 20% of Unqualified Income Earners	53	36	40	18
Percent of Unqualified Earners who earn more than the bottom 20% of Degree Holders	86	36	63	15

An indication of the considerable amount of income dispersion and overlap in the earnings distribution is provided in Table 2 In 1985, for example, 36 per cent of 25 year old males with a degree (those who received the most education) earned less than the top 20 per cent of unqualified income earners (those who received the least education) There is some evidence that the overlap declines as workers age but nevertheless it is still substantial at 28 years of age.[1] If the overlap were random it would be of no particular interest but it seems systematic in that in each group and

1 The evidence provided below indicates that this decrease in overlap is due to differences in wage growth resulting from factors other than education levels

education level those who earn above average earning in one year tend to earn above average three years later.[2]

These issues describe some of the relevant considerations for expanding the education system and the difficulties for computing the marginal rate of return. In the following section we adopt some relatively stringent assumptions to analyze the potential importance of selection and interaction bias in evaluating the rates of return.

3. Model and Estimation Strategy

Consider an economy comprising individuals who maximize the expected net present value of their future income stream by choosing the appropriate level of education, subject to financial and ability constraints.[3] While this is restrictive, as it ignores the utility generated by the direct consumption of human capital investment and the non-economic gains which accrue to the general community, it is a reasonable assumption[4] from a policy viewpoint. Furthermore, assume the income stream resulting from a particular investment for each individual can be characterized by the wage at time t, denoted, w, and the rate of wage growth over the individual's career, denoted by the vector g , reflecting wage growth between a series of adjacent time periods[5] where $'\tau$ represents the duration over which the wage growth is computed Write the potential expected net returns from investment in education level j as

$$V_i^j = V_i\,(w_{it}^j, g_i^j, C_i^j) \qquad i=1 \ldots N, j=0 \ldots J-1 \tag{1}$$

where C_i^j represents the cost of investment j to individual i Assume individuals choose j to maximize (1)[6] and this is reflected by the set of exhaustive and mutually exclusive indicator functions $D_i^0 \ldots D_i^{J-1}$ such that

$$D_i^j = 1 \text{ if } V_i^j > V_i^k \quad \text{for all } j \neq k,\ j,k = 0 \ldots J-1 \tag{2}$$

$$= 0 \text{ otherwise}$$

where $D_i^j = 1$ indicates that the individual terminated investment at level j.

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2 The R^2 from regressing weekly income of 25 year old unqualified males in 1985 against their income in 1988 is 37 Similarly, for 23, 24 and 25 year old degree holders the R^2 from regressing weekly income of one year against the other is 38.

3 The model that follows is a simplified version of that presented in Vella and Gregory (1990). A more detailed exposition of the technical issues is presented there.

4 This approach also attaches a zero weight to the utility generated by increases in non-market productivity from human capital investment (see for example Michael (1973))

5 For notational simplicity we refer to the $g_{it}^{t+\tau}$ functions as g_i.

6 The cost of investment should account for the variation in abilities which influences an individual's ability to acquire a given level of human capital.

Ideally t would represent a period where additional training costs and specific training have ended while the final period of wage growth considered would be near the end of the individual's work career. In obtaining an estimate of g it would be preferable to follow an individual throughout their whole working career and derive the actual time path of wages. This represents a substantial data requirement although significant insights can be obtained by examining different individuals at two reasonably distant, but uniform across individuals, points of time in their careers to examine if there had been substantial wage growth

Express the reduced form representations of w_i, g_i and the optimal educational attainment equation in the following manner

$$w_i = \beta''X_i + \delta(H_i) + e_i \qquad i=1..N \tag{3}$$

$$g_i = \alpha'X_i + \gamma(H_i) + u_i \qquad i=1..N \tag{4}$$

$$H_i^* = \lambda'Z_i + v_i \qquad i=1...N,\ j,k=0...J-1\ j \neq k \tag{5}$$

where w_i and g_i are the wage rate and rates of wage growth of individual i, H_i^* is the desired level of investment in human capital, derived from (2), and H_i is the actual level of human capital investment; X_i and Z_i are vectors of exogenous characteristics which determine the level of wages, the rate of wage growth, and the level of human capital investment; e_i,u_i and v_i are jointly normal distributed error terms with mean zero and covariance σ_{ev}, σ_{eu} and σ_{vu}. β, α, and λ represent vectors of parameters while δ and γ are functions mapping education into wages and wage growth. Typically these functions are assumed to be linear although this is relaxed through the use of dummy variables capturing educational attainment.[7] The observed value of H_i is obtained from the latent variable through the censoring function h shown in (6)

$$H_i = h(H_i^*) \tag{6}$$

noting the desired level of education is a continuous variable while H_i is a discrete ordered outcome More precisely

$$H_i = 0 \text{ if } H_i^* < \mu_0,\ H_i = 1 \text{ if } \mu_0 <= H_i^* < \mu_1 ...\ H_i = J-1 \text{ if } \mu_{J-2} < H_i^*$$

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7 Rewrite equations (2) and (3) in the following manner

$$w_i = \beta'X_i + \sum_{j=0}^{J-1} \delta_j D_i^j + e_i \qquad i = 1..N \tag{3'}$$

$$g_i = \alpha'X_i + \sum_{j=0}^{J-1} \gamma_i D_i^j + u_i \qquad i = 1..N \tag{4'}$$

where γ and γ are now j vectors

This is represented by the series of dummy variables shown by (2).[8]

At this stage the parameters in (3) and (4) do not possess subscripts. This is consistent with the conventional approach which constrains the parameters to be equal across educational groups and interprets the coefficient δ as the rate of return to human capital investment. It is the failure to allow β to vary across the j groups which induces the interaction bias. The primary difficulty in consistently estimating the parameters in (3) and (4) is the endogeneity of the education variable H due to the possibility that individuals systematically sort into the education level which best enhances their performance in the labour market This implies educational choice is not exogenous to the wage rate.[9]

In evaluating the impact of education upon wages there are at least two approaches which we can employ The first, noted above as the conventional approach, requires the estimation of a wage or log wage equation with the education level appearing as a regressor [10] The rate of return to education is then computed as some specified function of the parameter on the education variable. An alternative approach, similar in spirit to that featured in Willis and Rosen (1979), is to compute the wage an individual with a given level of education would receive with various other levels of investment and compute the rate of return as the individual progresses through the educational system. This requires estimates of the earnings equations parameters over the sub-samples of the different education groups to predict the relevant wages However prior to estimating over the sub-samples it is necessary to correct for the selection bias resulting from individuals choosing their education level on the basis of (2)

To do this, rewrite the reduced form system in the following manner

$$w_{ij} = \beta_j' X_i + e_{ji} \tag{3a}$$

$$H_i^* = \lambda' Z_i + \varepsilon_i \tag{5a}$$

$$H_i = h(H_i^*) \tag{6}$$

noting that ε_i is the reduced form error term which inherits the normality property. Following Vella (1990a) rewrite (3a) conditioning on the observed value of H_i and using our joint normality of the error terms assumption

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8 That is, $D_i^j = 1$ if $H_i = j$ and $D_i^j = 0$ otherwise.

9 This restriction that education is exogenous to the level of wages is capture in the null hypothesis that $\sigma_{ev} = 0$ This reflects that the error in the wage equation is not orthogonal to the level of education. This will produce inconsistent estimates of the parameters in the wage equations unless some adjustment is employed

10 This approach will be referred to as conventional although it is only fairly recently that rates of return have been adjusted for sample selection bias.

This second assumption allows us to compute an estimate of the conditional error term[11]

$$E(w_{ji}|H_i) = \beta_j'X_i + \{\sigma_{ev}/\sigma_{\varepsilon\varepsilon}\}_j E(\varepsilon_i|H_i) \qquad (3b)$$

where it is now possible to estimate the regression representation of (3b) by least squares once an estimate of $E(\varepsilon_i:H_i)$ is available. As the censoring function produces an ordered structure for H_i estimate the parameters from (5a) and (6) by ordered probit and compute the expected value of the conditional error term By inserting this value into the regression form of (3b) it is possible to consistently estimate the parameters by least squares

Using these estimates it is possible to compute the wage an individual would receive with different levels of human capital given that he invested in a specified level. This is similar to the strategy employed by Willis and Rosen (1979) although we differ by employing the methodology of Vella (1988).[12] Write the wage an individual with the j^{th} level of education would receive with $j^{th}+_l$ in the following manner

$$E(w_{j+\ l}|H_i) = \hat{\beta}_j'X_i + \{\sigma_{e\varepsilon}\ \hat{/}\sigma_{\varepsilon\varepsilon}\}_{j+l} E(\varepsilon_i|H_i)$$

where the hats denote the least squares estimates and t can take positive and negative values Now express the rate of return from increasing human capital investment from j to j+1 as $\{E(w_{j+1})-E(w_j)\}/E(w_j)$. This reflects the rates of return after accounting for the endogeneity of the educational choice and the relaxation of the constraints that all markets value individual and job characteristics identically

This measure of the rate of return will only be a useful if the relative magnitude of the wages do not vary wildly over the working career of the individual. Thus it is necessary to examine how the rate of wage growth varies by educational attainment We do so by estimating the rate of growth function and including dummy variables for education level. This potentially suffers from the same problems as those discussed in relation to the wage equations Accordingly an alternative approach is to adapt that employed in estimating the wage equations If growth rates are relatively stable across education groups the relative wage at one point will be a reasonable proxy for the relative rate of return to education

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11 For a fuller discussion of this procedure see Vella (1990a) or Vella and Gregory (1990)

12 Vella (1988) argues that in computing the conditional expectations in these sample selection models that it is necessary to incorporate the information available in the residuals.

4. Empirical Results

In implementing the model we employ data for males from the 1985 and 1988 waves of the Australian Longitudinal Survey.[13] These data provide a useful source of study as they include many of the individual characteristics which are potentially important determinants of human capital investment and earnings. Descriptions and summary statistics, for the 1985 wave, of the variables employed are reported in Table 3. The longitudinal nature of the data also enables the computation of wage growth equations although the duration of the interval is short. However, as the majority of the increases in earnings occur early in the individual's career even a three year period provides indication of the relative growth across education levels

The first step of the empirical work is to estimate the reduced form human capital investment function We estimate this equation by ordered probit [14] This is done for both the 1985 and 1988 cross sections to enable the computation of the relevant correction factors [15] The specification adopted includes variables that impact educational choice through their influence on the taste for education or their effect on financial considerations. A measure of discriminatory attitudes, discussed in Vella (1990b), is also included to test the hypothesis stated there that part of the impact negative attitudes towards working women have on educational attainment is due to some underlying correlation between education attainment and some general attitude proxied by these attitudes.

The results for equation (5a) are reported in Table 4 and support the findings of Miller and Volker (1987) and Vella (1990b). We focus only upon the 1985 results as they are representative of those for the 1988 wave and the majority of the analysis which follows is based on the 1985 data.

Many of the variables which characterize the individual's environment during their youth have a statistically significant impact on the level of education they acquire. The variables capturing the departure from the normal family composition reflect the absence of either or both parents from the household when the individual was aged 14 years The statistically negative coefficients on these variables indicates that the absence of parents from the household reduces human capital investment

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13 Initially we performed the analysis separately for females and males but the huge amount of empirical results which required presentation and discussion made this infeasible However, it is worth remarking that there appeared to be no difference between the male and female results

14 The censoring function generates the following variable. 0 for 8th grade and below, 1=9th grade, 2=10th grade; 3=11th grade, 4=12th grade; 5=diploma, and 6=Bachelor degree These variables represent the highest level of human capital obtained.

15 In estimating the ordered probit equations every observation that provided sufficient information was employed This produces sample sizes of 2724 for 1985 and 1175 for 1988.

Table 3: Variable Descriptions and Summary Statistics

Variable	Description	Mean	Std. Dev.
AGE	Age	20 93	2.60
MAR	Individual Married	13	.39
BIAUST	Individual born in Australia	8	32
MOTH	Mother only present at home at age 14 years	.03	15
FOTH	Father only present at home at age 14 years	03	15
NOTH	Neither parent present at home at age 14 years	02	13
MOTHW	Mother worked when individual was aged 14 years	43	50
MUNIV	Mother has university degree	.04	20
FUNIV	Father has university degree	08	27
SIBS	Number of siblings	2.96	2 00
SRC	Attended Roman Catholic School	15	36
SGOVT	Attended Government School	81	.40
SEX	Value of Discriminatory Index	25 03	4 71
9th Grade	Highest level of education is 9th grade	07	
10th Grade	Highest level of education is 10th grade	.37	
11th grade	Highest level of education is 11th grade	20	
12th Grade	Highest level of education is 12th grade	25	
Diploma	Highest level of education is Diploma	05	
Bachelors	Highest level of education is bachelor degree or higher	.04	
Workers Only			
HEALTH	Health impaired	09	.28
EXPER	Age minus years of schooling minus 6	3 03	2 55
$EXPER^2$	EXPER squared	15 77	20 39
UNION	Is union member	44	50
GOVT	Has government employment	25	43
HOURS	Average weekly hours of work	40 02	8 77

Table 4: Human Capital Investment Equations

Variable	1985	1988
Constant	1 507*	2.151*
	(148)	(.226)
BIAUST	- 069	- 115
	(063)	(.080)
MOTH	- 322*	- 368*
		(093)
FOTH	-.311*	-.343
	(153)	(.186)
NOTH	-.559*	- 514
	(121)	(180)
MOTHW	- 044	- 117*
	(043)	(.055)
MUNIV	171	244*
	(106)	(117)
FUNIV	557*	.536*
	(082)	(094)
SIBS	- 084*	- 073*
	(104)	(139)
SRC	- 684*	- 756*
	(087)	(121)
SGOVT	- 336*	-.281*
	(.101)	(.137)
SEX	069*	064*
	(005)	(.006)
μ_1	754*	858*
	(051)	(.097)
μ_2	2 168*	1.850*
	(.059)	(.104)
μ_3	2 779*	3 498*
	(062)	(1.09)
μ_4	3.864*	4 085*
	(.071)	(.114)
μ_5	4 150*	4 399
	(.078)	(118)
Log-likelihood	-3921.4	-2262.0
Observations	2724	1175

Notes The μ's represent the separation points corresponding to the thresholds in the ordered probit likelihood function.

The education level of the parents is also likely to affect human capital investment through its effect on the family's income level and through the presence of role models. This is supported by the positive coefficient on the variable denoting whether the father has a university degree

A strong negative effect upon human capital investment, also found for females in Miller and Volker (1987) and Vella (1990b), results from the presence of siblings in the household. It is unclear why larger families should have smaller investments in human capital although it may simply reflect income considerations The results also indicate that individuals attending Roman Catholic Schools and State Government Schools obtained less human capital than those attending Non-Catholic Private Institutions

A further interesting finding is the negative impact that discriminatory views towards the equality of females in the work place has upon educational attainment [16] This supports the arguments in Vella (1990b) [17]

Using the parameter estimates from Table 4 we compute the correction factors discussed in section 4, denoted SCORE, and estimate a log wage regression over the 1985 cross section. This wage is used as the measure of w discussed in Section 3 While this is not ideal it is satisfactory as, given the age distribution of the sample, it reflects the wage an individual receives in the early stage of their working career

The specification adopted is based upon typical earnings functions and is augmented with variables characterizing the form of employment and individual specific characteristics which potentially influence the wage level. The number of hours worked is also employed to capture the possibility that those working longer hours receive more of their wages in non-wage income for taxation considerations (see Vella 1990c). The regression results for the 1985 sample of 2121 working males are reported in column (2) of Table 5 [18] Before making the selectivity correction we estimate an unadjusted earnings equation and this is reported in column (1) of Table 5. We only present the unadjusted equation for 1985 in order to provide comparison with the selectivity adjusted results. As we do not focus upon the implied rates of return from the 1988 estimates we do not report the unadjusted results for that cross section.

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16 Vella (1990b) constructs an index of discriminatory attitudes with values ranging from 7 to 35 from questions pertaining to an individual's attitudes toward working women (Question 0 on the 1985 ALS Questionnaire) The index is constructed such that a low score represents a discriminatory view while a high score represents an egalitarian view.

17 While the issue of endogeneity of attitudes to educational attainment is not explored here it is pursued extensively, with regards to females, in Vella (1990b) That paper concludes that attitudes are weakly exogenous to educational attainment

18 In the empirical work that follows we include all individuals who reported working positive number of hours for payment Unlike other studies we include part time workers as it is equally important to examine how these individuals would perform with additional human capital. We do however exclude those with more than one job and the self employed

Table 5: Wage and Wage Growth Equations

Variable	1985		1988	Growth
	Unadjusted	Adjusted		
Constant	1 575*	1 397*	1.882*	2 388
	(093)	(108)	(.185)	(1.262)
MAR	070*	071*	.031	- 158
	(.022)	(022)	(021)	(.136)
BIAUST	.216	224	.275	054
	(226)	(.227)	(.271)	(095)
BOTH	021	001	- 002	-.029
	(.024)	(002)	(027)	(.098)
MUNIV	-.051	- 067	- 074	.094
	(044)	(045)	(053)	(169)
FUNIV	- 012	- 047	.013	.047
	(032)	(.032)	(.036)	(.094)
SIBS	006	.012*	009	-.001
	(.004)	(004)	(005)	(.014)
SGOVT	.022	062	- 033	- 199
	(031)	(.033)	(048)	(.147)
SRC	034	052	- 069	- 209
	(036)	(.036)	(046)	(154)
HEALTH	-.040	- 041	- 041	- 188*
	(.022)	(022)	(032)	(080)
EXPER	105*	105*	032*	- 118
	(007)	(007)	(011)	(.080
$EXPER^2$	-.007*	- 007*	-.001	.005
	(001)	(001)	(001)	(.003)
UNION	177*	.177*	131*	077
	(.015)	(015)	(.017)	(.069)
GOVT	062*	.059*	-	-
	(017)	(.017)		
HOURS85	- 008*	-.007*	-	019*
	(001)	(.001)		
HOURS88	-	-	- 010*	-.037
			(002)	(.028)

continued...

Table 5 continued

Variable	1985		1988	Growth
	Unadjusted	Adjusted		
9th Grade	047	093	.242*	- 183
	(.077)	(.077)	(093)	(371)
10th Grade	.174*	287*	.411*	- 045
		(.081)	(.129)	(438)
11th Grade	.208*	397*	644*	- 275
	(075)	(094)	(163)	(475)
12th Grade	292*	506*	645*	-.560
	(075)	(099)	(175)	(806)
Diploma	452*	628*	.888*	-.446
	(.085)	(.099)	(175)	(866)
Bachelors	544*	783*	1 006*	-.590
	(080)	(105)	(195)	(869)
SCORE		-.065*	-.071*	.134
		(019)	(035)	(188)
$\bar{R}^2$	32	.32	24	02
Observations	2121	2121	1145	1145

This table reveals some interesting points First, the point estimates for the rates of return to education are markedly smaller in the unadjusted equation than those for the adjusted equation. This is consistent with previous selectivity adjusted studies on the effects of education which have concluded that the selection bias produces underestimates of the rates of return (see Garen 1984, and Lee and Trost 1984).

Focus on the adjusted results reported in column 2 of this table First consider the coefficients on the education dummy variables Recall these education variables denote the highest level of education attained Human capital variables which do not come under the broad headings are excluded in order to analyze the impact of additional high school and/or tertiary education as this is the focus of the changes in the education system [19] Recalling that the control group are those with a maximum of 8th grade education the coefficients on the education variables reveal quite substantial returns to human capital investment. The point estimates indicate increases of the order of 10,18, 11 and 11 percent for additional years of high school above 8th grade and increases of 12 and 16 percent for diplomas and degrees The use of dummies in this context sheds doubt on the use of years of

19 This is not likely to bias the results as these additional human capital variables are unlikely to be highly correlated with any of the included regressors Furthermore, given the focus of this paper this is the correct manner in which to proceed as we are primarily interested in the impact of high school and tertiary education upon earnings.

education as the appropriate variable in earnings equation. It appears that while log wages are linear in schooling years initially there are much smaller returns for tertiary qualifications. This indicates the traditional specification imposes an invalid implicit restriction that all years of education, irrespective of when they are received, have the same impact on log wages.

Prior to considering the coefficient on the correction factor SCORE let us first focus on the variable's interpretation. The variable is derived as the 'residual' from the equation explaining the level of human capital investment.[20] Thus, in a sense, it can be thought of as the unmeasured influences which increase the level of human capital obtained Its inclusion in the wage equation reflects the possibility that the same unmeasured influences that increase human capital investment may also increase the level of wages received This accounts for the selection bias that results from the unmeasured influences increasing investment and systematically affecting the wage level The statistically significant coefficient on SCORE supports our prior views regarding the presence of selection bias. The negative coefficient, surprisingly, suggests the operation of negative sorting However, it should be recalled that as SCORE represents the generalized residual from the ordered probit equation it has mean zero over the whole sample. Accordingly, a negative coefficient implies sorting has a positive impact on wages for observations with negative values of SCORE. Furthermore the negative coefficient may be an artifact of the interaction bias due to the inappropriate restriction that the impact of sorting is constant across educational groups This also applies to several of the other explanatory variables For example while the parameter estimates indicate that union members receive a premium of nearly 18 percent it is unlikely bachelor degrees holders in union employment are receiving 18 per cent more than their non-union counterparts To explore this possibility, along with several of the other issues discussed in section 3, we estimate separate equations for the 1985 wave across the various education groups while accounting for the endogeneity of educational choice These results are presented in Table 6.

The major feature of Table 6 is the significant differences in the coefficients across education groups indicating the presence of interaction bias. For example, consider the dummy variable denoting whether the individual is married. This is often interpreted as increasing earnings through its use by employers as a screening device for responsibility and stability Table 6 suggests this effect only operates at the lower educational levels This is not surprising since at the higher education levels the requirement for inexpensive signals is redundant. Another effect left uncovered by the conventional approach is the positive Australian born effect for the group completing school at the end of 12th grade. The siblings

20 The SCORE variable is a residual in the Cox and Snell (1968) sense in that it is the non-linear counterpart to the least squares residual For a fuller discussion see Cox and Snell (1968) or for the use of these generalised residuals in discrete choice models see Gourieroux et al (1987) or Vella (1990a)

Table 6: Wage Regressions by Education Group

	Highest Grade Attained					
	9th	**10th**	**11th**	**12th**	**Dip.**	**Bac.**
Constant	2.24*	1.65*	1 63*	1 87*	2.56*	45
	(36)	(11)	(.15)	(09)	(32)	(1.57)
MAR	.19*	.07*	11*	06	08	03
	(07)	(03)	(05)	(05)	(11)	(09)
BIAUST	-.03	- 03	02	.10*	04	05
	(06)	(04)	(05)	(.04)	(10)	(11)
BOTH	02	03	03	- 07	- 03	04
	(.07)	(04)	(06)	(04)	(09)	(14)
MUNIV	- 07	03	- 11	- 13*	.03	- 17
	(06)	(12)	(.13)	(05)	(11)	(17)
FUNIV	- 02	-.09	- 01	02	- 41	- 16*
	(13)	(.09)	(10)	(05)	(16)	(.08)
SIBS	01	01	03*	00	-.01	05*
	(01)	(01)	(01)	(01)	(02)	(02)
SGOVT	- 46	- 02	.14	11	15	.22*
	(.30)	(07)	(.09)	(06)	(13)	(09)
SRC	- 43	- 01	02	14*	10	05
	(.32)	(07)	(10)	(05)	(11)	(12)
HEALTH	- 05	-.00	- 05	- 05	10	02
	(.08)	(04)	(.04)	(04)	(16)	(14)
EXPER	25*	14*	10*	12*	11*	03
	(03)	(02)	(02)	(.02)	(05)	(03)
EXPER	- 02*	- 01*	- 01*	- 01*	- 02*	00
	(001)	(001)	(002)	(.003)	(01)	(01)
GOVT	00	- 01	.14*	.08*	08	13*
	(01)	(03)	(04)	(.03)	(08)	(06)
UNION	07	22*	17*	.12*	13	.01
	(05)	(02)	(.03)	(03)	(08)	(07)
HOURS	-.019*	-.006*	- 006*	- 007*	-.018*	- 015*
	(003)	(002)	(002)	(002)	(.006)	(003)
SCORE	- 05	-.05	- 08*	-.07	- 03	1.86*
	(08)	(.05)	(03)	(.05)	(.12)	(97)
R	.51	30	25	.31	.05	23
Observations	113	819	462	532	65	101

effect is also restricted to a subset of labour markets Note the wage specification, in contrast to the education equation, employs the presence of both parents in the household at age 14 as the only variable capturing the presence of parents. This is due to the finding that, unlike the education equation, the different household compositional effects were not statistically different from each other in the wage equation. One particularly important effect is that accruing to experience in the labour market This is due to potential incentives for exiting from school at an early age to acquire specific human capital or on the job type general human capital The coefficients on the experience and squared experience variables reveal that for the lower educational levels experience is an important and positive attribute. However, in general the effect diminishes with education level until it is non existent for the bachelor degree category.

Finally consider the effects of the job characteristics on the wage level. Table 6 indicates they also differ across educational group For example, the effect of having a government position is relatively high for the higher education groups although it is low or not statistically significant at the lower education groups Another important effect is that of union membership As suspected, the effect is not uniform across education levels and is large for the lower education groups

Focus now upon the selection bias effects recalling the coefficient on the selection term is not the sole criterion as it is necessary to weight it by the mean value of the correction factor for each of the particular education groups. The means for selected variables by education groups are reported in Table 7 and reveals the mean of the correction factor is monotonically increasing, except for a minor decrease at the diploma level, with educational attainment This provides some support for sorting as those with the highest values of the residuals are obtaining the most education. Overall, there is no strong evidence to suggest the presence of any systematic selection bias although for bachelor degrees there is a very large and positive selection effect. This indicates the negative coefficient from Table 5 produces misleading implications for sorting.

Before proceeding it is worth considering the significance of this large selection effect operating in the bachelor degree market. As the mean value of log wages is 2.19 the average selection effect for this group, computed as the mean value of SCORE multiplied by its coefficient of 1.86 producing a value of 1 95, indicates the variation in this groups wages is largely explained by the unobserved forces which increase their human capital investment.

Using these parameter estimates from Table 6 we compute the wage an individual would receive with a specified level of education conditional on them choosing some given level of education.[21] In producing these wages we assign each individual an age of 24 years and compute their level of experience based on the years of schooling required to obtain the

21 As the wage equations are all estimated in semi-log form we compute the predicted wage by first computing the predicted log values and by then taking the anti-log.

Table 7: Means of Selected Variables by Education Level

	Highest Grade Attained					
	9th	10th	11th	12th	Dip.	Bac.
MAR	20	.13	12	10	17	19
BIAUST	86	90	88	.89	.95	87
BOTH	.78	88	.89	91	.86	94
MUNIV	.05	02	.03	06	06	.10
FUNIV	.05	.03	.04	12	.08	28
SIBS	3 33	2 89	2 70	2 61	2 72	2 21
SGOVT	.92	84	85	70	66	.61
SRC	.05	.14	.11	.20	21	21
HEALTH	10	08	08	.07	.06	.06
EXPER	5 44	3 13	2.44	2.64	2 53	2.21
GOVT	.14	20	19	37	.41	.40
UNION	.42	.45	40	44	.49	.52
HOURS	41.00	40.25	40.99	38.50	40.39	39.30
SCORE	-1.48	-.52	.61	.87	.32	1.05

Table 8: Predicted Wages For All Individuals Across Education Outcomes

Education	Hourly Wage	Standard Deviation
Bachelors	6.26	24 64
Diploma	9.05	.59
12th Grade	8 52	.74
11th Grade	7.48	87
10th Grade	7.36	47
9th Grade	7 17	1.08

qualification in question We also assign each individual the mean values of the job characteristics for each educational group to disentangle the job effects from the individual effects. The average predicted wages for the 2121 working observations are presented in Table 8.

The first feature of Table 8 is the large standard error attached to the prediction of the bachelor degree wage. The standard error is so large that it discourages the use of this point estimate as a measure of the mean Table 6 suggests the wide variability of this prediction is caused by the large coefficient on the correction factor.[22] In fact despite that the explanatory value of this equation is reasonably high it performs very poorly as a predictor due to the large weight it places on the selection effect. An examination of Table 7 indicates this will produce difficulties for some of the educational groups.

From these wage estimates we compute the implied rates of return to schooling. These are reported in Table 10 with the estimates from the bachelors group, taken from Table 9, and the conventional approach. The bachelor results are provided as this group represents an unconstrained agent in the pursuit of human capital investment Before proceeding let us clearly state the relevance of these different columns. in Table 10

The first column represents the implicit rates of return form the unadjusted equation reported in column 1 of Table 5 These represent the rates of return to the 1985 wave without adjusting for selectivity bias nor interaction bias Columns 2 and 3 report the implied estimates of the rate of return from columns 2 and 3 from Table 5 and reflect the selectivity bias adjusted rates of return. The final two columns are derived by computing the implicit rates of return from using the parameter estimates from Table 6 to predict the wage each individual would receive with various levels of education The All heading refers to the entire 2121 workers in 1985 while the Bachelor heading indicates the estimates are based on the various wage levels the 101 individuals with bachelor degrees would receive with other education levels. These final two columns represent the estimates in the absence of selectivity and interaction bias.

Several points are worth noting about these various estimates. First, the unadjusted conventional approach appears to underestimate the value of education while the selectivity adjusted approach overestimates it The point estimates of the rate of return of both are significantly higher than those from the selectivity/interaction adjusted procedures. Second is the nature of the earnings/education relationship. The selectivity and interaction adjusted estimates provide evidence of substantial gains to completing high school. In fact this is the most important step in the earnings ladder No such finding is produced by the conventional approach. Finally, the results indicate individuals who invested in bachelors degrees displayed the optimal investment behaviour in they pursued the activity which best enhanced the level of wages.

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22 The standard errors reported are clearly underestimates as they do not account for the variance in the parameter estimates used in computing the predicted wages.

Table 9: Predicted Wage of those with Bachelor's Degrees in Alternative Outcomes

Education	Hourly Wage	Standard Deviation
Bachelors	8 68	85
Diploma	8,56	.69
12th Grade	7.79	56
11th Grade	6 62	.62
10th Grade	6.90	36
9th Grade	7 43	1 54

Table 10: Rates of Return from Additional Qualification: Percentage Increase from Additional Education (%)

Transition	Selectivity Unadjusted	Selectivity Adjusted		Selectivity and Interaction Adjusted	
	1985	1985	1988	All	Bachelor
9th-10th Grade	13	18	17	3	-7
10th-11th Grade	3	11	23	2	-4
11th-12th Grade	9	11	0	12	19
12th-Diploma	15	12	24	6	10
Diploma-Bachelors	9	16	12	-30	11
12th-Bachelors	25	28	36	-25	12

Table 11: Correlation Matrix of Predicted Wages

	9th	10th	11th	12th	Dip
10th	.43				
11th	13	77			
12th	.10	61	70		
Dip	-.11	47	54	55	
Bac	-.14	- 24	- 15	- 23	- 15

To gain further insight we report the cross correlation matrix for the computed wages in Table 11. This table indicates how the predicted wages move together for each individual. If individuals performed well (poorly) in one market then a high degree of correlation would indicate a good (poor) performance in another. This provides some insight into how we can predict an individual's performance in a certain education level given his performance in another

The figures in this table reveal a remarkable lack of correlation across the various outcomes implying success in one market says little about probable success in another This questions the value of a government policy in which everyone is encouraged to step into a higher market. The table says nothing about absolute change but the previous tables have indicated this is likely to be small This is an interesting result when considered in conjunction with Table 2 That is, while it appears that the individual's position in the income distribution is relatively invariant over time the same can not be said regarding invariance with respect to educational level.

Table 12 provides the predicted values for each of the educational outcomes by each of the remaining actual educational levels attained. It appears that the estimate of the bachelor degrees wage can be disregarded due to the large standard error associated with the mean. The results indicate that for all educational groups an important step in the earnings function occurs at the completion of 12th grade This may represent some stigma affect associated with not completing high school Furthermore, the role of experience in the lower education groups is operating to equalize the wage rates This is an important result for policy makers as it suggests individuals may be disadvantaged by prolonging their stay in the education system The marginal increases are featured in bold print to indicate the change in earnings that would occur if each member of the 1985 sample increased their education to the next level. It is worth highlighting that while the rates of return to education are significantly smaller than those reported in Table 5 for the conventional approach there is some gain, on average, for additional investment However, this conclusion is based only on the evidence of the mean behaviour and says nothing about how dispersion may be important

Prior to an examination of some additional further issues we should focus upon the implication of these results. The computed wages indicate that the return to additional years of education, in terms of actual dollars, are actually quite low For example, consider, using the figures from Table 9, the various annual salaries an individual would receive from working 40 hours a week for payment for 52 weeks a year with various levels of high school education. Year 9 would produce a salary of $14,910; Year 10 a salary of $15,308, Year 11 a figure of $15,560 and Year 12 $17,720.

Now as the primary cost in Australia of additional education is the opportunity cost from not working, consider the decision of an individual with Year 10 education facing the decision to undertake Year 11. In order to do so he would forsake an annual salary of $15,308 to incur a $252 annual

Table 12: Predicted Wages For All Individuals Across Education Outcomes By Education Group

Education	Hourly Wage	Standard Deviation	Percentage Increase in Wage
i) 9th Grade			
9th Grade	7 73	1.12	
10th Grade	**8.15**	**.43**	5
11th Grade	8.94	.91	10
12th Grade	9 72	.62	9
Diploma	9.76	63	0
Bachelors	.11	.11	*
ii) 10th Grade			
9th Grade	7 24	77	
10th Grade	7.63	.30	5
11th Grade	**7.96**	**.61**	**4**
12th Grade	8.96	47	13
Diploma	9 29	.45	4
Bachelors	65	52	*
iii) 11th Grade			
9th Grade	6 94	1 07	
10th Grade	7 15	.35	3
11th Grade	7 17	.51	0
12th Grade	**8.17**	**.53**	**14**
Diploma	8 92	46	4
Bachelors	14 20	52 42	*
iv) 12th Grade			
9th Grade	7.62	1.30	
10th Grade	7 01	.27	-10
11th Grade	6 84	53	-2
12th Grade	7 97	47	15
Diploma	**8.71**	**.48**	9
Bachelors	10 08	10 11	*
v) Diploma			
9th Grade	7 40	1 24	
10th Grade	7 27	29	-2
11th Grade	7.22	74	-1
12th Grade	8 39	.60	16
Diploma	8 91	.56	6
Bachelors	**2.71**	**1.77**	*

(a) The sample size for each group corresponds to that used in estimating the parameters.
(b) The bold print reflects the increases if each group was to obtain the next level of education

increase [23] Ignoring discount rates, which produces an over estimate in how quickly returns are received, this indicates that it will take the individual over sixty years to break even on the additional investment! Even the most rewarding increase from Table 9, from Year 11 to Year 12, requires that the individual wait over seven years before getting positive returns on his investment [24]

While these results are useful they are limited as they focus on one point in time. While they indicate that the rates of return are overestimated by the conventional approach it would be useful to consider how the wage varies over the life cycle. This requires obtaining an estimate of the wage growth function. This represents a substantial data requirement and ideally we would employ panel data over the individual's life cycle to enable accurate estimation of the wage growth function Unfortunately such data are not available. To obtain insight into how wage growth is dependent on educational levels we employ the following approach. We obtain the wage rate for the corresponding individuals for the 1988 cross section and compute the percentage wage growth as $(wage_{1988} - wage_{1985})/wage_{1985}$. We use this variable as the dependent variable and estimate the reduced form growth equation as discussed in section 3. As well as controlling for the individual's personal and job characteristics we account for the difference in schooling level. If we are unable to identify the presence of education effects upon growth we conclude that wage growth is not a function of the education level and the estimates of the relative wage level from the 1985 cross section are a useful source of discussion for the relative rates of return. As the 1988 education levels are the explanatory variables it is necessary to account for the sample selection bias and the corresponding correction factor to SCORE for 1985 is computed from the results reported in column 2 of Table 3. Given the nature of the numerator in the wage growth computation the selection effects will be differenced out unless they affect wage growth in a systematic manner

Prior to estimating this wage growth regression a log wage regression is estimated for the 1988 sample and is reported in column 3 of Table 4. The larger coefficients, compared to the 1985 results, do not indicate general higher growth by the higher educational groups but indicate the gap between that particular group and the control group is larger This is not particularly important given the small size of the control group. In general the relative magnitude of the increase in the rates of return do not change systematically across the two cross sections

Consider these results from estimating the wage growth equation presented in Table 5. There appears to be no independent statistical impact of education upon wage growth. While the coefficients on the education

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23 This assumes the probability of finding and keeping a job is not influenced by the level of education.

24 These figures do not suggest that this investment will not be profitable for all individuals That is, given the presence of selectivity effects high school investment may be very lucrative for particular individuals.

variables are large in magnitude they are not statistically different from zero There is also no indication of selectivity bias supporting our supposition that the selection effects would be differenced out Attempts to estimate separate regressions for the different education groups provided little additional insight and, accordingly, are not reported

An additional issue is the impact of excluded human capital variables upon wage growth One form of human capital not considered here is that developed in the apprenticeship system.[25] This is particularly important for these data as 28 percent of those in the 1988 sample indicated that they had been apprentices As this training distorts the relationship between earnings and marginal productivity it is necessary to account for this in the wage growth equation Accordingly it was re-estimated including a dummy variable indicating whether the individual had been an apprentice [26] The results suggest, surprisingly, that those with apprenticeships experienced a statistically significant lower rate of wage growth over the three year period The inclusion of this variable had no impact on the magnitude or statistical significance of the other education variables This result is unexpected as apprentices often receive lower wages in the training years and then experience above average wage growth. A possible explanation for the results reported here are that the apprentices in the 1985 sample had already gone beyond the flattest section of their earnings curve.

5. Conclusions

The major objective of this paper are the computation of selectivity and interaction bias adjusted estimates of the rates of return to education We pursue this through the estimation of reduced form selectivity adjusted wage equations. The empirical results have major findings in terms of economic behaviour and have important messages for policy makers in the education arena. The results clearly indicate that previous empirical studies focusing on the estimation of earnings equations overestimate the rates of return to human capital investment. This is due to the imposition of several invalid restrictions in the estimation

With the exception of a significant increase in wages induced at the completion of high school it appears that the returns to education are substantially smaller than those reported by earlier studies More importantly, it appears that the individuals who gain from higher levels of education are those who are already undertaking the investment Accordingly, efforts to encourage additional investment by individuals may

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25 Those with apprenticeships are included in the empirical work as it is important to identify how those individuals would perform, in terms of market wages, with additional years of high school and tertiary education It is not expected that including these individuals, while not including an apprenticeship variable, will bias the earlier results as it is not likely that the apprenticeship variable will be highly correlated with the variables which are included.

26 This approach suffers from the possible endogeneity of the apprenticeship dummy variable but it provides some useful information

not unambiguously produce an improvement in their labour market performance. A policy supporting a general increase in the level of human capital does not appear to be supported by the data. It appears that more effort should be allocated to identifying the individuals who would benefit from the additional education Studies of the type presented in this paper are an important step in that direction.

A final comment should be directed to an important issue not confronted in this paper In analyzing the effects of education we have restricted our analysis to the examination of wage levels It is quite likely that, given the evidence reported above, individuals invest in human capital for reasons other than pecuniary returns. While this issue has been examined in the United States it has remained relatively unexplored in Australia. It is possible that once non-market effects from education are taken into account the returns to human capital investment may appear more lucrative.

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Self Discrimination and Human Capital Investment: The Relationship Between Gender Roles and Female Labour Market Performance

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1. Introduction

Sexual discrimination in the labour market remains one of the most hotly debated issues in labour economics (see, for example, *Journal of Economic Perspectives*, Winter 1989) Despite the great deal of attention it has received, however, the relative performance of females in the labour market remains a contentious issue. Not only is there disagreement over the major determinants of the female/male wage differential but there is also a lack of consensus regarding its magnitude and secular movement While it is impossible to do justice to the opposing views in a brief discussion the major debate concerns the source of the differential Whereas some authors argue it is primarily demand driven (for example Bergmann, 1989) others attribute it to cultural and social 'tendencies' which influence the market work commitment of females (Mincer and Polachek, 1974; Polachek, 1981, and Fuchs, 1988, 1989)

The flavour of this second view is clearly set out in a well known paper by Mincer and Polachek (1974) which argues that the differential is partially due to the relative human capital investments of males and females combined with the continuity of their work experience. As males expect long term involvement in market work they invest in qualitatively and quantitatively different human capital to females who anticipate shorter and interrupted spells of market employment Furthermore the human capital stock of a typical female often depreciates more quickly due to her absences from the work place Accordingly females invest in human capital which produces relatively flatter earnings profiles and is typically myopic in nature Mincer and Polachek argue that females, in a sense, discriminate against themselves by making human capital investments which inhibit their professional and wage growth. This controversial view has additional support Fuchs (1988,1989) argues that while the differential is partially attributable to employer discrimination it is primarily due to females anticipating long absences from market employment for childbirth and

* I owe a great debt of gratitude to Tom Cooley and Adrian Pagan for their encouragement and support I alone am responsible for any remaining errors

motherhood. These expectations induce systematically different human capital decisions than males

While this view of self-discrimination is commonly held it is not obvious how these expectations are 'obtained' by females. Are they randomly distributed over females or systematically developed due to the nature of their environment? If we accept that females do 'discriminate' against themselves through this belief that market employment and motherhood/marriage are not compatible it is valuable, for several reasons, to determine which factors are responsible. First, it is not clear that a lengthy absence from market employment is necessary for child rearing. Many economies enable females to simultaneously participate fully in market careers and motherhood. Second, the marriage failure rate is such that many females who invested in limited human capital on the expectation of marriage are experiencing under-investment through divorce and separation. This is partially responsible for the feminisation of poverty phenomenon Finally, if the objective of labour legislators is equality of opportunity in the labour market we need to identify what is potentially producing under investment in human capital

This paper investigates the link between human capital investment and discriminatory attitudes Discriminatory attitudes are defined to reflect the opinion that males and females should not behave or be treated identically in labour market related activities We examine whether such attitudes are systematically developed during the individual's youth and if they reduce human capital investment We also examine the impact of these attitudes upon the individual's labour supply and offered wage rate The arguments in this paper should be not interpreted as evidence that females are not behaving in an optimal manner (see Becker 1985). We simply examine whether an attitude of labour market inequality affects labour market behaviour. We also do not examine how the chosen educational level influences occupational choice and nor do we discuss the role of attitudes in occupational choice although these may potentially have some impact on the wage differential

The next section introduces the empirical model It also discusses the data to be examined and the construction of the discriminatory index. Section two also contains the results from the ordered probit and sequential probit estimation. Section three presents the empirical results from investigating the effect of these discriminatory attitudes upon wages and labour supply. Section four examines the performance of the same individuals three years after the initial survey. Concluding comments are offered in section five

2. The Relationship Between Self Discrimination and Human Capital Investment

Early human capital models (see Becker,1964) highlight the positive role of the expected duration of the period when returns are received in human capital investment The dynamic human capital models (Ben-Porath,1967; and Heckman, 1967) suggest that investment primarily occurs in the

individual's youth as potential returns decrease as the individual approaches retirement

These models have strong implications for females. As many anticipate a high probability of exiting the labour market for home work there is a smaller pecuniary incentive, relative to males, to invest in human capital. This suggests that fewer females will complete high school education and even fewer will accumulate additional labour market related human capital. This produces a wage differential driven by supply behaviour which is exacerbated by the deterioration in human capital experienced by females during market absences.[1]

Consider if this attitude that home and market work are incompatible is systematically developed by individuals and whether it influences human capital investment. It should be noted that the finding of a negative relationship between this attitude and education does not imply that self discrimination produces the wage differential. Self discrimination may result from expectations of unequal treatment and is thus indirect demand discrimination Further, the existence of a negative relationship does not exclude demand side effects. It is also possible that females are conditioned to have these attitudes through other forms of discrimination

Consider the following model comprising a demand for education equation and a reduced form equation expressing the relationship between discriminatory attitudes towards working women and a set of exogenous variables.

$$H_i = \alpha_0 + \alpha_1' S_i + \sum_{j=2}^{J} \alpha_j' X_{ji} + u_i \qquad i=1..n \qquad (1)$$

$$S_i = \beta_0 + \sum_{k=1}^{K} \beta_k' Z_{ki} + v_i \qquad i=1..n \qquad (2)$$

where H_i is a latent variable denoting desired level of education of individual i; S_i is an index reflecting individual i's attitudes towards working women; X and Z are J-2 and K-1 vectors of exogenous variables, α and β are parameters to be estimated, and u and v are jointly normally distributed error terms with zero means, variances σ_u^2 and σ_v^2 and covariance σ_{uv}. While H_i is a continuous variable the observed level of education is not. Accordingly we employ the observed censored variable, H_i^*, denoting the level of education obtained. This is produced by the following indicator function

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1 Mincer and Polachek (1974) attribute approximately 50 per cent of the wage differential to investment and depreciation effects Polachek (1981) presents and estimates a model in which occupational choice is partially based on anticipated absences frm the labor market He concludes that if females were to have a full commitment to market employment the number of professional females would increase by 35 per cent and the number of females in menial positions would decrease by 25 per cent A subsequent study by England (1982) questions the latter empirical results.

$$H_i^* = h(H_i) \tag{3}$$

where

$$H_i^* = 0 \text{ if } H_i < \mu_1; H_i^*=1 \text{ if } \mu_1 < H_i < \mu_2; \ldots H_i^*=m \text{ if } \mu_m < H_i$$

and

$$H_i^* = h(\alpha_0 + \alpha_1' S_i + \sum_{j=2}^{J} \alpha_j' X_{ji} + u_i) \qquad i=1...n \tag{1a}$$

The dependent variable in equation (1a) has an ordered form and as the error in the latent model is normally distributed we can estimate the parameters by ordered probit The difficulty now lies in the potential endogeneity of S_i as it is possible that investment in human capital and the development of attitudes towards working women are simultaneously determined. To overcome this we adapt the conditional maximum likelihood model in Smith and Blundell (1986) and Rivers and Vuong (1988). Invoking the joint normality assumption rewrite (1a) as

$$H_i^* = h(\alpha_0 + \alpha_1' S_i + \sum_{j=2}^{J} \alpha_j' X_{ji} + \lambda' v_i + \eta_i) \tag{4}$$

where λ is equal to σ_{uv}/σ_v^2 and η is a zero mean normally distributed error which is uncorrelated with the regressors. As the errors are normally distributed we first estimate the β's in (2) by least squares noting that this coincides with MLE. We then produce estimates of v_i, $\hat{v}_i$ as $S_i - \hat{\beta}_0 - \Sigma\hat{\beta}'Z_i$ and estimate (4) by ordered probit, replacing v_i with $\hat{v}_i$, to obtain estimates of the α's and λ. The t-test on the null hypothesis that λ is equal to zero is a test of weak exogeneity of S_i with respect to H_i This is particularly important in this context as it examines whether discriminatory attitudes are influenced by the education process

Estimating the education equation by ordered probit implies that human capital decisions are made in a 'once for all' manner. That is, an individual faced with the decision to continue after seventh grade, for example, has already decided when she will stop investing. This may be inferior to the sequential estimator of Amemiya (1975) employed by Mare (1980) and Miller and Volker (1987a). In the empirical work we employ both procedures and report the results of a conditional moment test of whether the errors across equations in the sequential case can be treated as independent.

We examine these issues with data taken from the List sample of the 1985 wave of the Australian Longitudinal Survey. These data represent an

excellent focus of study for the following reasons [2] First, they comprise solely of young Australians aged between 16 and 25 years.[3] As equal pay for equal work was introduced in Australia in 1975 these individuals have made their human capital investment decisions with the expectation of equal treatment in the labour market.[4] Second, empirical work by Miller and Volker (1987a, 1987b) analysing this data set found that a sex-wage differential exists Finally, the questionnaire from which these data are taken include questions on the individual's attitudes towards working women

In estimating (4) we employ two alternative measures of human capital The first, HS, focuses on high school and takes the following values An individual who has only completed eighth grade or below is assigned a value of zero For every additional year of high school an individual is assigned a value of one producing a maximum value of four for those completing the twelve years of school. An alternative measure, denoted TS, was constructed to account for post-school training. We first make the minimum group equal to ninth grade and below and add a value of one for additional years of high school Those completing high school now receive a value of three while those completing some post school training indicating some commitment to employment, such as an apprenticeship or a diploma, are assigned a value of four. Individuals with a bachelor or higher university degree receive a value of five.

The first measure is superior if we are only interested in high school performance as the ranking of the outcomes is clear. It is inadequate, however, as many individuals pursue post high school education. In this sense the second measure is preferred although it produces outcomes which cannot always be easily ordered. We also require a measure of S, the individual's attitude towards the role of females in the labour market We produce a measure by employing the responses to statements regarding the individual's view of working women Individuals are asked their responses

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2 The history of the gender wage differential in Australia is particularly interesting (see Gregory and Duncan 1981) Prior to the equal pay decisions of the wage tribunals in 1967 and 1972 the female wage rate was significantly less than that of males During periods the male wage rate was set to enable a man and his family to live in a 'civilised manner' the female rate provided only for a single female The wage differential was thus initially attributable to discrimination by employers and the wage tribunal Its persistence (see Miller and Volker 1987a, 1987b, Rummery 1989) suggests the existence of contributory factors It should be noted however that the equal pay decisions have been quite effective in eroding the wage differential

3 In the empirical work we only include individuals who have completed their schooling to avoid any additional complications from censoring It is not likely that this will induce any selection bias

4 It is possible that demand side discrimination exists despite the legislation and this discourages females from investment as the anticipate unequal treatment Riach and Rich (1987) anonymously applied for several advertised positions by using the same application form and changing only the applicant's gender They found that there were systematic differences on the grounds of gender with males overall receiving preferential consideration at the interview stage of the employment process

to seven statements, shown in Table 1, intended to capture the individual's attitudes regarding females' roles in homemaking and the labour market. Individuals respond with 1) strongly agree; 2) agree, 3) don't know; 4) disagree; and 5) strongly disagree The statements are worded to imply an unequal burden of homemaking activities should lie with the female and/or that a female's activities in the labour market should be of secondary importance to a) her role as a homemaker and b) her husband's role in the labour market.

In mapping these responses into a measure of attitudes at least two options are available. First we could transform each response into a dummy variable representing either an equal or unequal attitude towards females. This approach was not employed as several of the resulting variables were highly correlated. The second option, employed here, is to assign a value ranging from one, for strongly agree, to five, for strongly disagree, for each question, producing a negative relationship between the respondent's answers and their attitude towards female equality We sum the responses to the seven statements producing a variable ranging from seven to thirty-five where a score of seven denotes an attitude of relative inequality toward women while a score of thirty-five represents an attitude of relative equality

This procedure is clearly not ideal First, the responses may not have the same meaning to each individual Second, by summing responses we assign equal weights to each question although this may be inappropriate. Also, assigning values to the responses may impose an unrealistic numerical structure Furthermore, there is doubt regarding the accuracy of the answers. The individual may not know the true response or may give the answer she thinks is correct. Finally, there also exists the bias resulting from ex post rationalization To ensure that the index was representing the views we examined its relationship with the individual responses and found it to be satisfactorily reflecting the views in the individual answers.[5]

Table 2 reports educational attainment by values of this index It reveals a striking negative relationship between discriminatory attitudes and human capital investment. Of particular interest are those with the most and least discriminating attitudes. 41 per cent of individuals in the least discriminatory category are attaining post secondary qualifications compared to 26 per cent of the most discriminatory group. More remarkably, while 12 per cent of the most egalitarian group attain university qualifications the comparable figures for the other groups are 0, 1 and 2 per cent respectively. While females with non-discriminatory views invest in similar education levels to males those with average or discriminating views obtain far less.

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5 To explore how well the index was reflecting the views expressed in the various statements we examined the partial correlation coefficients for the separate responses and the index. The responses were all highly correlated and the index was highly correlated with each of the responses. These findings did not alter when we removed the responses individually from the index. We conclude from this that the index is accurately reflecting the views of the individual responses and that no single response was dominating the index

Table 1: Statements Relating to Construction of the Discriminatory Index

		Strongly Agree	Agree	Don't know	Dis-Agree	Strongly Disagree
i)	Important decisions should be made by the husband rather than the wife	1	2	3	4	5
ii)	A woman is really fulfilled only when she becomes a mother	1	2	3	4	5
iii)	Whatever career a woman may have, her most important role in life is that of becoming a mother	1	2	3	4	5
iv)	A wife who does not want to work should not work	1	2	3	4	5
v)	Husbands and wives should both do the housework	5	4	3	2	1
vi)	A mother who stays at home will have a much better relationship with her children	1	2	3	4	5
vii)	A husband's career should be more important to the wife than her own	1	2	3	4	5

Source Question 0 1 of the 1985 Australian Longitudinal Survey

Note: The values of the responses to question v) were initially in reverse order although they are altered here to ensure consistency in the ordering of responses

Table 2: Human Capital Attainment by Discriminatory Index

	Value of Discriminatory Index:					
	7-14	15-19	20-24	25-29	30-35	Males
Bachelor Degree or Higher	0.0	.014	015	024	123	.039
Diploma	.023	.027	029	059	100	029
Apprenticeship	070	.023	030	034	026	202
Business Degree	116	072	102	109	077	004
TAFE	070	072	086	097	114	035
Years of Primary and Secondary Education	10 186	10.356	10 511	10 863	11 344	10 649
Observations	43	264	893	973	456	2724

Note: TAFE denotes Technical and Further Education.

There is also a substantial difference in the nature of education obtained While far fewer females with discriminatory views obtain university qualifications, compared to the non-discriminatory and males, a higher proportion of these groups invest in secretarial and similar skills obtained from business colleges. As expected females, as a group, engage in fewer apprenticeships than males.

Focus now upon the estimation results [6] First we estimate the reduced form of the discriminatory index. The regressors characterize the individual's environment in the human capital investment years and their description, and summary statistics, are presented in Table 3. Table 4 presents the results from regressing S against these variables and reveals several interesting features First, considering how the dependent variable was constructed, the explanatory value of the equation, as measured by the $\bar{R}^2$, is high Furthermore, several variables have a statistically significant impact upon an individual's attitude. As these variables fall into various categories let us consider them systematically

The variable indicating the individual was Australian born has a negative coefficient suggesting that Australian born females are more discriminatory than overseas born females. While it is difficult to have strong expectations regarding the sign of this coefficient this may be considered a surprising result

The nature of the individual's household during her youth may potentially influence her attitudes towards women in the labour market Accordingly, we include variables to capture the presence of parents in the household when the individual was aged fourteen years. As the control group is the presence of both parents the included variables capture the absence of at least one parent. These variables possess positive coefficients implying that households with absent parents produced children with less discriminatory attitudes. This may reflect income effects but also indicates that where the individual is subjected to less than ideal economic circumstances they develop a more positive attitude towards labour market involvement. This may result from economic necessity or through the presence of a role model

Parents' human capital investment and labour market involvement are captured by the variables MUNIV, FUNIV and MOTHW The variables reflecting parents' university education are significantly positive indicating that individuals with university educated parents were, *ceteris paribus*, less discriminatory. The positive coefficient on the mother working variable reinforces previous findings that the mother acts as an influential role model

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6 To employ the estimation procedure outlined above it is necessary that the variable S be normally distributed As the construction of the variable constrains S to take discrete values from 7 to 35 this is clearly not satisfied However to account for departures from non-normality we borrow an idea from Gallant and Nychka (1987) and include higher terms of residuals in the second state

Table 3: Variable Definition and Summary Statistics

Variable Name	Definition	Mean	Standard Deviation
BIAUST	Was born in Australia	883	321
MOTH	Lived with mother only at age 14	116	320
FOTH	Lived with father only at age 14	025	158
NOTH	Lived with neither parent at age 14	017	131
MOTHW	Mother worked when individual aged 14	434	496
MUNIV	Mother has university qualifications	041	200
FUNIV	Father has university qualifications	077	267
SIBS	Number of siblings	2 958	1 998
AGE1	Aged 16 to 18 years	130	.337
AGE2	Aged 19 to 21 years	334	472
AGE3	Aged 22 to 24 years	342	474
Religion			
ANG	Anglican	315	464
RC	Roman Catholic	.326	469
PRES	Presbyterian	075	.265
METH	Methodist	065	246
GORT	Greek Orthodox	024	153
RORT	Russian Orthodox	001	027
ISLAM	Islamic	003	058
BUD	Buddhist	001	027
UNIT	Uniting Church	.031	173
OTHREL	Other Religion	073	260
NONREL	Not religious	086	280
State in which school attended			
SNSW	New South Wales	386	487
SVIC	Victoria	233	422
SQLD	Queensland	156	362
SWA	Western Australia	082	275
SSA	South Australia	092	289
STAS	Tasmania	045	206
SNT	Northern Territory	006	078
School Type			
SGOVT	Government school	806	395
SRC	Roman Catholic	149	356
SOTH	Private non roman catholic	045	207

Table 4: Reduced Form Discriminatory Index Equation

Variable	Coefficient	Variable	Coefficient
Constant	25 869* (589)	UNIT	.426 (.541)
BIAUST	-.562* (.285)	NONREL	1.486* (.363)
MOTH	.573* (.280)	SVIC	.502* (.236)
FOTH	817 (.571)	SQLD	-.176 (.268)
NOTH	1 881* (687)	SWA	-1.690* (.345)
MOTHW	1.141* (.187)	STAS	-.592 (446)
MUNIV	1 421* (.476)	SSA	-.382 (.332)
FUNIV	1.203* (.351)	SNT	.790 (1.148)
SIBS	-.162* (046)	SGOVT	-.741 (.447)
OTHREL	1 574* (382)	SRC	.248 (.514)
ANG	.109 (.251)	$\bar{R}^2$	076
PRES	-.369 (378)	OBS	2629
METH	.308 (403)		
GORT	.351 (.605)		
RORT	218 (3 218)		
ISLAM	-4 652* (1 535)		
BUD	-9 878* (3.254)		

A surprising result from Table 4 is the statistically significant negative impact from the presence of siblings It is not obvious why this occurs although one explanation is the reinforcement of role model effects through the assignment of family tasks. It is unlikely that this variable is capturing any racial or religious effects as variables included to directly account for these effects are either included in Table 4 or were excluded on the basis of statistical insignificance. An important determinant of a female's attitudes will be her religious education and beliefs. Accordingly we include a group of dummy variables for the individual's religion and employ Roman Catholicism as the control group. The results indicate the other major religious groups do not have significantly statistically different views from Roman Catholics. However, those in the Islamic and Buddhist group have dramatically more discriminatory views than Roman Catholics. The positive coefficient on the non-religious group variable indicates that in general the effect of religion is discriminatory.[7]

The final two categories of variables are intended to capture any regional effects and influences of school type The results reveal some regional variation but do not uncover any school type effects Following the estimation of the index equation we compute $\hat{v}_1$ as the least squares residuals and estimate the education equation by ordered probit including the residuals as an additional regressor The results are reported in Table 5 and reinforce previous findings for this age group (see Miller and Volker 1987a). Parents' level of education is an important determinant of educational attainment, although surprisingly the father's level of education appears more important than the mother's There appears to be no effect from being Australian born while the absence of the father from the individual's home at age fourteen has a significant negative impact on educational progress Absence of the mother appears to have no role in the education decisions of the individual and would seem to reflect income considerations This is an important result as it reflects the financial difficulties females encounter in broken homes Also surprising is the strong negative impact upon educational attainment from the presence of siblings. This result, which is likely to represent wealth effects, was also found by Miller and Volker (1987a) and for the U.S by Mare (1980). A negative impact also results from attending a government or Roman Catholic school although this also may reflect income effects.

Before proceeding we should discuss the exclusion of 'potentially' important regressors We do not include any additional economic type variables as there is some doubt regarding their validity. Miller and Volker (1987a) found that the unemployment rate at the time of the investment decision had little or no effect upon the transition decision between school grades There is also no empirical support for the inclusion of variables representing the presence of school subsidies or other assistance schemes

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7 This interpretation is not strictly valid as the control group is Roman Catholicism and not simply religion. However as the other,more populous, religions were not statistically different from Roman Catholicism this interpretation seems reasonable

Table 5: Conditional Ordered Probit and Ordered Probit Equations of Human Capital Investment

	Dependent Variable					
	HS (1)	HS (2)	HS (3)	TS (4)	TS (5)	TS (6)
CONSTANT	1.175*	1.769*	3 260*	1.164	.867*	2.133*
	(.596)	(.186)	(148)	(605)	(.175)	(.141)
BIAUST	- 057	-.062	-.062	-.046	-.044	-.046
	(.069)	(069)	(.069)	(063)	(.066)	(.066)
FOTH	- 100	-.081	- 051	-.129	-.139	-.111
	(137)	(.136)	(133)	(124)	(.122)	(.121)
MOTH	-.367*	-.352*	-.321*	- 328*	-.335*	-.310*
	(070)	(069)	(069)	(.065)	(064)	(.064)
NOTH	-.316*	- 274	-.200	- 366*	- 387*	-.328*
	(.151)	(.145)	(.149)	(.141)	(135)	(.138)
MOTHW	-.008	036	.067	.021	007	.033
	(.052)	(050)	(.046)	(.051)	(044)	(044)
MUNIV	.357*	391*	.436*	371	.354*	.388*
	(131)	(.125)	(122)	(117)	(.112)	(111)
FUNIV	524*	554*	.556*	373*	357*	.369*
	(191)	(087)	(085)	(087)	(083)	(.082)
SIBS	- 054*	- 058*	- 059*	- 066*	-.065*	- 065*
	(012)	(.011)	(011)	(012)	(011)	(011)
SGOVT	- 878*	-.892*	- 858*	- 621*	- 613*	-.592*
	(119)	(.118)	(117)	(113)	(113)	(.112)
SRC	-.512*	- 503*	- 470*	-.261*	- 265*	-.242*
	(127)	(.126)	(124)	(123)	(123)	(122)
SEX	.093*	069*	-	.046*	057*	-
	(023)	(.005)		(.023)	(.004)	
FAIR	-	-	.470*	-	-	.443*
			(109)			(.046)
UNFAIR	-	-	- 325*	-	-	-.273*
			(109)			(.097)
λ	-.024	-	-	.012	-	-
	(023)			(.023)		
μ_1	.988*	.987*	.975*	1 145*	1.145*	1.129*
	(071)	(.071)	(.070)	(.038)	(.038)	(.038)
μ_2	2.389*	2 389*	2.354*	1 591*	1 591*	1.568*
	(.076)	(.076)	(075)	(041)	(041)	(.041)
μ_3	2.001*	2.998*	2.953*	2 141*	2.141*	2.115*
	(.077)	(.077)	(076)	(.043)	(044)	(.043)
μ_4	-	-	-	3.501*	3.500*	3.462*
				(.065)	(.065)	(.064)
LOG-LIK	-3175.7	-3176.2	-3213.7	-4085 4	-3085.6	-4112.5

However it would be beneficial to have additional income variables indicating the financial status of the individual's family. Having noted this it is likely that the variables included are adequately capturing the relevant income effects. Furthermore there is no evidence that any such effects should contaminate the coefficient on the index variable Focus on the coefficients relating to the discriminatory index, SEX, and the residuals. The results in columns (1) and (3) represent the ordered probit results with both the index and residuals included. The positive coefficient on the index variable in both equations indicates that discriminatory views reduce human capital investment.[8] As well, the coefficient on the residuals in each of the equations is not statistically different from zero[9] indicating that we cannot reject the null hypothesis that the index is weakly exogenous to educational attainment [10] This is particularly important as it suggests that the development of attitudes towards working females occurs outside the educational system. Accordingly we re-estimated the ordered probit equations omitting the residuals. These results are reported in columns (2) and (4) of Table 5. Their major feature is the strong negative impact of discriminatory attitudes on educational attainment. Note that the

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8 It is possible that discriminatory attitudes and education are negatively correlated through some mechanism independent of expectations about future market work behaviour. To explore this possibility we first estimate the attitudes equation over the sample of males. Using the parameter estimates we then decompose the female attitudes into a component representing the attitude they would have if they were male and a residual component reflecting the difference between male and female attitudes We then estimate the ordered probit equation entering the various components of attitudes separately The results confirm the possibility that attitudes may be negatively correlated with education.

9 The standard errors reported in Table 5 are underestimated as they do not account for the uncertainty induced in estimating v_1 Rivers and Vuong (1988) show that for conditional maximum likelihood models the correct covariance matrix is equal to the covariance matrix from estimating the model assuming that the effors are known with certainty plus a positive definite matrix As in the present case we cannot reject that the coefficient is equal to zero when assuming we know the value of the errors there is no need to compute the correct covariance matrix. The reported standard errors and the test statistic are also valid under the maintained null hypothesis (see Smith and Blundell, 1986, and Rivers and Vuong, 1988).

10 To account for the possibility of non-normality in the v_1 we included powered up values of the generalised residuals as additional explanatory variables in the ordered probit equation and tested the null hypothesis that the coefficients on the generalised residuals, and their higher orders, were jointly equal to zero As we were unable to reject the null, we are unable to reject weak exogeneity even in the absence of normality in the v_1s (see Vella 1990a) One final test we employed was to estimate the education equation with the predicted values of the discriminatory index, from (8) in place of the actual values. These estimates, which are consistent in the absence of normality of the reduced form errors, were very similar to those reported in column (1) of Table 5 This indicates that the assumption of normality appears to be a reasonable approximation

remaining variables display the expected signs, are reasonable in magnitude and show no drastic changes from the other columns. Before proceeding we also constructed an alternative index variable and include it in place of the original measure. Two dummy variables, FAIR (for SEX>27) and UNFAIR (for SEX<15) representing the two relative extremes of the index were substituted for SEX. As we have been unable to reject weak exogeneity we do not employ any form of correction for possible endogeneity. The results are reported in columns (3) and (6) and are very similar to those in columns (2) and (5). This indicates the results are not due to a high degree of correlation between the index and the other regressors.

Using these coefficients we compute the probability of an individual obtaining a specific level of education. We calculate the probability for an individual with specified characteristics and value for the discriminatory index. We then vary the assigned value of the index. We can then evaluate how the probabilities change in response to changes in attitudes. These probabilities are reported in Table 6. To compute these probabilities we choose an individual who is Australian born; lived with both parents at age fourteen; has three siblings and attended a government school. In some sense this is *a typical* female although the number of conditioning variables is limited. We assign three values for the discriminatory index reflecting a (relatively) discriminatory attitude, Sex=15, the average view, Sex=25, and a view of relative equality, Sex=30.

For both high school completion and total human capital investment the effect of attitudes is dramatic The discriminatory female has only a 24 per cent chance of proceeding beyond the tenth grade compared to 61 per cent for the least discriminatory. Further, while the 'equal' female possesses a 40 per cent probability of completing high school the discriminatory has a 10 per cent probability. The probability for an 'average' individual is 27 per cent A similar story is portrayed by the probabilities for total human capital investment. While individuals with equal views possess a 30 per cent probability of obtaining post secondary qualifications those with average views face a 24 per cent chance The most discriminatory have a 10 per cent probability. An interesting contrast is provided by comparing these probabilities to the actual values for males While the non-discriminatory obtain more high school education than males the average and discriminatory females obtain significantly less. One shortcoming of the ordered probit model is the assumption that the entire investment decision is made at once and not in a sequential manner. To overcome this we estimate the probit equations sequentially, as shown in equation (5), where the dependent variables are transition indicator functions. These results are reported in Table 7. Note that initially we estimated a sequence of conditional probit equations accounting for the potential endogeneity of the index. However as there was very little evidence to suggest the index is endogenous we estimate conventional probit equations which treat the

Table 6: Estimated Probabilities of Human Capital Investment Outcomes[1]

	High School Completion				
	Actual	Males	Sex=30	Sex=25	Sex=15
<9th Grade	.011	.025	003	009	046
9th Grade	.075	075	.038	.074	196
10th Grade	.378	408	342	421	.516
11th Grade	208	214	224	228	147
12th Grade	327	279	391	.267	095
	Total Human Capital Investment[2]				
	Actual	Males	Sex=30	Sex=25	Sex=15
0	079	085	042	075	192
1	278	284	239	309	416
2	156	148	166	176	156
3	.194	191	214	198	134
4	257	.254	301	221	097
5	036	039	038	020	004

Notes·

1 The probabilities are estimated employing the point estimates reported in columns (2) and (5) of table 5 respectively. The probabilities are evaluated for an individual who is Australian born; lived with both parents at age 14 years; attended a government school and had 3 siblings

2 Represents any post secondary excluding university degree

Table 7: Sequential Probit Estimates of Education Continuation

	Grades of Transition				
Variable	**8-9**	**9-10**	**10-11**	**11-12**	**12-Tertiary**
Constant	1 793*	3.857	- 610*	- 450	- 736*
	(.619)	(16.480)	(235)	(.280)	(.338)
BIAUST	-.467	086	-.213*	.198	.024
	(.369)	(.116)	(.086)	(.103)	(.138)
MOTH	- 281	- 316*	- 341*	-.183	.194
	(.194)	(108)	(086)	(.124)	(.163)
FOTH	3.054	-.361	.178	-.312	.451
	(35.210)	(.206)	(.178)	(215)	(302)
NOTH	2 803	- 705*	-.005	.079	-.168
	(42 250)	(.221)	(.222)	(.302)	(357)
MOTHW	048	085	056	- 097	.002
	(165)	(084)	(056)	(074)	(100)
MUNIV	- 342	501	636*	113	.113
	(347)	(387)	(181)	(163)	(.170)
FUNIV	- 048	257	673*	401*	289*
	(312)	(209)	(124)	(122)	(127)
SIBS	- 115*	- 080*	- 013	- 056*	024
	(030)	(018)	(014)	(019)	(027)
SGOVT	301	-3 370	- 754*	- 820*	-.385*
	(325)	(16 470)	(.160)	(172)	(153)
SRC	384	-2.830	- 487*	- 471*	- 279
	(370)	(16 480)	(172)	(190)	(.173)
SEX	046*	044*	.067*	.056*	.026*
	(017)	(010)	(006)	(007)	(.010)
Log-like	-141 67	-639.79	-1476 9	-871.00	-570.95
Obs	2629	2600	2401	1408	860

index as weakly exogenous to education.[11] The estimated equations had the form:

$$T_{i,y-y+1} = \gamma_y S + \sum_{k+1}^{K} \gamma_{ky}' X_i + \varepsilon_{iy} \quad (5)$$

where $T_{i,y-y+1} = 1$ if the individual proceeds from school year y to y+1 and zero otherwise. The γ's are parameters and are subscripted by y to denote that they are not necessarily constant across transitions The ε_y are normally distributed mean zero error terms.

Table 7 reveals that the factors determining transition vary across transition stage. A number of additional points are also worth noting. First the Australian-born show no difference to immigrants. Living with mother only has a negative impact on the probability of transition at virtually all stages of education and appears to reflect some type of wealth effect. The living with father only effect is not significantly different from zero in either model which provides support for the apparent feminisation of poverty Individuals with university educated fathers had a significantly higher probability of continuing at each stage of education. These models also reveal that females who attended government or Roman Catholic schools have a much lower probability of progressing through the various stages of the educational process than those who attend private non-catholic schools Now consider the coefficients on the discriminatory variable SEX The coefficient is remarkably robust in that discriminatory views reduce the probability of progressing to the next stage of educational attainment at all stages of transition

We now compute the corresponding probabilities to those in Table 5 The top panel represents the conditional probability of progressing to grade y given the individual has obtained educational level of grade y-1 Again the results are dramatic. The probability of progressing is much lower for the discriminatory group than those with the non-discriminatory, and even average, attitudes. By multiplying these conditional probabilities together we derive the probability of an individual completing various stages of high school education. These are reported in the lower panel of Table 8 The results are quite shocking Those with relatively strong discriminatory attitudes possess only an 8 per cent probability of completing high school while the least discriminatory face a 40 per cent probability of doing so

11 Vella (1990c) employed the conditional moment tests of Newey (1985) and Tauchen (1985) discussed in Pagan and Vella (1989) to examine whether the errors across transitions were independent as required by this approach He rejected the null hypothesis that errors are uncorrelated across transitions indicating that the sequential approach is not appropriate We report the results here for comparison with the ordered probit results.

Table 8: Conditional and Unconditional Continuation Probabilities

	Conditional Probabilities		
	Sex=30	**Sex=25**	**Sex=15**
8th/9th Grade	.996	992	975
9th/10th Grade	950	924	.839
10th/11th Grade	655	528	.272
11th/12th Grade	670	560	.343
12th/Tert	401	350	.260
	Unconditional Probabilities		
	Sex=30	**Sex=25**	**Sex=15**
9th Grade	996	992	.975
10th Grade	946	.916	818
11th Grade	619	484	222
12th Grade	414	271	.076
Tertiary	166	095	.019

4. Attitudes, Labour Supply and Rates of Return

The above section indicates that attitudes play an important role in human capital investment It is also worth investigating whether they affect other aspects of labour market activity One important question which is crucial to the gender differential debate, is whether these attitudes reduce the degree of labour market involvement and rate of return on human capital investment. To investigate this we estimate rate of return functions while controlling for the level of labour supply The model is of the form

$$W_i = \psi_0 + \psi_1 *Sex*Educ + \psi_2 *Educ + \psi_3 *L_i + \sum_{p=4}^{P} \psi_p *X_{pi} + v_{wi} \qquad (6)$$

$$L_i = \delta_0 + \delta_1 *Sex_i + \sum_{1=2}^{L} \delta_1 *X_{li} + v_{Li} \qquad (7)$$

where

W and L are the log of the hourly wage rate and hours of weekly work respectively,

Educ is a variable measuring years of education;

v_L and v_w are mean zero jointly distributed normal error terms with variances σ^2_L, σ^2_w and covariance σ_{Lw}; and

δ and ψ are vectors of parameters.

As many females in the sample do not engage in market work there is a cluster of observations at zero hours of work To overcome this we employ the procedure of Vella (1990a) and estimate the hours equation by Tobit. We then compute the generalised residuals from this equation and employ them as an additional regressor in equation (6) This procedure simultaneously accounts for the endogeneity of hours of work and provides a test of sample selectivity bias.

We first estimate the reduced form supply equation and the results are reported in Table 9 The variables typically display the expected sign and appear to be of reasonable magnitude The most important feature is the significant negative impact of discriminatory attitudes on weekly hours of work. The effect is quite large recalling that the attitudes also indirectly influence the level of supply through their impact on marriage and child rearing decisions

The second column of Table 9 reports the results from estimating equation (10) over the sub-sample reporting positive number of weekly hours of work A number of features are worth highlighting. The first of these is the selection term, GRES, which captures the covariance between the respective error terms is statistically significant indicating the presence of sample selectivity bias The second feature is the negative coefficient on the weekly hours of work variable. As discussed in Vella (1990b) this captures the payment of non-wage labour income to full-time workers and can be interpreted as the part-time premium. The inclusion of this variable is vital in this specification to account for the influence attitudes have on reducing the number of hours worked It is likely that those with discriminatory attitudes are working fewer hours and thus receiving the part-time premium Now focus on the education variable, Educ, and the interaction term, Sex*Educ. We include the interaction term to capture the possibilities that attitudes also affect the type of human capital which is obtained rather than simply the number of years of education Both of these education variables are statistically significant indicating a certain rate of return for each year of education which is supplemented depending on the level of the variable capturing the interaction term The base rate of return for a year of education is estimated to be 1 2 per cent which may appear to be quite low However recall the sample comprises only individuals in their youth and the inclusion of age dummy variables explain a lot of the variation in wages.

To assess the effect of attitudes on the rate of return consider an individual with ten years of education and vary the value of their attitude index. An individual who is discriminatory, Sex=15, receives the base rate of 12 per cent plus an additional 4.5 per cent through the interaction term producing a total return of 16.5 per cent. The return for the average individual, Sex=20, is 18 per cent while for the non-discriminatory, Sex=30, it is 21 per cent. These are quite large differences and reveal the operation of some very strong and important influences in the labour market.

Table 9: Labour Supply and Wage Regression Equations

	Dependent Variable:			
	Hours	**Log of Hourly Wage**	**Hours**	**Log of Hourly Wage**
Constant	-6 794*	2 060*	-1.002	1 855*
	(4 025)	(059)	(5 978)	(107)
AGE1	-7 361*	- 646*	-	-
	(1 662)	(022)		
AGE2	-3.865*	-.322*	-	-
	(1.442)	(018)		
AGE3	-2.635*	- 055*	-	-
	(1 313)	(018)		
AGE4	-	-	-3 033	- 291*
			(2 318)	(037)
AGE5	-	-	-3 502	- 134*
			(1.792)	(029)
AGE6	-	-	- 649	- 025
			(389)	(029)
MOTHW	1 871*	-	- 366	-
	(874)		(1 225)	
CHILD	-39 013*	-	-32 908*	-
	(1 892)		(2 063)	
MAR	-9.046*	-	-2 411	-
	(1 697)		(1 760)	
BIAUST	2 438	- 050*	2 709	-
	(1 248)	(018)	(1 986)	(028)
SPINC	026*	-	012*	-
	(005)		(003)	
INC	001*	-	- 0001	-
	(0006)		(0002)	
HEALTH	-10.485*	-	-14 142*	-
	(1.303)		(1 938)	
ASSIST	-	- 054*	-	-.102
		(.023)		(.092)
UNION	-	.028*	-	075*
		(012)		(017)
GOVT	-	102*	-	-
		(014)		
HOURS	-	- 007*	-	- 002
		(001)		(001)
EDUC	2.084*	.012*	1.920*	.024*
	(.279)	(005)	(695)	(.008)

continued...

Table 9 continued

	Dependent Variable:			
	Hours	Log of Hourly Wage	Hours	Log of Hourly Wage
SEX	404* (.093)	-	273* (125)	-
SEX*EDUC	-	0003* (0001)	-	0007* (0002)
GRES	-	- 0001 (.00006)	-	- 002 (.001)
σ	20 070	-	20 731	-
Log-Likelihood	-8434.8	-	-4571 1	-
Adjusted R	-	.525	-	245
Observations	2629	1763	1476	912

Note The age dummies in columns 3 and 4 are adjusted to account for the increase in ages over the respective samples

5. Attitudes, Labour Supply and Rates of Return in 1988

In section 4 we examined the labour market performance of individuals at the time of the survey. We now examine the same individuals three years later to establish whether the attitudes they expressed in 1985 still appear to influence their labour market activity in 1988 To do this we re-estimate equations (6) and (7) for the sub-sample who provided sufficient information in 1988 These results are presented in the final two columns of Table 9

While there appears to be some structural change in the labour supply functions from 1985 to 1988 several of the variables are important determinants of labour supply in both periods Most notably, the health condition of the individual and the presence of young children in the household still reduce the level of labour supply However education and egalitarian attitudes remain similarly positive While the coefficient on SEX has reduced in magnitude for the 1988 sample the effect of education has increased quite markedly. As we have already established the impact of attitudes on educational attainment it is clear that these discriminatory views continue to play an important role in female labour supply

In the final column of Table 9 the variable capturing the effect of government employment is excluded as the 1988 questionnaire did not elicit this information The first point worth noting is that the age variables now display significantly smaller coefficients as the majority of the sample are no longer minors and thus payments cannot vary on these grounds. The remaining coefficients all display the expected signs although they are somewhat contaminated by the exclusion of the government employment variable.

Now consider the magnitude of the education related variables The coefficient on Educ has increased to 2.3 per cent which partly reflects the reduced effect of the age variables The coefficient on the interaction term has also increased to .0007 reflecting an increased impact of discriminatory attitudes upon wages. Again consider the return to education for an individual with ten years of education with varying degrees of discriminatory attitudes. An individual with an index value of 15 now receives a return of 34.5 per cent while an individual with an index value of 30 enjoys the substantially higher return of 45 per cent This indicates the existence of significant supply side discrimination. Two other points worth noting are:(i) there is a stronger selectivity bias effect in the second panel, as indicated by the coefficient on GRES, as some of the sample have selected themselves out of the work force; and (ii) the coefficient on HOURS, reflecting how the hourly wage rate reduces with hours due to the presence of non-wage benefits, is smaller than for the 1985 results indicating that the part-time premium has reduced between panels This is most likely due to the introduction of fringe benefit taxes following the collection of the 1985 data

6. Conclusions

The objective of this paper is to examine the link between the views females have of their role in the labour market, relative to males, and how these attitudes influence their investment in human capital. We do so by employing Australian data to construct an index of discriminatory attitudes and by estimating a model of human capital attainment by conditional ordered probit We find that while the views are systematically developed by the females comprising the sample they are weakly exogenous to educational attainment We also find that these discriminatory views have a dramatic negative impact upon the level of the individual's education and rate of return

These results have an important message for policy makers in the labour market As the individuals in the sample made their human capital decisions in a period following the introduction of equal pay for equal work the amount of anticipated demand side discrimination is limited It is clear that the investment patterns of females are influenced by the envisaged minor role they are conditioned to adopt Accordingly equal opportunity laws and affirmative action legislation will be relatively less effective until females are taught and conditioned to consider themselves the equals of males in the labour market. Future goverment policy in this area should be directed toward influencing and educating youth at an earlier stage in their lives and within the home

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Section III

The Changing Nature of Employment

Part-Time Employment and Participation and Retention in Higher Education

Mark Wooden, Frances Robertson, Peter Dawkins

School Students in Part-Time Employment

Ian McRae

The Extent And Impact of Career Interruptions Among Young Australian Men and Women

Donald E Lewis and Brett Shorten

The Effect of Child Care Costs on Women's Market Work

Francis Teal

Part-Time Employment and Participation and Retention in Higher Education

Mark Wooden, Frances Robertson, Peter Dawkins*

1. Introduction

In the last twenty years, the incidence of part-time employment has approximately doubled. Using the ABS definition of part-time employment (any job entailing fewer than thirty-five hours per week), part-time jobs constituted 21 per cent of all jobs in 1990 compared with 10.6 per cent in 1970. A major contributor to this growth has been the growth in the part-time employment of young people. In 1970, fifteen to nineteen year olds accounted for 8.6 per cent of total part-time employment By 1990, their share was 17 per cent Even more dramatic has been the growth in part-time employment amongst young people at school. Census data reveal that teenagers at school accounted for 2.4 per cent of all part-time jobs in 1971.[1] By mid-1990 the comparable figure was over 10 per cent. The addition of teenagers attending tertiary education institutions (on a full-time basis) increases this share to 14 per cent, while a further 3 8 per cent of part-time workers are aged between twenty to twenty-four and are involved in full-time tertiary education.

This tremendous growth begs a number of questions. Most notable here are what factors lead young people to enter part-time employment as compared with other alternative labour market states, and what are the ramifications of this growth in part-time employment for educational participation? An earlier companion to this paper addressed the former issue (Dawkins and Robertson 1990). Attention here, therefore, is focussed on the connection between part-time employment and participation in education The importance of this issue is difficult to deny. The current Government has placed large emphasis on increasing participation in education, as conveyed in its policy statement on higher education (Dawkins 1988), and it is hard to believe that the rapid growth in part-time employment amongst youth has not affected in some way the education experience.

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1 Based on data reported in Fisher (1983, Table 1).

In the following analysis, data from the four waves of the Australian Longitudinal Survey (ALS) conducted to date—in 1985, 1986, 1987 and 1988—is used to shed light on this issue. In particular, the paper examines whether part-time employment has significantly affected decisions on entry into higher education, and whether it has had any affect on attrition from higher education. The paper thus largely ignores the issue of retention at the secondary school level; a decision which can be justified partly by the amount of attention it has received in the literature. Furthermore, four different avenues by which part-time employment may affect education participation decisions are identified and tested

In the following section we briefly summarize what light other Australian studies can throw on the issue of part-time employment and participation in education. In Section 3 we outline the hypotheses to be tested. In Section 4 the data and approach used in the current study are described, while the results of the analysis are presented in Section 5. Finally, in Section 6 a summary and conclusion is presented.

2. Previous Research

There have been more than a few studies of part-time employment amongst Australian students (for a review, see Ashenden 1990) That body of work has focussed predominantly on secondary school students and has tended to overlook the relationship between part-time employment and subsequent decisions on education participation. Similarly, while there have been a number of empirical investigations of participation by youth in both the labour force and in education, only three studies could be found that consider part-time employment as a possible explanatory variable.

The first of the those to appear, Sloan and Wooden (1984), included part-time employment on the grounds that it acted as a subsidy, and therefore as an inducement to educational participation. They follow Merrilees (1981) in estimating Australia-wide school retention rates for various age-sex groups with time series data, and find evidence of a positive relationship between part-time employment in the previous year and school retention for fifteen year olds, but a strong negative association for sixteen and seventeen year old males. They conclude that the positive sign reflects the use of part-time jobs as a subsidy to education, but are loathe to make much of the negative coefficients because of the likelihood that the variable representing part-time employment is picking up labour market effects. That is, part-time employment growth may be correlated with a declining state of the labour market (part-time jobs being substituted for full-time jobs). This could give rise to a negative association between part-time employment growth and education participation if, as suggested not only by Sloan and Wooden (1984) but also by the Commonwealth Tertiary Education Commission (1982) and Merrilees (1981), declining job opportunities give rise to a 'get a job while you can' syndrome (Miller and Volker 1989, p.49).[2]

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2 In contrast, it is typically hypothesized that high unemployment gives rise to discouraged worker effects causing young people to remain at school (e g. Gregory and

The second study of note, Forster and Ryan (1986), improves on the specification used by Sloan and Wooden by incorporating cohort effects: in particular, size and age of cohorts. Further, they use pooled cross-section time series data increasing the number of observations substantially as compared with Sloan and Wooden's simple time-series model. Their results indicate a significant association between part-time employment and school retention for sixteen year olds only, and in this case the direction of the association is positive—consistent with the argument that part-time employment lowers the opportunity cost of education. It appears that, unlike Sloan and Wooden, Forster and Ryan use part-time employment in its contemporaneous form which is somewhat tautological. Most individuals who have decided not to continue school are unlikely to consider part-time employment in preference to full-time employment. Consequently, high part-time employment rates amongst teenagers will, almost by definition, be associated with high rates of retention, since it is students who usually take part-time jobs in this age group.

Undoubtedly, the most straightforward study to date which has considered part-time employment is the recent work by Prior and Beggs (1989). They examine the transition from secondary school to tertiary education, rather than retention in secondary school. Using cross-sectional data from the 1985 and 1986 waves of the Australian Longitudinal Survey they found evidence that part-time employment amongst school children is associated with significantly lower rates of entry to tertiary institutions and higher employment probabilities This result, however, was only found to hold for boys Prior and Beggs offer no explanations for this, and indeed they consider that the finding represents an unresolved puzzle (p 118).

3. Hypotheses

It is clear from the foregoing that apart from the possible subsidy effect of part-time employment on education, there are few explanations, at least in the empirical literature, which might account for any relationship between part-time employment and education participation In this paper four different explanations are identified and subsequently tested:

(i) *The subsidy effect.* The higher the income earned from part-time employment the greater the demand for higher education (assuming that higher education is a normal good) or, put another way, the easier it is to finance higher education. The subsidy can be measured by weekly income earned.

(ii) *The hours effect.* The greater the hours worked in part-time employment while at school, the less likely the student is to be successful at school and, therefore, to proceed to higher education. This can be measured by the number of hours worked.

Sheehan 1975). Most studies have found significant discouraged worker effects for younger students, but for older students at least two studies have produced evidence of a negative relationship between unemployment rates and education participation (Sloan and Wooden 1984, Miller and Volker 1989)

One possible problem with testing this hypothesis could be that some students in year 12 have already decided not to proceed to higher education and, therefore, have chosen to work more hours. However, if this effect is present, it is more likely to apply to the less able students. We test for this pattern by interacting a measure of ability with the hours variable.

(iii) *Current earnings capacity (relative to future earnings capacity) effect.* The higher a student's current earnings capacity in the labour market, relative to their potential post higher-education earnings capacity, the more likely they are to quit education Assuming that differences in future earnings capacity can be controlled for by measured ability and other characteristics, then a measure of current earnings capacity is sufficient. The wage rate received in part-time employment is used as a proxy for this.

We consider that ability is likely to be a better proxy for future earnings capacity than for current earnings capacity because employers when recruiting, tend to rely on qualifications as an indication of a person's ability. For partly the same reason, the current wage rate is likely to be a better indicator of a teenager's current earnings capacity (at least as perceived by the teenager). Those young people who have been able to command a relatively high wage rate in part-time employment are also likely to have greater access to a continuing relatively high wage rate if they opt to leave education, by virtue of their involvement in the labour market and employers' knowledge of them. They could also be regarded as lucky in commanding a relatively high wage rate and they may therefore wish to capitalize on that, as their future earnings capacity may be less certain.

(iv) *Taste effect.* Numerous studies into the reasons why students take part-time work, and notably those of Coventry, Cornish and Stricker (1984), Bentley and O'Neil (1984) and Nolan and Hagen (1989), have concluded that the driving influence behind students taking part-time jobs is a desire or need to earn money as a result of a desire to be 'independent' (Ashenden 1990, p.9). It is plausible that part-time work creztes a certain independence through the income it generates, which in turn increases students' tastes for further work thus making them more likely to opt out of education in favour of full-time employment. This is likely probably the case if they have a high rate of time preference, that is, if they place a higher value on income now, than on income later.[3]

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3 Part-time employment is more likely to increase the taste for further employment if the experience of work was very satisfying. While the ALS collects information on job satisfaction, inclusion of this variable would reduce the number of observations on persons in employment during year 12 by 51 per cent. Job satisfaction is, therefore, not incorporated into this analysis.

Unfortunately, there is a major problem in separating this effect from the others since tastes are likely to be simultaneously influenced by hours worked, the wage rate and income earned.

Table 1 summarizes the implications of the above effects in relation to the three key variables - hours worked, hourly earnings and weekly income.

Table 1: Summary of Hypotheses

	Effect on entry to higher education (or retention) of:		
	Hours worked	**Hourly earnings**	**Weekly income**
Subsidy effect			+
Hours effect	-		
Current earnings capacity		-	
Taste effect	-	-	-
Net effect	-	-	? (+ if subsidy effect dominates)

4. Data and Methodology

The approach adopted in this study has close similarities to the earlier work of Miller and Volker (1989) and Prior and Beggs (1989). As in both those studies, the data used here come from the ALS which provides what is undoubtedly the richest source of data on the education and labour market histories of youth in Australia Moreover, it provides numerous variables on not only the personal characteristics of the respondent, but also their parents.[4]

The model used is based on that proposed by Miller and Volker (1989). They estimated sequential binary logit equations for each of four school continuation decisions—the probabilities of completing year 10, year 11, year 12 and finally, entering tertiary education. This analysis, however, begins with the final stage, and is restricted to higher education only. A second equation then estimates the probability of an individual remaining in higher education in the following year. As in Miller and Volker, both steps provide conditional probabilities, the first step being conditional on completing year 12, the second step being conditional on entering into higher education.

The sample for the first step is drawn from respondents who completed year 12 in either 1985, 1986 or 1987, while the sample for the second step

4 More information about the structure of the sample can be found in McRae (1984), while an overview of the data collected to date can be found in Kryger (1990).

comprises individuals who entered higher education in 1985, 1986 or 1987 *and* completed year 12 in the previous year. This provided sample sizes of 906 and 492 observations respectively. Purging the data to exclude observations for which data was missing on any of the explanatory variables of interest subsequently reduced the usable samples to 746 and 423.

Variable selection was also guided largely by the work of Miller and Volker (1989). Indeed, all the variables included in the specifications reported by Miller and Volker were considered.[5] In addition, because this data set involves up to three different cohorts, dummy variables for the year in which the final year of secondary schooling is completed (year 12) are included. A variable measuring self assessed schooling ability while in year 10 is also included. Numerous studies have confirmed the importance of ability, typically measured by university entrance scores, in affecting participation in higher education (e g Beswick, Hayden and Schofield 1983, Robertson 1986). The measure used here is, at best, a crude proxy for ability. Constructed as a simple dummy variable depending on whether respondents concluded that they were well above average at school in year 10 compared with others in their year, it is likely to be affected by response bias. That is, there will be a tendency for respondents to overstate their ability. However, so long as that bias is consistent, it does not present any problems for the analysis. More problematic is the measurement error resulting from (a) the inability of the variable to account for differences in the average ability of students across schools and locations, and (b) the retrospective nature of the question used to devise the variable (that is, there may be a tendency for respondents who have completed university studies, for example, to respond that they were above average at school even though they may not have been). Finally, there are reasons to suspect that the ability variable is not exogenous If so, a bias towards zero will be imparted to the coefficients on other variables in the model Exogeneity is a testable issue and is discussed further below. The concerns with measurement error do suggest that the sensitivity of the results to the inclusion of the ability variable will need to be looked at closely.

We also include variables to represent part-time work which Miller and Volker did not. Unlike Prior and Beggs, however, we only consider work in the year leading up to the time when the schooling decision has to be made. Thus Prior and Beggs treat equally a person who worked in a part-time job in year 9 and a person who worked part-time in year 12. We believe our definition to be more reasonable, though it is acknowledged that decisions about higher education are often made before year 12 is reached. Furthermore, this approach means that we can examine not only whether working or not working while studying is of relevance, but also whether that impact varies with the number of hours worked [6] Variables for both

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5 For more details on the construction of the variables used, see Appendix A

6 This strategy reduces the number of observations at our disposal considerably since it means we cannot include in the sample persons who begin higher education in 1985. For

weekly and hourly pay are also included to primarily test for the subsidy and current earnings capacity effects.

Finally, in the second step of the model, a variable measuring the amount of income received under the Tertiary Education Assistance Scheme (and subsequently AUSTUDY) each fortnight (in real terms) in the first year of higher education is included. One of the major reasons for the introduction of TEAS was to encourage participation in higher education by students from families for whom such participation may have represented a substantial financial burden It is impossible to directly test the impact of TEAS on the initial decision to enter higher education with these data since we have no information with which to determine the amount of income support for which each potential student would have been eligible. Since we know whether a student entering higher education receives TEAS, and the amount of the assistance provided, we can test whether receipt of TEAS had any marked effect on the continuing attendance in that course of study.

One issue which the method adopted here fails to address is that of sample selection bias, since observations on retention in higher education are contingent on participation in higher education in the first place. A procedure for correcting for possible selectivity bias is available for models where both dependent variables are dichotomous if it is assumed that the error terms have a bivariate standard normal distribution. However, estimation of such a model yielded a selectivity correction coefficient insignificantly different from zero indicating that sample selection bias is not a problem, and since this procedure involved the loss of a substantial number of observations (204), the results are not reported here.[7]

5. Results

Entry into higher education

Parameter estimates from the estimation of a model of the decision to undertake higher education—what we label from now on, the entry decision—are presented in Table 2. Three variants of the basic model are reported there. All have a similar degree of explanatory and predictive power, correctly predicting outcomes in 68 to 69 per cent of cases, which represents a 34 to 35 per cent improvement on what would have been achieved without parametrics.

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such persons we do not have details of the amount of hours they may or may not have worked in part-time employment while at school.

7 In any case, very little change occurs in the significance levels on any of the important variables.

Table 2: Estimates of Logit Model of Entry Probabilities - Total Sample

	(1)		(2)		(3)	
Constant	-2.172	(2.39)*	-2.091	(2.29)*	-2.144	(2 34)*
Male	0 423	(2.58)**	0.413	(2 50)*	0.420	(2 56)*
Poor English	-0.153	(0.22)	-0 113	(0.16)	-0 105	(0 15)
Overseas at age 14	0.401	(0.60)	0.351	(0.52)	0.353	(0.52)
Small urban at age 14	-0.320	(1.40)	-0.333	(1.45)	-0.335	(1.46)
Rural at age 14	0.095	(0 44)	0.114	(0 53)	0.101	(0.47)
Father's birthplace:						
England, USA, Canada	-0 298	(0.91)	-0.387	(1.16)	-0.376	(1.13)
N. Europe	0.510	(1 10)	0.455	(0 98)	0 451	(0.97)
Mediterranean	0.086	(0.34)	0 059	(0 23)	0 084	(0 33)
Asia	0.622	(1.32)	0.564	(1.19)	0.579	(1 22)
Other overseas born	0.676	(1 04)	0.628	(0.95)	0.634	(0.96)
Lived with mother only	1.554	(3 44)**	1 536	(3.39)**	1 549	(3 41)**
Lived with father only	-0.580	(0.50)	-0 860	(0.73)	-0 820	(0 70)
Mother attended uni.	0 443	(1 59)	0.433	(1.55)	0.458	(1 64)
Father attended uni.	-0 055	(0 22)	-0.040	(0.16)	-0.027	(0 11)
Catholic school	-0 149	(0 62)	-0.104	(0.43)	-0.119	(0 49)
Other non-government school	0 336	(1.16)	0.348	(1 20)	0.344	(1 18)
Religion Catholic	0.365	(1.78)#	0.349	(1 70)#	0.360	(1 75)#
Family size	0.012	(0.22)	0.016	(0.29)	0.021	(0.37)
Father's occupational status	0.022	(2.79)**	0.021	(2.69)**	0.021	(2.67)**
Duration of residence	0.672	(0.41)	0.720	(0.44)	0.685	(0.42)

continued..

Table 2 (cont'd)

	(1)		(2)		(3)	
Unemployment/ population ratio	0.211	(0.04)	-0.175	(0.03)	-0.048	(0.01)
Ability	1.286	(6.77)**	1.317	(6.88)**	1.320	(6 90)**
Year 12 in 1986	0.143	(0.83)	0 134	(0.77)	0.143	(0.82)
Year 12 in 1987	-0.137	(0.44)	-0.145	(0.46)	-0.146	(0 54)
Worked part-time in year 12	-0.211	(1 22)	-0.789	(2.51)*		
Hours (in year 12)					-0.094	(1.86)*
Weekly pay (in year 12)			0.017	(2.23)*	0.033	(2 42)*
Hourly pay (in year 12)					-0.132	(2 00)*
McFadden's ρ^2		0 10		0.10		0.10
Cragg-Uhler R^2		0.17		0 18		0.18
Chi-square		101 03		106 11		106.07
Prediction success (%)		68 1		68 5		68 0
Reduction in prediction error (%)		34.3		35.1		34 0

Notes ** Significant at the 1 per cent level
* Significant at the 5 per cent level.
# Significant at the 10 per cent level.
Asymptotic *t* statistics in parentheses.
The omitted categories for the categorical variables define the control group as female non-Catholic students of a State school who have an adequate command of the English language, who lived with both parents in a capital city at age 14, completed year 12 in 1985 and do not work in paid employment. Neither parent attended university and the father was born in Australia.

If the influence of part-time work is ignored, the most significant variable is ability, a factor not considered in either Miller and Volker (1989) or Prior and Beggs (1989). Taken at face value, the results indicate that students who believe that they were 'well above average' when in year 10 have a probability of entering higher education which is between 2.7 and 2 9 times greater than that of otherwise comparable students.

Earlier we expressed concern that ability may not be exogenous and hence will bias coefficients on other variables in the system towards zero As a check for this problem we applied a test due to Pagan and Vella (1989). This test strongly supported treating the ability variable as exogenous in these data.[8]

Father's occupational status is also significant, the positive sign indicating, as argued by Miller and Volker (1989, p.55), either of two influences. First, since occupational status is closely associated with income it may indicate that the quality of a child's education is a normal good, demand for which rises with income And second, occupational status may reflect 'differences in family background which condition preferences towards schooling' (Miller and Volker 1989, p 55).

Other significant influences are exerted by. the gender variable, males *ceteris paribus*, being more likely to enter higher education; the control dummy for lived with mother only at the age of fourteen[9]; and, at weak significance levels, Catholic religion. In contrast to Miller and Volker's results, no significance could be attached to ethnicity (though the variable for Catholic religion may be disguising some effects here), mother's education[10], school type, family size, and labour market conditions.

We now examine the role of part-time work When this was initially included as a simple dummy variable in equation (1), working part-time in year 12 was not found to exert any significant impact on the entry decision, though the negative sign is consistent with the results reported by Prior and Beggs (1989) Table 1, however, indicates that all the hypothesized effects of part-time employment are not in the same direction In particular, the subsidy effect should act to increase education participation whereas it is argued that all the other effects reduce participation in education. In

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8 The test actually applies to probit estimates rather than logit estimates derived here. We, therefore, re-estimated equation (3) using the probit model (which obtained qualitatively similar results). The test then involves obtaining the generalized residuals from this probit equation and multiplying them by observations on each of the other explanatory variables. The interaction between the the residuals and the ability variable is then regressed on all of the remaining newly created interaction variables as well as the residuals. The test of endogeneity of ability is then simply a t-test on the intercept term in this equation, which is highly insignificant (t = 0.001).

9 The inclusion of this control is necessary since in families where the father is not present, no values can be assigned to the variables constructed from the father's characteristics. Of course, the positive sign may also signal that children of single mothers (at age fourteen) are more likely to go on to higher education.

10 Application of a one-tailed test on mother's education would see the null hypothesis of no correlation rejected at the 10 per cent level.

specification (2), therefore, we include weekly pay alongside the part-time employment dummy in order to distinguish this positive subsidy effect from the other negative effects of part-time employment. Both the part-time employment dummy and the pay variable achieve significance, their signs indicating as expected that part-time work reduces the probability of entry into higher education but as the pay from that job rises, the probability of entry rises.

In specification (3) the dummy variable is dropped and we move to a model which seeks to separate the effects of hours of work, weekly pay and hourly pay. Again the results accord with expectations. The hours variable is negative and significant at the 5 per cent level (in a one-tailed test), while hourly pay exerts a significant and negative effect Finally, the weekly pay variable is positive suggesting that the subsidy effect outweighs any negative influence coming from the effect of employment in increasing tastes for employment.[11] It should also be noted that the interaction variable between ability and hours of work was insignificant and had little impact on the overall results and hence is not reported in Table 2.[12]

In Table 3 estimates of separate models for males and females are reported. It is conventional to do this because the slope parameters may vary between the sexes [13] Of most interest are the hours and pay variables. All attract the hypothesized signs but are only significant for females Thus the expected effects of part-time work appear to apply only to females.

Looking at the size of the net effect of part-time employment, the results reported in Tables 2 and 3 can be used to calculate the estimated probabilities of year 12 students going on to higher education. Focussing first on the control group implicit in the reported equations, the results in Table 2 give a probability of 0.309 for males (calculated at the mean values of unemployment, family size, and father's occupational status). For females, the conditional probability is only 0.227, although when we estimate separately for each gender group, the difference in the control groups is slight, 0.273 versus 0.268. Part-time employment, however, has very divergent effects for the sexes. Taking an average year 12 student worker, working 7.5 hours per week and earning $35 for that week's work

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11 There is some concern, however, that in this specification multicollinearity may be a problem The t-statistics may, therefore, overstate the level of confidence we can have in separating the effects of the three variables representing the different aspects of employment

12 This variable continues to perform insignificantly in the separate sex equations reported on below. Tests for the importance of other interactions, notably between weekly pay and unemployment, and between weekly pay and father's occupational status, also failed to find any relationships of significance.

13 The application of a chi-square test for the validity of splitting the total sample by gender gives a statistic of 40 4 which, with 27 degrees of freedom, is significant at the 5 per cent level

Table 3: Estimates of Logit Model of Entry Probabilities by Gender

	Males		Females	
Constant	-3.893	(2 24)*	-0.861	(0.75)
Poor English	-0.605	(0.49)	-0.075	(0.07)
Overseas at age 14	0.886	(0.95)	-0.147	(0.13)
Small urban at age 14	-0.066	(0.19)	-0.548	(1.61)
Rural at age 14	-0.176	(0.50)	0 267	(0.90)
Father's birthplace:				
England, USA, Canada	-0.471	(0 91)	-0 369	(0.79)
N. Europe	0.494	(0 74)	0.051	(0.07)
Mediterranean	0 909	(2 36)*	-0.606	(1.60)
Asia	0.779	(0.80)	0 252	(0 41)
Other overseas born	1 603	(1 17)	0 418	(0 51)
Lived with mother only	2 923	(3 89)**	0 668	(1.02)
Lived with father only	0 737	(0 46)	-9 604	(0 11)
Mother attended uni	0 883	(1 84)#	0 411	(1.09)
Father attended uni.	0.203	(0.52)	-0.199	(0 56)
Catholic school	-0.424	(1.12)	0 209	(0.63)
Other non-government school	-0.014	(0 03)	0 793	(1.83)#
Religion Catholic	0.025	(0 08)	0.573	(1.99)*
Family size	0.123	(1 44)	-0 104	(1.28)
Father's occupational status	0.034	(2.75)**	0 009	(0 83)
Duration of residence	2.294	(0 86)	-0 836	(0.28)
Unemployment/population ratio	7.941	(0 65)	-1.152	(0.16)
Ability	1.624	(5 00)**	1 257	(4.85)**

continued..

Table 3 (cont'd)

	Males		Females	
Year 12 in 1986	-0.200	(0 68)	0 266	(1 10)
Year 12 in 1987	-0 323	(0 68)	-0.078	(0 17)
Hours (in year 12)	-0.035	(0 49)	-0.175	(2.11)*
Weekly pay (in year 12)	0.026	(1.34)	0 050	(2.29)*
Hourly pay (in year 12)	-0.097	(0 95)	-0.222	(2.31)*
McFadden's ρ^2	0.17		0.12	
Cragg-Uhler R^2	0.28		0 20	
Chi-square	80 07		62 00	
Prediction success (%)	72.8		71.1	
Reduction in prediction error (%)	44 7		38.3	
Sample size	345		401	

Notes ** Significant at the 1 per cent level.
* Significant at the 5 per cent level
# Significant at the 10 per cent level.
Asymptotic *t* statistics in parentheses
The omitted categories for the categorical variables define the control group as non-Catholic students of a State school who have an adequate command of English language, who lived with both parents in a capital city at age 14, completed year 12 in 1985 and do not work in paid employment Neither parent attended university and the father was born in Australia

(in 1984 prices), the probability of going on to higher education for males is four percentage points higher than an otherwise identical group of non-working males. In contrast, the net effect of part-time work on female participation in higher education is negative, with the probability of entry falling to 0.163 (compared with 0.27 for the control group).

Perhaps more revealing are the probabilities presented in Table 4. Here we look at the effect of different combinations of wage rates and hours of work on the probability of entering higher education by gender. Somewhat arbitrarily, relatively long weekly hours and high hourly wage rates are set at the level determined by the 80 percentile level in their respective frequency distributions in the total sample. Similarly, relatively short hours and low rates of pay are represented by the 20 percentile level. For males the distinctive feature of Table 4 is the large positive increment to the probability of further study that comes from the combination of relatively long hours and high rates of pay, which suggests that subsidy effects are important. For females, when compared with the control group, regardless of what hours are worked or the wage earned, the probability of further study is lowered when schooling is combined with employment However, the effect is not marked for females working relatively long hours and on relatively high rates of pay, again suggesting the countervailing influence of subsidy effects

Table 4: Estimated Probabilities of Entry into Higher Education Associated with Different Employment States

	Weekly hours of work					
Hourly wage rate	Not in employment		Short hours (4)		Long hours (10)	
	M	F	M	F	M	F
Not in employment	0 273	0 268				
Low wages ($3 71/hr)			0 251	0 144	0 327	0 152
High wages ($5 93/hr)			0 254	0.138	0 411	0 249

Overall, these findings stand in stark contrast to those reported by Prior and Beggs (1989), and presumably result from the major differences in the measurement of part-time work in the two studies, and possibly also because this paper treats non-students and persons attending TAFE colleges as identical.[14]

14 Estimation of a multinomial logit equation which separates attendance at a higher education institution, attendance at a TAFE college and ceasing education, however, did not reveal any effects being exerted by part-time employment on the probability of attending TAFE, while our conclusions with respect to higher education are unaffected

While Prior and Beggs were at a loss to explain their finding, we are not surprised to find that part-time employment has a large negative impact on girls' participation in education. It seems plausible that the discretionary income and consequent independence obtained from working is more highly valued by girls than by boys, thus increasing their taste for employment Added to this, the rate of return to education for females is lower than for males. The value of work now, relative to work after higher education, is therefore greater for girls This could be expected to compound the effect.

What is more surprising is our finding that part-time employment actually increases the probability of boys going on to higher education, which suggests a strong positive subsidy effect. Indeed, application of a one-tailed test on weekly pay would support such a conclusion at the 10 per cent level The overall effect of part-time employment for boys, however, is clearly insignificant.[15]

Another point of interest is that while it is insignificant in both the total sample and in the male sample, attendance at a non-Catholic non-government school has a positive effect on the entry of females into higher education, consistent with findings reported by education researchers (see Anderson and Vervoorn, 1983, Chap. 5)

Finally, a number of characteristics associated with parents—birthplace (Mediterranean), mother's education, occupational status and lived with mother only (at age fourteen)—are significant for males but not for females. However, being of the Catholic faith appears to be associated with greater probabilities of entering higher education for females, but not for males.

Retention in higher education

In Table 5 we report the estimates of our logit model which seeks to explain the retention of students in higher education (that is, whether they continue in higher education beyond the first year). Models are presented for the total sample as well as disaggregated by sex. All perform relatively well as indicated by the pseudo-R^2 measures and the extent of prediction success, though the separate sex equations perform best.

Variables that achieve some significance are: self-assessed ability (positive in the total sample); family size (negative in the male equation); birthplace in Northern Europe, Asia and other overseas countries (negative in either the total sample or in the male equation); Catholic religion (which is associated positively with retention for males but negatively for females); amount of TEAS received (positive in the male equation), place of residence at age fourteen being overseas or rural Australia (both positive in the female equation); and the measure of duration of residence in Australia. The latter variable has a positive sign in the male equation which, because of the way the variable is constructed, implies a negative relationship with retention

15 A Wald test (which has a chi-square distribution) for the joint significance of hours, weekly pay and hourly pay gave a statistic of 3 4 which, with 3 degrees of freedom, is insignificantly different from zero

Table 5: Estimates of Logit Model of Retention Probabilities

	Total sample		Males		Females	
Constant	2 818	(1.77)#	0.437	(0.15)	4.277	(1 88)#
Male	-0.029	(0.10)				
Poor English	0.457	(0.50)	-0.846	(0 55)	1.264	(0.78)
Overseas at age 14	0 022	(0.03)	-1 464	(1 38)	3.796	(2 27)*
Small urban at age 14	0.257	(0.61)	0 097	(0.15)	0 887	(1.34)
Rural at age 14	0.499	(1.18)	-0 038	(0 06)	1 306	(1.97)*
Father's birthplace:						
England, USA, Canada	0 754	(0.96)	0 805	(0.64)	1.264	(0 96)
N. Europe	-1 403	(2 44)*	-2 466	(2.45)*	-0 979	(1.12)
Mediterranean	-0 227	(0 51)	-0.831	(1 23)	0 421	(0.60)
Asia	-1.228	(1.99)*	1.764	(1 63)	-0.648	(0 73)
Other overseas born	-1.233	(1 52)	-2.164	(1 93)#	1 289	(0 60)
Lived with mother only	-0 810	(1.00)	-0 890	(0 67)	-0 437	(0.36)
Lived with father only	9 876	(0 09)	10 319	(0.05)	10 893	(0 05)
Mother attended uni	0.697	(1 52)	0.930	(1.20)	0 847	(1.28)
Father attended uni.	0.541	(1 21)	1 133	(1.51)	0.401	(0.58)
Catholic school	0.678	(1 55)	-0 420	(0.59)	1 725	(2 46)*
Other non-government school	0 374	(0 86)	0 202	(0 29)	0.340	(0 54)
Religion Catholic	-0 013	(0 04)	1.012	(1 74)#	-0 907	(1 78)#
Family size	-0 092	(1 08)	-0 233	(1 71)#	-0 062	(0 40)
Father's occupational status	-0 011	(0 77)	-0.003	(0 15)	-0 023	(1.08)
Duration of residence	1 153	(0 53)	8.708	(1.83)#	-16.639	(3 09)**

Table 5 (cont'd)

	Total sample		Males		Females	
Unemployment/ population ratio	-8.712	(0.80)	7 379	(0.38)	-15 020	(1.18)
Ability	0 703	(2.22)*	0.785	(1 56)	0.587	(1.15)
TEAS	0 006	(0.84)	0 020	(1 75)#	-0.010	(0.96)
Year 12 in 1985	0 471	(1 34)	0 924	(1 62)	0 250	(0.46)
Year 12 in 1986	-0 424	(1 12)	-0 354	(0.59)	-0 450	(0 78)
Hours (in first year)	-0 006	(0 15)	0 054	(0.95)	-0.001	(0.01)
Weekly pay (in first year)	-0 002	(0.25)	-0.017	(1 39)	0 008	(0.35)
Hourly pay (in first year)	0.079	(1.08)	0 187	(1 68)#	-0 025	(0.20)
McFadden's ρ^2		0.09		0 21		0 17
Cragg-Uhler R^2		0.21		0.30		0 24
Chi-square		37 00		42 36		33.38
Prediction success (%)		82.3		83.7		84 1
Reduction in prediction error (%)		39 5		46.9		45.2
Sample size		423		209		214

Notes ** Significant at the 1 per cent level
* Significant at the 5 per cent level
# Significant at the 10 per cent level.
Asymptotic *t* statistics in parentheses
The omitted categories for the categorical variables define the control group as non-Catholic students of a State school who have an adequate command of English language, who lived with both parents in a capital city at age 14, completed year 12 in 1985 and do not work in paid employment. Neither parent attended university and the father was born in Australia

probability.[16] Similarly, the negative sign in the female equation implies that the probability of retention for females increases with duration of residence in Australia.

The main finding of this paper is that working part-time is typically found to have insignificant effects on retention in higher education. The only indication of any significant effects comes from the weakly significant sign on hourly pay in the male equation. In contrast to expectations, the sign on that variable is positive. The most likely explanation for this is that the hourly pay variable (instead of weekly pay) is picking up the positive subsidy effect. Even in the male equation, however, the three variables used to capture the effects of part-time employment are jointly insignificant.[17] Indeed, the overall fit of the equations can be improved slightly by including a variable representing whether a student was studying on a part-time or full-time basis in their first year in higher education While it may have been thought that this variable would have been highly correlated with part-time employment, it enters the equation for the total sample significantly (though only at the 10 per cent level) yet has little impact on the significance of the other variables in the equation [18]

6. Summary and Conclusions

In this paper we have analysed the factors that influence the probability of year 12 students going on to higher higher education and, in turn, the probability that first year higher education students will proceed to the second year, with special reference to the effect of part-time employment.

There are four hypotheses that we have sought to test. One, that part-time employment assists retention because of the finance provided (the subsidy effect) Two, that part-time employment reduces retention because it affects school studies and reduces performance at school This effect will be greater the more hours worked (the hours effect) Three, that there is an effect associated with the wage rate earned from part-time employment *Ceteris paribus,* those students receiving a higher wage rate for their part-time employment assess their earnings potential now (relative to their potential post higher education wage) as being higher and are, therefore, more likely to leave school (the current earnings potential effect) Four, that a taste effect could be present It is argued that this effect should be greater the more hours a student works, the higher their hourly earnings, and the higher their weekly pay.

Previous studies have tended either to focus on the subsidy hypothesis or have not put forward any hypotheses. In this paper we have tested for the presence of each of these four effects. In addition we have been concerned with the direction and size of the *net* effect of part-time employment

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16 Duration of residence is constructed as 1 / (1 + length of residence), for overseas born, and zero, for Australian born.

17 The Wald test gave a chi-square statistic of 3 68

18 Part-time study, however, does not achieve significance in the separate sex equations

The estimates of our model for retention in higher education suggest that part-time employment whilst studying at university (or similar level institution) has not been a factor which has been critical to continuing studies into a second year. However, part-time employment appears to be far more important for the decision concerning entry into a higher education institution in the first place, particularly for girls. While part-time employment is found to increase the probability of young males entering higher education from year 12 by four percentage points, this measured effect is not found to be significant. The net effect for females, however, is very significant and is negative Compared with the control group implicit in the estimating equations, the probability of entering higher education is over ten percentage points lower for the average female year 12 student with a part-time job Moreover, our model appears to work very well in explaining this transition, and evidence is found to support the presence of all of the hypothesized effects of part-time employment in the case of girls. The subsidy effect is found to outweigh the taste effect with regard to the weekly income variable, the hours effect (possibly in association with the taste effect) has a negative impact and the current earnings capacity effect (again possibly in association with the taste effect) also has a negative impact

These conclusions, however, must be treated with some circumspection given: (a) our inability to discern any obvious pattern in the effect of part-time employment on the education decisions of boys, (b) the possibility that multicollinearity may be distorting the relative importance of the different component- variables used to capture the influence of part-time employment; and (c) uncertainty as to whether the measured effects of part-time employment are the result of part-time work itself, or whether they reflect joint decisions about work and education made prior to commencing year 12. On this latter point, while no significant interaction between ability and hours of work could be found (which we argued would be present if all we were observing was the presence of joint decisions), the fact that part-time work had no effect on retention in higher education is somewhat disquietening. If, however, the entry decision is far more critical than that concerning retention, as would seem reasonable, then we would expect any non-school activities undertaken while in year 12 to have a greater bearing on education decisions than similar activities undertaken while studying at higher education institutions.

A further concern is that our results regarding the divergent effects of part-time employment for the sexes stand in direct opposition to those produced by the earlier study of Prior and Beggs. However, we argue that there are good reasons to believe that part-time employment is more likely to lead girls to opt out of education because of two related factors. First, it seems plausible that girls in the age groups of concern here value more highly the income employment provides, and second, if rates of return to education are lower for females, this effect will be further compounded.

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Sloan, Judith and Mark Wooden (1984) 'Part-time Work, School Retention and Unionization Aspects of the Youth Labour Market', Working Paper No. 72, National Institute of Labour Studies, November.

Appendix A: Variable Descriptions and Sources

The variables used in the analysis are defined briefly below. Many exactly replicate those used in Miller and Volker (1989; see pp 64-65). The question number and codes relating to each variable are also listed. Note that the first letter in the code provided indicates the year of the survey (V denotes 1985, W 1986, X 1987 and Y 1989).

1. Variables derived solely from the 1985 survey

(a) Gender: Male = 1 [VA3]

(b) *English ability:* Fair, poor or very poor = 1 on a self-assessed item [VB26].

(c) *Where living at age 14:* Overseas, [VB6], non-capital city (small urban), country town or rural area (rural) [VB7]. The omitted category is capital city.

(d) *Father's birthplace:* Based on categories used by Miller and Volker (1989) [VB2].

(e) *Family structure at age 14:* As in Miller and Volker (1989), three categories are considered. lived with mother only; lived with father only, lived with both mother and father, the last being the omitted category [VB10].

(f) *Parent's post-school qualifications:* Based on attainment when the respondent was fourteen years of age, only two attainments were identified in this analysis: had attended a university or equivalent; had not attended a university or equivalent. Separate variables for father and mother were constructed [VB15, VB21].

(g) *Religion:* As in Miller and Volker, only Catholics are separately identified [VB27].

(h) *Family size:* Total number of siblings [VB22] plus one

(i) *Duration of residence:* Calculated as 1/(1 + length of residence) for overseas born and as zero for Australian born persons Length of residence is derived from VB4

(j) *Father's occupational prestige:* Derived by transforming occupation data [VB20] into a prestige score using the socio-economic status score matrix used in the Australian National Social Sciences Survey (Kelley *et al* 1987).

(k) *Ability:* Based on responses to a question asking respondents to rate how good they were at schoolwork in year 10 relative to others in the year. Four different response options were provided. The variables used in this analysis take the value 1 if the respondent stated they were 'well above average' [VD10, VD12, VE7].

2. Variables derived from longitudinal methods

(a) *Educational Attainment:* To construct the dependent variables it was necessary to identify whether year 12 had been attained [from VD7, VE5, VE8, WE5, XE5, YE5], and whether that person had gone on to higher education in the following two years [from VE32, WE22, XE25, YE33].

(b) *Type of school attended.* As in Miller and Volker, three types of schools are identified. Catholic; other non-government; government schools; the last being omitted [VD6, VE4, WE4, XE4, XE8, YE4, YE8]

(c) *Amount of TEAS received.* Income per fortnight received from either TEAS or AUSTUDY (in 1984 prices) [VP8A11, VP9, WP8A11, WP9, XP8A11, XP9, YP8A11, YP9]. In some cases it was not possible to separate TEAS income from other benefits. These observations had to be discounted from the sample Further, the relevant question concerned income received by the respondent or his or her spouse If both were studying, the income attributable to TEAS was halved

(d) *Unemployment/population ratio.* Ratio of unemployed fifteen to nineteen year old persons to the population of fifteen to nineteen year olds for different gender and State groupings. [State of residence derived from VE3, WE7, XE7, YE7, BLMRID]

(e) *Hours of work·* In the entry equation this variable is defined as usual hours worked per week while in year 12 In the retention equation it is defined as usual hours worked per week while in first year of higher education studies [VG5, VG27, WG14, WG38, XG18, XG43, YG12, YG36]

(f) *Weekly pay:* Usual gross weekly pay before tax (in 1984 prices) [VG7, VG8, VG9, WG18, WG19, WG20, XG22, XG23, XG24, YG16, YG17, YG18].

Appendix B: Descriptive Statistics

1. Sample - Completed Year 12 in 1985, 1986 or 1987

	Mean	Standard Deviation	N
Dependent Variable			
Entered higher education in following year	0.406	0.491	906
Explanatory Variables			
Male	0.469	0.499	906
Poor English	0.020	0 140	906
Overseas at age 14	0.034	0.182	906
Small urban at age 14	0.188	0.391	906
Rural area at age 14	0.244	0.430	906
Father's birthplace:			
England, USA Canada	0 081	0.272	906
N. Europe	0 036	0 187	906
Mediterranean	0 156	0 363	906
Asia	0 051	0.220	906
Other overseas born	0 020	0 140	906
Lived with mother only at age 14	0 081	0 272	906
Lived with father only at age 14	0 008	0.088	906
Mother attended uni	0 113	0 317	875
Father attended uni	0 172	0 377	867
Catholic school	0 203	0 402	906
Other non-government school	0.105	0 307	906
Religion Catholic	0.361	0 481	898
Family size	3.417	1.597	906
Father's occupational status (÷ 10)	41 446	17 978	838
Duration of residence	0 024	0 079	904
Unemployment/population ratio	0 136	0.016	906
Ability	0 251	0 434	903
Year 12 in 1986	0.406	0.491	906
Year 12 in 1987	0 094	0 292	906
Worked during year 12	0.383	0 486	906
Hours worked during year 12	2 687 (7.547[a])	4 464	868
Weekly pay in year 12 (in real terms)	12.260 (35.029[a])	20.577	860
Hourly pay in year 12 (in real terms)	1 650 (4.798[a])	2.495	852

2. Sample - Completed Year 12 in 1984, 1985 or 1986 and Entered Higher Education in Subsequent Year

	Mean	Standard Deviation	N
Dependent Variable			
Continued higher education in following year	0.817	0.387	492
Explanatory Variables			
Male	0 498	0.501	492
Poor English	0 024	0 154	492
Overseas at age 14	0.073	0 261	492
Small urban at age 14	0 157	0 364	492
Rural area at age 14	0 215	0 412	492
Father's birthplace:			
England, USA Canada	0 067	0.250	
N Europe	0.047	0 211	492
Mediterranean	0 154	0 362	492
Asia	0 085	0 280	492
Other overseas born	0 030	0 172	492
Lived with mother only at age 14	0 085	0 280	
Lived with father only at age 14	0 010	0 100	
Mother attended uni	0.172	0.377	478
Father attended uni	0 234	0 424	479
Catholic school	0 204	0 403	490
Other non-government school	0 163	0 370	490
Religion Catholic	0 367	0 483	489
Family size	3 486	1 718	492
Father's occupational status (÷ 10)	43 852	18 819	459
Duration of residence	0 034	0.099	491
Unemployment/population ratio	0 132	0 017	492
Ability	0 358	0 480	489
Amount of TEAS received in previous year ($/fortnight)	13 733 (43 504[a])	23 256	491
Worked during previous year	0 427	0.495	492
Hours worked during previous year	6 121 (14 583[a])	10.978	486
Weekly pay in previous year ($)	29 132 (71 262[a])	51.209	477
Hourly pay in previous year ($)	2.181 (5 402[a])	2.865	473

Notes [a] Mean conditional on positive values

All variables are proportions except family size, father's occupational status, duration of residence, the unemployment/population ratio, amount of support received under TEAS, hours worked, weekly pay and hourly pay.

School Students in Part Time Work

Ian McRae*

1. Introduction

Many school students are involved in part time work, and in the last ten years the proportion has grown significantly. Figure 1 shows the growth since 1978. In August 1980 17.2 per cent of school students worked part time, ten years later the figure was almost 25 per cent.

This of course is the proportion working at the time of interview, and the numbers who have worked at some time is much greater. Examination of the Australian Longitudinal Survey (ALS) data used in this paper shows that in 1985 around 57 per cent of year 12 students had worked at some time in the preceding four years.

In this paper we address the questions:

* What are the characteristics of school students who work part time?
* What do we know about the work which they do?
* Does part time work while at school influence later employment outcomes?

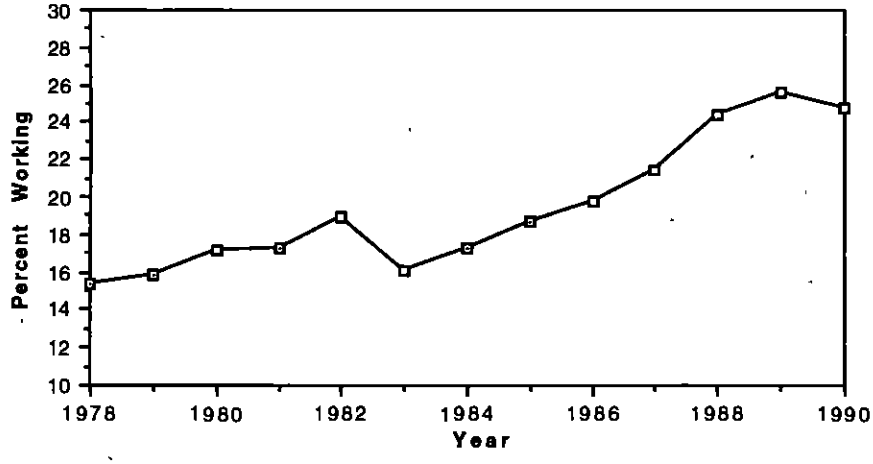

Fig 1: School Students Working (Percent of Students)

* The views expressed in this paper are those of the author and not necessarily those of the Department of Finance

2. Related Research[1]

Ashenden (1990) draws together a great deal of earlier research into issues relating to school students who work. He finds few studies based on substantial data sets, with many being based on studies from one or two schools. This paper should provide a more solid basis for many of the conjectures reported by Ashenden from those smaller studies.

Ashenden's synthesis concludes that while students mainly work for the money, few of them work to contribute to the family income, but rather they work to establish some degree of independence. This means that generally speaking he expects people of lower socio-economic status to be less likely to work than those from the higher status groups (although he notes one study showing students from independent schools being relatively less likely to work than their government school counterparts)

In this paper we follow the work of Coventry et al (1984) who investigate a group of school students over the period 1981-1983. Their results also support the view that part-time work tends to be undertaken by better off, rather than by poorer students, and that participation in part-time work has little influence on longer term labour market and study outcomes.

The ALS data is more recent, does not cover a period of recession, and comprises a larger data set (particularly with respect to the follow up data). It therefore provides an opportunity to more thoroughly explore issues relating to part time work by school students

Both Prior and Beggs (1989) and Wooden, Robertson and Dawkins (1990) use ALS data to examine the role of part time work in transition. Their main interests, however, are in transition to higher education Prior and Beggs (1989) study which was undertaken earlier was able to use only 1985 and 1986 data from the ALS. They examine the transition of year 12 students to further education or employment, and conclude that part-time work leads to lower representation in tertiary studies, but to a higher probability of being employed

Wooden, Robertson and Dawkins (1990) use four years of ALS data, to address the question of whether school students who are part time workers are more likely than non-workers to go on to further study. Their results suggest that part time employment is important in decisions relating to progress to higher education, especially for girls. The following analysis complements their work by explicitly considering those who do not go on to higher education.

3. The Data

The data for this study were drawn from the Area Sample component of the Australian Longitudinal Survey. The Area Sample provides data from a representative sample of Australians aged 16 to 25 in 1985, with follow-up

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1 The literature on part time work among youth in Australia is relatively small. Papers of relevance to this research include Dowrick (1988), Robertson (1989) and Sloan and Wooden (1984)

interviews in 1986, 1987, 1988 and 1989. This study draws on the data for 1985 and 1988, and uses as a sub-sample that group of young people who responded in both of those years. As our main interest is in long term outcomes, the data for the intervening periods is not considered except for the specially constructed file which allows analysis of the process of transition from school to work. While data for 1989 is now available, 1988 provides an adequate period over which to explore changes in the student's employment, and minimises problems of sample attrition.

4. Who are the Part-Time Workers?

Table 1 below shows the basic information given by the ALS on part-time work by school students. Around 30 per cent of the students were working when interviewed in 1985 (virtually none were working full time). Slightly higher proportions of females worked than males, and somewhat higher proportions of those in years 11 and 12 worked Already in these figures we see one of the main features of the data: that the proportion working is relatively large in all groups—part time work is a part of life for a wide spectrum of school students.

One factor apparent in Table 1 and confirmed by further analysis is that, broadly speaking, the groups which are more likely to work are likely to work less hours. This effect is consistent with the results of Coventry et al (1984). For example, while females are more likely to work than males, almost twice as many males as females work more than 10 hours, and 12 per cent work 15 hours or more compared with 5 per cent of females (see Table 5)

The results in Table 1 are consistent with the view that it is the children of the higher socio-economic groups who participate in part time work, since the children of the better off are more likely to complete school than the children of lower socio-economic groups Equally however they do not prove this view as age/level at school and socio-economic status may both be relevant influences.

We are able to look directly at socio-economic status using family income as a measure. Unfortunately income information is difficult to collect in any study and the ALS is no exception. It is particularly difficult to collect income information in relation to people other than the respondent—partly because the respondent does not know, and partly because the relevant person (in this case usually the parent of a respondent) is not part of the study and therefore does not feel obliged to provide the information

As a consequence family income data are available for only 409 of the 978 school students in the sample. While there will undoubtedly be some biases in this sub-sample, analysis suggests that these will be minor. It is worth noting, for example, that the 'Total' lines of Tables 1 and 2 are very similar. The Appendix provides a comparison of the full sample and the sample for which income data is available for a range of variables

An alternative used by other researchers is to replace income with a derived socio-economic status score based on father's occupation. This would have increased the numbers of observations available, but would

Table 1: School Students Basic Data

Group	% Employed	Average Hours Worked by Workers	Sample Size
Males	29	8 0	487
Females	33	7 2	491
Year 12	35	7.2	382
Year 11	32	7 9	434
Year 10	18	7 6	162
TOTAL	31	7.6	978

Table 2: Hours Worked by School Students by Family Income (net of students earnings)

Income (per week)	% Employed	Average Hours Worked by Workers	Sample Size
< $200	18.2	11 3	66
$200-$399	23 5	7.7	98
$400-$599	34 2	6.6	123
$600-$799	41 3	7 3	84
$800 or more	26 4	5 4	38
TOTAL	29.9	7.5	409

have meant using a variable which was less directly related to a family's capacity to support a student

Table 2 shows the proportions employed and the hours worked by school students tabulated against family income. The income data relates to the income unit of which the respondent is a member. This will consist of the respondent, the parent(s) (if the respondent is living at home—97 per cent of school students live with one or both of their parents), and any siblings who are at school or are otherwise dependent on the parents. The student's earned income is excluded from the family income figure.

Thus table shows that, apart from the very high income group, increasing family income is associated with a higher probability of working. This is again consistent with the view that school students who undertake part time work generally do so not to support themselves or their families, but may in fact be middle class students working for pocket money. The lower probability of work of the highest income group is against this trend, and may be because this group has less need to work. The lower probability of the high income group working is statistically very unlikely to have occurred due to small sample effects, and later multivariate analysis confirms the existence of this effect.

The hypothesis that those more likely to work are likely to work less hours is broadly supported by the evidence in this table. In particular the least well off students are least likely to work, although if they do work they work the longest hours. In contrast the students from higher income families are generally likely to work less hours This further supports the 'pocket money' hypothesis.

The expansion of AUSTUDY into high schools in recent years is likely to reinforce the trend of students from less well off homes being less likely to work. Indeed if they did work they would need to work longer hours to make the work worthwhile. The 1985 ALS did not separately identify those who received assistance under the Secondary Assistance Scheme (SAS—the precursor to AUSTUDY in schools) so we cannot address this issue.

The level of penetration of SAS in 1987 was already over 30 per cent for 16 and 17 year olds (Larum and Beggs, 1989) In their time series analysis Larum and Beggs show that an increase in SAS reduces the extent to which students participate in part time work.

To better understand which groups of students participate in part-time work we have modelled employment and hours worked using a large set of potential explanatory variables following the examples of Miller and Volker (1987), Coventry et al (1984) and Wooden, Dawkins and Robertson (1990)

Table 3 shows the result of the logistic modelling of employment by school students A variable assessing the facility of the respondent to use the English language was used initially, but was dropped because it was very highly correlated with the variable identifying recent arrivals The high income variable was included to examine the effect visible in Table 2 that the highest income group was relatively less likely to work than would be expected from extrapolation from the lower income groupings

The model shown fits very poorly, in part almost certainly because there are not large differences between employment rates of different groups (except for some relatively small groups). However the models can help us to see some structure in the data, and to develop some views regarding which groups are most likely to undertake part-time work

Firstly we note the strong effect of age as reflected in the 'year at school' variable (also evident in Table 1); the younger students are less likely to work than older students.

Secondly, the income effect is highly statistically significant (income was in fact not significant when the high income dummy was not used) While the effect of high income is not significantly different from zero, it is significantly different from the effect of $800pw income as estimated from the simple income variable. The trend is clearly in the direction that the better off students are more inclined to work, although those in the highest income group are much less inclined to work than an extrapolation of the trend would suggest (being in fact about as likely to work as those with a family income of $263 pw).

Table 3: Logistic Models of Employment For School Students

Variable	Model One	
	Estimate	p-value
Intercept	-2.32	0 00
Gender(1)	0.01	0 97
Roman Catholic School(2)	0.46	0.12
Private School(2)	-0.33	0 42
Year at School(3)	-0.38	0.09
Aboriginal	0 68	0.54
Capital City(4)	0 05	0.87
Other City(4)	-0.29	0.42
Recent Arrival(5)	0.73	0 41
Mother's Birthplace(6)	0 42	0.46
Father's Birthplace(6)	0 71	0.18
Mother Has Degree	0 19	0 75
Mother's Schooling (7)	0 36	0.37
Father Has Degree	0 19	0 67
Father's Schooling (7)	-0 20	0.57
Educational Aspirations (8)		
- parents	-0 15	0 73
- respondent	0 10	0 81
Ability at School(9)	0 32	0.44
Family Income (10)	0 002	0.01
High Income (11)	0 45	0 41

Model One. df = 381 chi sq = 454 7 prob = 0.0055 N = 412

Notes:

The p-value is 1 minus the probability that the observed value differs from zero (ie a two tailed test)

(1) Coded 1=Male, 2=Female
(2) Base group is government schools
(3) Coded 1=Year 12, 2=Year 11, 3=Year 10 or below.
(4) Base group is small towns and rural areas
(5) Coded 1=arrived since 1980 from other than UK or NZ, 0 otherwise.
(6) Coded 1=Australia, UK, NZ and 0=all other countries
(7) Coded 1=attended secondary school or higher, non-degree, 0= all others
(8) Coded 1=aspirations at least year 12, 0=lower aspirations
(9) Coded 0=average or below, 1=above average.
(10) Income set at 0 for values over $800pw
(11) Coded 0=family income below $800 pw, 1=family income $800 pw or more.

Table 4: Estimated Probabilities of Employment for School Students

Group		Probability of Employment
Standard		0.27
Standard but:		
Year 10		0 27
Year 11		0.35
Year 12		0 43
Standard but.		
New arrival, both parents overseas born:		0.20
Standard but·		
Family income	$200pw	0.21
	$400pw	0 27
	$600pw	0.35
	$800pw	0 23
Standard but:		
Attended Catholic school		0 37
Attended Indendent school		0 21

The 'standard' group is defined as. male, attending a government school, year 10, non-aboriginal, living in a capital city, parents Australian born (ie not a recent arrival), parents having attended at least secondary school but without degrees, with low personal and parental aspirations, reporting above average school ability, and family income at the group average

The Table shows expected probabilities of employment based on Model 1 of Table 3 Since the gender effect is both insignificant and very small, all estimates are for males but those for females are virtually the same.

It is interesting to note that students at Catholic schools are more likely to work than those at government schools, and although the effect is not significant, those at private schools are less likely to work as reported in Ashenden (1990).

If we undertake the analysis without the income variables, mother's education is highly significant. Thus is obviously linked to family income (and indeed Prior and Beggs (1989) use it for precisely this purpose) In experimenting with these variables it was noted that in the models without income, greater discrimination between levels of education improved the model's explanatory power, but in the models with income it did not matter how the variables were specified.

To show the impact of these variables on the likelihood of working, Table 4 shows the probabilities of working for selected groups of students in Model One. The table shows the strong impact of family income on employment, and that age/year at school is an even stronger determinant of probability of employment. The combined effects of the several variables which would

impact upon a recent arrival are shown to have a negative effect on probabilities of part-time employment while at school (again consistent with results reported in Ashenden), although the 'recent arrival' variable taken in isolation has the opposite sign.

5. What Kind of Work is Done?

The stereotypical work for school students involved in part-time work is in fast food outlets or stacking the shelves in a supermarket Ashenden (1990) collates most of the available information on these part-time workers and his results are broadly consistent with this view. The ALS also enables us to examine the nature of part time work Table 5 summarises this information. These results are largely consistent with those provided by Ashenden, and do lead to the view that this is temporary work—it is not likely to be the work which the young people take up when they leave school. In the next section we examine this suggestion more directly.

Table 5 also shows clearly that sales occupations still dominate both for male and female part-time workers. Even more dominant is the retail industry, where almost three quarters of both males and females work However, compared with Ashenden's figures the participation in manual work is lower and work in the service sector higher. The gender differentiation is particularly noticeable, with very few females active in the manual occupations As noted earlier the males tend to work more hours, and as a consequence receive higher weekly wages.

It is worth noting however that males are also more likely to receive higher hourly wages. This is at least in part because they work in higher paying occupations, with manual occupations receiving the highest average wages ($5 42 per hour) while the largest group of females are in the sales occupations which receive on average $4 97 per hour.

Table 6 shows models of hours worked by school students Again it is a relatively poorly fitting model, exacerbated in part by the fact that people must be working to contribute to it so the sample size is further reduced. The only significant variables in Model Two relate to regions, and show that those in cities who work part-time are likely to work more hours than those in small towns or rural areas (although they are not significantly more likely to work).

When this model was assessed with the income variables excluded, a significant negative effect of mothers education and of parental aspirations was apparent Those from families with higher educational achievements and aspirations are more likely to work shorter hours.

Table 5: Aspects of the Jobs Held by School Students

	Males	Females	Persons
		(per cent of workers	
HOURS WORKED PER WEEK			
Less than 5	27	27	27
5 and less than 10	42	57	50
10 and less than 15	19	11	15
15 hours or more	12	5	8
WEEKLY EARNINGS			
Less than $25	33	32	32
$25 and less than $50	39	50	45
$50 and less than $75	19	12	15
$75 and less than $100	5	3	4
$100 or more	4	3	3
HOURLY EARNINGS			
Less than $2.50	7	3	5
$2.50 and less than $5	45	53	49
$5 and less than $7 49	35	37	36
$7.50 and less than $10	9	5	7
$10 or more	3	1	2
OCCUPATION			
Clerical	5	4	5
Sales	45	74	60
Basic Manual	29	4	15
Service	11	11	11
Other	10	7	9
INDUSTRY			
Retail Trades	71	75	73
Recreation and other services	11	14	13
Other	18	11	14

Table 6: Regression Models of Hours Worked for School Students

Variable	Model Two	
	Estimate	p-value
Intercept	10.64	0 00
Gender (1)	-0.68	0.33
Roman Catholic School (2)	-0.89	0.32
Private School (2)	-1.73	0.15
Year at School (3)	0 01	0.98
Aboriginal	1 08	0.70
Capital City (4)	1 83	0 04
Other City (4)	2 78	0 01
Recent Arrival (5)	4.62	0 11
Mother's Birthplace (6)	-1 62	0.43
Father's Birthplace (6)	0.89	0 64
Mother Has Degree	-1 70	0.35
Mothers'sSchooling (7)	-0 96	0 40
Father Has Degree	-0 90	0 49
Father's Schooling (7)	-1 25	0 22
Educational Aspirations (8)		
-parents	-0 70	0 58
-respondent	-0 20	0 88
Ability at School (9)	-0 56	0 65
Family Income (10)	-0 0006	0 76
High Income (11)	-1 20	0 46

Model Two R-square = 0.215 R-square adj = 0 073 N = 125

Notes

The p-value is 1 minus the probability that the observed value differs from zero (ie a two tailed test)

(1) Coded 1=Male, 2=Female
(2) Base group is government schools
(3) Coded 1=Year 12, 2=Year 11, 3=Year 10 or below
(4) Base group is small towns and rural areas.
(5) Coded 1=arrived since 1980 from other than UK or NZ, 0 otherwise
(6) Coded 1=Australia, UK, NZ and 0=all other countries
(7) Coded 1=attended secondary school or higher, non-degree, 0= all others.
(8) Coded 1=aspirations at least year 12, 0=lower aspirations
(9) Coded 0=average or below, 1=above average
(10) Income set at 0 for values over $800 pw
(11) Coded 0=family income below $800 pw, 1=family income $800 pw or more

6. 1988 Outcomes and School to Work Transition

General

In the preceding sections we have examined the kinds of jobs which young people have while they are at school, and the kinds of young people most likely to work while at school.

We now examine the labour market activity of these young people three years later in 1988, and in particular whether employment while at school has any discernible impact on:

* whether they are employed or unemployed;
* the quality of the jobs they work in as measured by wages received;
* the duration and nature of the process of transition from school to a permanent job:
  in particular whether working students move to work in the same occupation after leaving school.

This analysis will be focused on those young people who are not in the labour force and are not in full time study in 1988, so the sample is reduced by around 40 per cent

To begin we examine the transitions of these students over the three years to 1988. The vast majority have left school (in fact only five were still at school in 1988) Following the pattern of analysis in Kryger (1990) we can examine the transitions, and see whether those who worked at the time of the 1985 interview behaved differently from those who did not.

The results are presented in Table 7 There are several findings from this relatively simple table:

Table 7: School Students in 1985
1988 Employment/Study Status by 1985 Employment Status
(% of 1985 group)

	1985 Employment Status		
1988 Employment/Study Status	**Employed**	**Not Employed**	**Total**
Full time education:			
employed	26.6	17.6	20.4
not employed	12.6	20.4	18.0
Not full time education:			
employed full time	52.2	45.6	47.6
employed part time	6.0	7.7	7.2
unemployed	1.0	5.8	4.3
not in labour force	1.7	3.0	2.6
Sample size	301	677	978

* those who worked or did not work while at school are equally likely to go on to further study, but if they do study those who worked at school are very likely to continue in employment. Wooden, Robertson and Dawkins (1990) explore this issue more fully. Examining a group of year 12 students they find a positive (but not significant) effect of part-time work on probability of attending higher education for boys and a negative (and significant) effect for girls. As Table 7 does not separate effects by gender these results are of course not visible.
* of those who do not go on to full time study, those who worked while at school are more likely to work and particularly more likely to work full time than those who did not.

In our analysis of the 1988 outcomes we therefore attempt to establish whether, after allowing for the relevant background variables, part-time work at school has any impact on students' experience after leaving school. We model the outcomes (in particular unemployment and wages) using the standard set of variables used earlier, plus an indicator variable to identify whether the students worked in 1985. Further variables are used to identify level of schooling achieved and time since leaving school as a proxy for labour market experience (including a squared term to allow for non-linearity).

Unemployment in 1988

The model in Table 8 examines the probability of unemployment in our sample. Since we have excluded those in full time study and those not in the labour force, we essentially have a dichotomous situation. The model fits well, and shows that whether the student was working in 1985 is important. People who were employed while at school are less likely to be unemployed after leaving school

Other variables broadly take the directions expected with, for example, higher personal education associated with reduced likelihood of unemployment. It is of note that higher family income is generally associated with lower probabilities of unemployment in 1988.

Table 9 shows these results in the form of estimated probabilities of unemployment. The impact of attending year 12 and of being employed in 1985 are both clear and very large—in both cases reducing probabilities of unemployment by factors as high as four. The latter is consistent with the results in Table 7.

This does not prove that working while at school reduces the chances of being unemployed on leaving school, and it could be that other correlated variables not included in this model are the main operatives (eg motivation, family attitudes) However, it provides a strong indication that work while at school is in fact related to avoidance of unemployment on leaving school. This result is consistent with Prior and Beggs (1989).

Table 8: Logistic Models of Unemployment in 1988 for 1985 School Students

Variable	Model Three	
	Estimate	p-value
Intercept	-0.61	0.86
Gender(1)	0.83	0.16
Months Since School	0.05	0.82
Months Since School Squared	-0.002	0.63
Roman Catholic School(2)	-0.37	0.64
Capital City(3)	-0.05	0.94
Other City(3)	0 25	0.77
Mother's Birthplace(5)	0 46	0.69
Father's Birthplace(5)	-0.75	0.50
Mother Has Degree	2.75	0.18
Mother's Schooling(6)	0.02	0.99
Father's Schooling(6)	0.36	0.68
Educational Aspirations(7)		
parents	-0 01	0 98
respondent	0.57	0.45
Ability at School(8)	-0 92	0.19
Family Income (9)	-0 001	0.36
Completed Year 11	-0 56	0 50
Completed Year 12	-1 79	0 02
Employed in 1985	-1 78	0.10

Model Three. df = 204 chisq = 101.06 prob = 1.00 N = 229

Notes:

(A) The following variables were included in the modelbut the analysis indicated that either all values were zero or the model implied infinite estimates: Aboriginal, Private School(2), Recent Arrival(4), Father Has Degree, High Income (10). (B) The p-value is 1 minus the probability that the observed value differs from zero (ie a two tailed test)

(1) Coded 1=Male, 2=Female.

(2) Base group is government schools

(3) Base group is small towns and rural areas.

(4) Coded 1=arrived since 1980 from other than UK or NZ, 0 otherwise

(5) Coded 1=Australia, UK, NZ and 0=all other countries.

(6) Coded 1=attended secondary school or higher, non-degree, 0= all others.

(7) Coded 1=aspirations at least year 12, 0=lower aspirations.

(8) Coded 0=average or below, 1=above average.

(9) Income set at zero for values above $800 pw.

(10) Coded 0=family income below $800 pw, 1=family income $800 pw or more.

Table 9: Estimated Probabilities of Unemployment in 1988 for 1985 School Students Who Were Not in Full Time Study in 1988

Group	Probability of Unemployment	
	Not Employed in 1985	Employed in 1985
Standard	0 16	0 03
Standard but		
Highest level of education attended.		
Year 10	0 16	0 03
Year 11	0.10	0 02
Year 12	0.04	0.01
Female	0 30	0.07
Family income:		
$200pw	0.21	0.04
$400pw	0.15	0.03
$600pw	0 10	0.02

The 'standard' group is defined as: male, attending a government school, highest education completed year 10 or below, living in a capital city, parents Australian born, parents having attended at least secondary school but without degrees, with low personal and parental aspirations, reporting above average school ability, family income at the group average and not employed in 1985

The Table shows expected probabilities of employment based on Model 3 of Table 8.

Wages in 1988

A further measure of success is wages Following the usual human capital modelling of earnings we use log (hourly wages). With this data we construct a basic regression model with the full set of explanatory variables.

The results of this modelling are presented in Table 10, where age appears as the most significant variable Since the model also includes variables to assess labour force experience (which are verging on being significant), age must be reflecting the age-based nature of junior awards.

The 1985 employment variable is clearly not significant, and indeed suggests that if employment at school is related to later earnings it does not improve these earnings However the effect is very small

The Relationship Between Part Time Employment and the Transition Process

In this section we look at the relationship between part time work while at school and the actual process of moving into employment Model Three in Table 8 established that there is a relationship between part time work and later employment (at least in terms of reducing probabilities of unemployment) Other questions are do those who have part-time work while at school have an easier transition to full time work?, do they get

Table 10: Regression Models of Log of Hourly Wages in 1988 for 1985 School Students

Variable	Model Four	
	Estimate	p-value
Intercept	-0 41	0 59
Gender(1)	-0 04	0.48
Age	0 15	0 001
Months Since School	-0.04	0 18
Months Since Left School Squared	0.001	0 11
Aboriginal	0 15	0.45
Roman Catholic School(2)	0 11	0.10
Private School(2)	-0 04	0 70
Capital City(3)	0 03	0.64
Other City(3)	0 05	0 51
Recent Arrival(4)	0 13	0 60
Mother's Birthplace(5)	0 09	0 46
Father's Birthplace(5)	0 01	0 93
Mother Has Degree	0.03	0 88
Mother's Schooling(6)	-0 03	0 71
Father Has Degree	-0 03	0 79
Father's Schooling(6)	0 01	0 85
Educational Aspirations(7)		
parents	0 06	0 48
respondent	0 06	0 48
Ability at School(8)	-0 05	0 50
Family Income (9)	0 0002	0 26
High Income (10)	-0.013	0 91
Completed Year 11	0 11	0.24
Completed Year 12	0 18	0 02
Employed in 1985	-0 06	0 28

Model Four. Rsquare = 0 19 Rsquare adj = 0 07 N = 193

Notes. The p-value is 1 minus the probability that the observed value differs from zero (ie a two tailed test)

(1) Coded 1=Male, 2=Female
(2) Base group is government schools
(3) Base group is small towns and rural areas
(4) Coded 1=arrived since 1980 from other than UK or NZ, 0 otherwise
(5) Coded 1=Australia, UK, NZ and 0=all other countries
(6) Coded 1=attended secondary school or higher, non-degree, 0= all others
(7) Coded 1=aspirations at least year 12, 0=lower aspirations
(8) Coded 0=average or below, 1=above average
(9) Income set at 0 for values over $800 pw
(10) Coded 0=family income below $800 pw, 1=family income $800 pw or more

Table 11: Aspects of Transition to Work

Table 11A: Duration of Transition to First Full Time Job

	Duration of Transition:			
	Less than 2 weeks	2 weeks to 6 months	More* than 6 months	Total
	(% of group)			
Group of Students				
Completed Year 12				
Employed in 1985	69	12	19	100
Not Employed in 1985	72	12	16	100
Did not Complete Year 12				
Employed in 1985	87	5	7	100
Not Employed in 1985	82	7	10	100
Total	75	10	15	100

* Includes those who still have not obtained their first full time job.

Table 11B: Proportions Employed in Selected Occupation Groups

	1985 Survey	First Full Time Job[1]	1988[2] Survey
		(% of Employees)*	
Occupation			
Clerical	4	37	38
Sales	62	20	15
Basic Manual	18	7	4
Service	9	3	9
Other	8	32	34
Total	100	100	100

* Based on sample employed while at school, and

1 having at least one full time job after leaving school;

2 employed in 1988 (including part time)

Table 11C: Duration of First Full Time Job

	Duration of Job:		
	Less Than 6 Months	More Than 6 Months	Total
	(% of group)		
Group of Students:			
Completed Year 12			
Employed in 1985	52	48	100
Not Employed in 1985	57	43	100
Did Not Complete Year 12			
Employed in 1985	41	59	100
Not Employed in 1985	50	50	100
Total	53	47	100

their first full time jobs more quickly or hold on to them longer?; is there any similarity between the 1985 job and the 1988 job?

The ALS data allow us to answer these question directly. Firstly, as shown in Table 11A, we examine the time taken to obtain a job for those who do or do not work at school. To allow for whether or not the respondent completed year 12 (the only other significant variable in Model Three) the two groups are examined separately. Among those who complete year 12, the 'workers' take marginally longer to find their first full time job, while for those who do not complete year 12 the converse is true Overall however there is very little difference.

The table also shows that the time taken to find a first job is less on average for those who leave school early. This is probably because these students leave school explicitly to work and have a job organised, while those who stay to year 12 are more likely to begin to seek work after completing school.

In considering this data it is also important to note that those who go from study to a 'holiday' job are included, and it is not possible with the data in its present form to differentiate 'real' from 'holiday' jobs However the results in Table 11B show relatively little difference in occupation structure between the first full time job and the job held in 1988, while there is significant difference between these jobs and the part-time jobs at school. The 'holiday job' effect is therefore expected to be small

We can also examine the duration of the first full time jobs Because the duration of the job is incomplete this measure should be treated with some care. However since none of the sample left school after 1987 (and relatively few in 1987), and interviews were held in September 1988, all respondents had at least 9 months in the labour market. If we consider six months to be the boundary between a 'stable' and an 'unstable' first job truncation, bias should not be relevant.

Table 11C shows that those who had a part-time job while at school have greater probabilities of retaining their first full time job for more than six months than those who did not work Interestingly those who do not complete year 12 are also likely to hold the first job longer.

Overall these transition data provide a strong indication that while those who work at school do not get their first full time job any more quickly than others, they tend to hold the job longer. Thus the group of young people who worked at school are either more prepared for work in general, or are better matched to their jobs than those who did not work while at school.

The figures in Table 11B, which compare the occupation categories in which young people work at school and after leaving school would appear to support the view that those who worked are better prepred rather than better matched. Even ignoring the balancing flows between occupations, there are very large net flows In particular there are very large shifts from the sales and manual occupations in which most young people work while at school, to the much wider range of occupations they participate in on leaving school. In particular clerical occupations and the trades are virtually

unused by school students, but comprise a significant proportion of school-leaver employment.

It is also important to note (although not shown explicitly in this table) that only about 20 per cent of those who worked at school were working in the same occupation in 1988 The students who worked are therefore not, in general, benefiting from job specific skills The only obvious conclusion therefore is that their work experience led them to be better and more stable workers than those with no experience of the world of work.

7. Conclusions

Part time work while at school is a very wide spread. The work undertaken by school students is heavily concentrated in the sales and basic manual labour occupations, especially within the retail trading industry

Of those who work, 90 per cent work less than 15 hours per week, and 75 per cent work less than 10 hours In 1985 this meant that less than 10 per cent of the workers earned more than $75 per week.

The main determinant of whether a student worked was their level at school, which is presumably a mixture of peer group and age effects. Students from higher income families are generally more likely to work than those from lower income families The exception is the very high income group who are much less likely to work than would be predicted from the trend of those on lower incomes, and those with family incomes over $800 per week are on average as likely to work as those with incomes of round $263 per week

There is also evidence that many of the factors which lead to a higher probability of working also lead, on average, to working fewer hours This provides strong support for the hypothesis that much of part-time work provides pocket money for middle class school students rather than family support, a view proposed by Coventry et al, and broadly supported by our results

Any attempt to measure the impact of employment while at school on later outcomes must always be qualified by the fact that the same factors are likely to influence both outcomes, and we may not fully account for these. However our results indicate that, of the non-students who are in the workforce in 1988, those who had part-time work while at school are more likely to be employed than those who did not

The examination of the transition process shows that the workers and non-workers take about the same time on average to find their first post-school job. However those who work are likely to hold their first post-school job longer

Given that there is little evidence that technical skills learned while working part-time are of direct use in later employment, this would seem to imply that 'working skills' acquired in the part-time work are themselves of value when the young person leaves school These results support the view of Ashenden (1990) that part time work can be a 'kind of trial run, a very gentle learning curve'.

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Appendix

Comparison of Group Which Reports Family Income and Full Sample of School Students

Category	Total Sample (%)	Reports Family Income (%)
Male	49.8	53 6
Female	50.2	46 4
Age (1985)		
15	1 5	1.5
16	57 5	55.6
17	32.9	33.3
18	6.7	8.0
19-20	1 5	1.7
Year at school (1985):		
year 12	39 1	41 0
year 11	44 4	42 5
year 10 or below	16 6	16.5
Employment Status 1985		
employed	30 8	30 3
unemployed	8 2	9 0
not in labour force	61 0	60.7
Employment Status 1988		
employed	75 3	72.5
unemployed	6 5	8 0
not in labour force	18.2	19.4
Mother's Birthplace·		
Australia, New Zealand or Great Britain	77.8	75.0
Elsewhere	22.2	25.0
Father's Birthplace.		
Australia, New Zealand or Great Britain	75.0	73.1
Elsewhere	25 0	26.9

The Extent and Impact of Career Interruptions Among Young Australian Men and Women

Donald E. Lewis and Brett Shorten*

1. Introduction

Despite equal pay legislation and equal employment opportunity policies, women in Australia continue to earn less than men. Recent studies (Chapman and Mulvey 1986; Gregory, Daly and Ho 1986; Rummery 1989) have generally estimated a gender wage gap of 15-20 per cent. Differences in human capital variables such as education and experience account for some of the difference but much of the observed gap is unexplained. The residual is often attributed to discrimination but could also be the result of measurement errors or missing variables

It is also widely recognised that women and men do substantially different types of work (Power 1975, Lewis 1985, Karmel and MacLachlan 1988). It is estimated that more than one-quarter of the Australian workforce would have to change occupations for men and women to have similar occupational structures.

One suggested reason for both the earnings gap between men and women and occupational segregation is that women are more likely to have intermittent labour force participation. Women, for example, are more likely to leave the labour force when they get married or when they have children. Most of the women who leave under such circumstances eventually return to the labour force but their temporary withdrawal may have deleterious consequences. The human capital paradigm (developed by Stigler 1962; Becker 1964; Mincer 1974; Mincer and Polachek 1974, Polachek 1981) provides a useful framework for analysing the effects of interruptions on wages and occupational patterns.

2. A Human Capital Framework

Investments are expenditures which are expected to be recouped over time Business firms invest in physical capital such as buildings, plant and equipment. Workers invest in human capital in the form of education and training, migration and the search for new jobs The knowledge and skills of a worker represent a stock of productive capital. Such productive capital is

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acquired through formal education, on-the-job training and work experience. Human capital can also be acquired within the household as knowledge is passed on from parents to children and between partners (Benham 1974).

The value of a given stock of human capital depends on how much this bundle of knowledge and skills can earn in the labour market. Migration and job search can increase the worker's wage rate and hence increase the value of human capital by increasing the rate at which human capital is remunerated.

Human capital, as well as physical capital, is subject to depreciation and also the possibility of restoration In the short run, long hours of employment can bring on fatigue Such depreciation of human capital is commonly restored by sleep or rest. Long hours of employment, especially under stressful conditions over a long time period may lead to 'brown out'. This is a more permanent form of fatigue and the resulting depreciation of human capital may be more difficult to restore. Long periods of rest, counselling, job change or retirement may be necessary.

Human capital may also depreciate from lack of use Atrophy is the wasting away of muscle organs or muscles through defective nutrition or lack of use Unemployed workers may suffer atrophy as previously acquired knowledge is forgotten and skills become rusty Depreciated human capital can be restored by retraining, or new work experience. Human capital can also depreciate over time as new technology renders old knowledge and skills obsolete

3. The Expected Effects of Interruptions on Wages

Mincer and Ofek (1982) have emphasised the negative impact an interruption may have on wages When individuals are not employed they can not acquire on-the-job training nor can their human capital be augmented through experience Furthermore, their skills and knowledge may deteriorate from lack of use or become obsolete The consequence of these effects is that re-entry wages may be lower than exit wages. Polachek (1981) argues that anticipation of an interruption may also influence choice of occupation He suggests that as women are more likely to experience an interruption, they will have a preference for occupations in which rates of depreciation through atrophy are low. The crowding of women into such occupations may depress wages and contribute to the gender gap.

On the other hand, wages may be enhanced by an interruption if the time out of paid employment is used to participate in formal education (Chapman and Mulvey 1986; Rummery 1989). Formal education enhances the stock of human capital and most empirical studies have found the level of formal education to be an important explanator of variation in wages and earnings among both males and females Education is also an important determinant of the choices available to an individual in selecting an occupation If individuals further their education during an interruption, their human capital will be increased and their re-entry wage rate may be

higher than their exit wage. Longer interruptions, taken for the purpose of schooling, would be expected to lead to higher re-entry wages

Individuals may also interrupt their employment history as part of a strategic job search to find more desirable employment (Stigler 1962; Morgan 1977). If the search is successful, within a short period the re-entry wage is likely to be higher than the exit wage.

Some workers search for a new job while employed. If successful, they may interrupt their employment with a short break (probably less than a month) during the transition between employers. Under these circumstances their re-entry wage may be expected to be substantially higher than the exit wage. The interruption should be viewed as a side effect of the successful job search and not a contributor to the wage increase Nevertheless, it may be difficult empirically to distinguish between those who have completed their job search before the interruption and those who use the interruption for the purpose of searching for a better position.

In summary, the net effect of an interruption on wages can not be determined *a priori*, at least within the framework of human capital theory. Individuals who interrupt their employment may suffer a decline in wages (absolutely or relative to continuously employed workers) as they forego the positive effects of on-the-job training and experience They may also suffer an erosion of wages due to atrophy or obsolescence of their skills and knowledge On the other hand, if individuals use the interruption to further their formal education or as part of a process of strategic job search and job improvement, their re-entry wage may exceed their exit wage Their growth in wages may even exceed that of a continuously employed worker The various effects and their expected impact on re-entry wages and lifetime earnings are highlighted in Table 1

Table 1: Possible Effects of an Interruption on Wages

Activity or effect during interruption	Impact on re-entry wage
Further education	positive
Job search or job transition	positive
Foregone on-the-job training	negative
Foregone experience	negative
Atrophy of skills and knowledge	negative
Obsolescence of skills and knowledge	negative

To date, an empirical study of the extent and impact of interruptions in Australia has not been completed. Rummery (1989) calculated that approximately 40 per cent of the gender gap can be attributed to the fact that females have less actual labour market experience than males. She was not able to estimate the effects of interruption *per se* as the number and length

of interruptions were not known. In her analysis a person with ten years of continuous employment is not distinguished from a person with two periods of five years employment interrupted by two years out of the labour force. Anstie et al.(1988) used cross-sectional data to document the decline in female earnings relative to male earnings for older age groups They suggest (without empirical support) that a principal reason for the decline in relative earnings of females as they get older '.... is that most married women experience interruptions in their labour force careers for child-rearing' (p 5)

Overseas studies have generally found that interruptions have a negative effect on earnings. Using longitudinal data for the United States, Mincer and Ofek (1982) found that women about to experience an interruption had lower wages and that re-entry wages were on average less than exit wages. They also found a rapid growth in wages after the return to work (the rebound effect attributed to the restoration of human capital) which lasted about five years. Stewart and Greenhalgh (1984) found that the majority of women in the United Kingdom have at least one interruption. More frequent and longer interruptions were associated with significantly lower earnings, employment in occupations requiring less training and skill and a greater likelihood of part-time employment Both of these studies were concerned with adult females and it should be noted, in particular, that work histories covering the normal child bearing years were available.

4. The ALS Data

The Australian Longitudinal Survey (ALS) is a representative panel of young Australians The survey began in 1985 and approximately 9000 Australians between the ages of fifteen and twenty-four were interviewed. The same individuals are interviewed annually and data is now available through to 1988 Besides providing personal data, individuals provide information on a weekly basis concerning their labour force and education activities The data set is ideal for analysing the effects of career interruptions on young Australians and will become more valuable as the cohort matures.

Because of its more representative nature, the Level 2 ALS sample was chosen for analysis. Data from all four interviews over the period 1985-1988 were used, supplemented by a summary data set[1] which covered the full reference period Only persons successfully interviewed in all four years were included, producing a sample of 5837 respondents.

An employment interruption is defined as a spell of two weeks or more in which no employment was reported both preceded and followed by a period of employment. The pre-interruption wage is the last wage reported in the job held immediately prior to the interruption. Similarly, the post-interruption wage is the first wage reported in the job held immediately after the interruption In many cases, wage data was either not provided by the respondent or was not sought for the relevant job

1 Supplied by the Department of Employment, Education and Training (DEET)

In all cases, wage data was converted to an hourly wage rate, then to a real hourly wage rate, using average full-time weekly earnings (for males and females separately) as the deflator. The base period is the March quarter of 1984.

5. Preliminary findings

As shown in Table 2, only one quarter of all persons were employed for the entire four year period of the survey. Continuous employment seems to have been more frequent for males (29 per cent) than for females (20 per cent). However, a majority of both sexes had at least one completed interruption. Males and females had an almost equal likelihood of experiencing one or more completed interruptions. This does not imply that females worked, on average, as much as males during the period. In fact, the mean percentage of the full reference period worked by females was only 65.6 per cent (median = 77.0 per cent), compared with 78.7 per cent for males (median = 93.0 per cent). This is because, for all interruptions, both mean and median length of interruption were greater for females. For example, with respect to the first interruption, the mean and median duration for females was 22.9 weeks and twelve weeks respectively, compared with 19.9 and nine weeks for males Hence for this cohort of young adults, the main gender difference is found in terms of longer interruptions for females, rather than in more interruptions Additionally, 8.2 per cent of the females were never employed during the four year period compared to only 1.6 per cent of the males

Table 2: Number of Interruptions 1985-1988 by Sex

	Males		Females		Persons	
Number of Interruptions	**No**	**%**	**No**	**%**	**No**	**%**
0 (worked continuously)	846	28 9	579	20 0	1425	24.4
0 (not working at either start or finish or both)	499	17 0	630	21 7	1129	19.4
1	704	24.0	716	24.7	1420	24 4
2	388	13.2	372	12.8	760	13 0
3+	448	15.3	363	12.5	811	13.9
Never worked	47	1.6	237	8.2	284	4.9
	2932	100.0	2897	100.0	5829	100.0
Missing = 8						

Table 3: Real Hourly Wages ($ 1984) in 1985 and 1988 by Sex and Number of Interruptions

Males				
Number of Interruptions	Median Hourly wage 1985	Median Hourly wage 1988	Median % change in wages	Number of persons
0 (worked continuously)	6.80	7.92	+15.3	642
0 (near continuous)	5 38	7 05	+38 3	183
1	6 43	7 43	+22 8	331
2	5.58	6 69	+21 4	159
3+	6 20	7.05	+16 6	161
Total	6.36	7.50	+19.7	1476
Females				
Number of Interruptions	Median Hourly wage 1985	Median Hourly wage 1988	Median % change in wages	Number of persons
0 (worked continuously)	5 98	7.03	+12.7	451
0 (near continuous)	5 57	6.13	+13.3	122
1	5 42	6.30	+20 6	299
2	5.27	6.35	+25.0	155
3+	5.16	6 19	+22.3	118
Total	5 66	6 39	+17.6	1145

Table 3 presents real hourly wages as at the 1985 and 1988 surveys, according to the number of interruptions experienced during the full reference period, for persons reporting valid wage data (and hence working) at both survey points. The first two columns indicate the median wage rates in 1985 and 1988. The percentage increase in wages between 1985 and 1988 was calculated for each person and the median per cent increase is shown in column three. The category of zero interruptions *(near continuous)* refers to persons becoming employed during the 1984-85 reference period and working continuously thereafter It is dominated by school leavers, which explains, for males, the much lower 1985 wage and the very rapid wage growth of this group over the next three years. This pattern did not apply in the case of females, however, with wage growth only equal to that for *fully continuous* workers. Table 3 also suggests that real wages in both 1985 and 1988 generally decline as the number of completed interruptions increases, especially for females A possible explanation is that persons anticipating

zero or few interruptions may have chosen educational investments and occupations leading to higher wage rates, whereas those anticipating more interruptions may have made human capital investments and entered employment areas more commensurate with their expectations

Also, males had higher real wages than females in 1985 and this advantage increased between 1985 and 1988. Male wages were $6.36 in 1985 compared to average female wages of $5.66. Over the three year period a typical male's wages increased by 19.7 per cent while female wages grew by only 17.6 per cent.

Finally, Table 3 suggests that wage growth for males and females was not impeded by periods spent out of employment Real wage growth of 15 3 and 12.7 per cent was experienced by male and female continuous workers between the 1985 and 1988 survey dates. However, this level of growth was always matched or exceeded by persons experiencing either one, two or three or more interruptions.

The result that those experiencing career interruptions also experienced the largest wage increases is inconsistent with evidence from other countries, and may partly indicate the influence of wage rigidities in the Australian labour market. Even though time is spent out of employment, re-entry may be at a regulated wage rate at least equal to that which would be earned by a continuous worker. In this case we may speculate that the difficulty of re-entry, rather than the wage rate, may be affected, so that re-entry may be more difficult in Australia than overseas. Additionally or alternatively, it may be that career interruptions are, for some reason, not deleterious to the labour market progress of young persons, but may become important later in life. This might result from the fact that for workers in some occupations, wages are determined by age (up to twenty-one years) rather than by experience Overseas evidence has generally drawn on the experience of older cohorts, typically in the 35-44 years range Another reason for the apparent inconsistency with overseas studies may be a consequence of the use of a shorter minimum period of time which was used to define an interruption in this study Overseas studies generally define an interruption as a period of non-participation lasting more than six months. In this study short interruptions may result from successful job searches and be too brief for depreciation effects to be relevant. Finally, the evidence presented in Table 3 is consistent with the expected wage effects of using employment interruptions as an opportunity for further study, thus augmenting the stock of human capital

Pre- and post-interruption real hourly wage rates are shown in Table 4, for persons for whom both exit and entry wage rates could be calculated Real wages were consistently higher after the interruption than before, suggesting that job search and study effects may have dominated human capital depreciation and loss of on-the-job training and experience effects Overall, post-interruption real hourly wages were 16 6 per cent above pre-interruption levels. In fact, wage growth during the interruption may even account for much of the total observed wage growth over the full reference period. Males with very short interruptions (2-4 weeks) had above average

Table 4: Median Real Hourly Wages ($ 1984) Before and After an Employment Interruption

Sex	Cross tabulation	Wage before interruption	Wage after interruption	Median % increase in wage	Number of interruption episodes
Male		5.93	6.70	17 4	795
Female		5 20	6.08	15 9	751
Total		5.53	6.39	16.6	1546
	Length of interruption				
Male	2 - 4 weeks	6.35	7.70	21.0	229
	5 - 13 weeks	6.19	6.90	16.9	178
	14 - 26 weeks	6.28	6.53	10.3	135
	27 -52 weeks	5.13	5.92	23 6	162
	53 + weeks	4.86	5.79	17.2	91
Female	2 - 4 weeks	5 46	6.26	16.5	194
	5 - 13 weeks	5 34	6.07	13.7	157
	14 - 26 weeks	5.34	5.93	12 7	150
	27 -52 weeks	5 01	6.08	15.5	136
	53 + weeks	4 77	6.10	25 7	114
	Education activity				
Male	Study	5 51	6.49	19 7	404
	No study	6.07	6.85	14.9	391
Female	Study	5.01	6.10	17.2	364
	No study	5.36	5.99	14 4	387
	Age				
Male	20 years or less in 1985	5 06	6 07	21.3	478
	21 years or more in 1985	6.77	7.65	10.8	317
Female	20 years or less in 1985	4.46	5.46	20.4	477
	21 years or more in 1985	6.21	6 84	8.6	274

wage growth. Hence, the evidence may be more compatible with job-search and study explanations of wage behaviour associated with employment interruptions than a human capital depreciation theory Both males and females who undertook formal study during their interruption experienced wage increases greater than those who did not engage in study.

The effect of age on wage growth is also shown in Table 4. Both male and female workers aged twenty years or less in 1985 experienced much larger wage increases than their older counterparts. Thus is consistent with the

Australian system of award rates for junior workers which sets higher wages for older workers (up to twenty-one years of age). Thus young workers can be 'rewarded' for an interruption due to aging even though their human capital has not been enhanced as a result of formal education, experience or on-the-job training.

Table 3 suggests that real wages at any point in time decline as the number of interruptions over time increase. Table 4 suggests that a similar phenomenon may have occurred in terms of length, rather than number, of interruptions. Pre-interruption wages in particular declined as length of interruption increased, and post-interruption wages also fell somewhat overall. However, wage growth at the point of re-entry seems to be greater for those experiencing interruptions of more than six months. Again, this is more compatible with job-search and human capital investment hypotheses regarding wage behaviour.

6. The Relationship Between Interruptions and Occupational Choice

Using the ASCO 2 digit level classification of constant occupations, we calculated median real hourly wage rates, in 1984 dollars, of those in each of the thirteen occupations as at the 1985 and 1988 interview dates Occupations were then ranked in order of wage rates, for each year separately The Pearson rank order correlation was 0 9, indicating little change in rank over the period. We then ranked each occupation according to its average rank for the two years From this ranking we defined a variable which measured occupational improvement or deterioration between the 1985 and 1988 interview dates.

The results show that of the 3352 respondents who were working at both survey points, and who reported adequate wage data on both occasions, only 13.8 per cent had moved to lower wage occupations A further 54 0 per cent had not changed occupations (at least at this level of disaggregation) whilst the remaining 32.2 per cent had moved to higher paying occupations

Table 5 shows that the overall picture changes substantially once interruptions are considered, as respondents experiencing interruptions are found to be much more mobile than continuous workers. Note that the 'near continuous' category refers to those who did not work absolutely continuously over the four years, did not have an interruption, and were employed at both survey dates Hence, they must have started a job during the 1985 reference period and worked continuously from then on These respondents followed a mobility pattern very similar to that of continuous workers. Non-continuous workers progressed both up and down the occupational 'ladder' more frequently A larger percentage became worse off as the number of interruptions rose, whilst a rising percentage became better off as interruptions rose to two, but this percentage declined thereafter. All of this suggests that job search may be a very important factor underlying employment interruptions for this youth cohort.

Table 5: Occupational Movement 1985-1988 by Number of Interruptions

Number of interruptions	Number of Respondents	Percentage of worse occupation	Percentage of same occupation	Percentage of better occupation
0	1419	10.4	63 4	26.2
0 (near continuous)	360	9.2	68 6	22.2
1	812	16.9	45 1	38.1
2	407	18 2	38.6	43 2
3+	350	20.6	39.1	40.3
Missing	4			
Total	3352	13 8	54.0	32 2

Table 6: Median Real Wage Growth by Sex, Number of Interruptions and Occupational Movement

		Median real wage increase in % 1988 occupation relative to 1985 occupation		
Sex	Number of interruptions	Worse	Same	Better
Males	0 (continuous)	20 2	13 5	17 5
	0 (near continuous)	16 6[a]	34 8	24 9
	1	8.2	14 9	26.7
	2	28 4	17.1	20.6
	3+	-1.0	10.4	25 4
	Total	11 9	17.5	20 6
Females	0 (continuous)	10 1	9 6	12.4
	0 (near continuous)	18 8[a]	11.2	12.1[a]
	1	4 1	15 5	24.4
	2	16.2[a]	17 7	23.5
	3	10.8[a]	18.9	39.0
	Total	7.1	10.5	23 1

[a] $n < 30$

Table 6 demonstrates that, in aggregate, both males and females who move to higher wage occupations do in fact experience the highest rate of real wage growth, whilst those who move to lower wage occupations experience the lowest rate of average growth. However, Tables 5 and 6 also demonstrate that there is no simple relationship between occupational mobility, wage growth and labour force interruptions. In fact, overall the results suggest that those with more interruptions are better off than those with less, for a given state of occupational mobility. Once again, the results seem to be dominated by interruptions caused either by periods of human capital investment or by periods of job search/job change.

7. Regression Models

Two regression models were estimated, along the lines suggested by Mincer and Ofek (1982). The first seeks to explain variations in the (log of the) re-entry wage, as a function of schooling, previous experience, the length of the interruption and appropriate control variables.
The second examines the effect of both number and length of interruptions on changes in (the log of) real earnings over the full ALS survey period 1985-1988. The results are shown in Tables 7 and 8.

In order to construct convenient measures of schooling, the first model, which seeks to explain variations in the re-entry wage across individuals, was restricted to those returning in 1988 from an interruption of more than four weeks duration, and for whom a re-entry wage could be isolated This produced a subsample of 203 respondents, Table 7.

The negative effect of length of interruption predicted by human capital depreciation theory was found, with the estimate approaching statistical significance at 0.10 Similarly, prior episodes of non-work were found to have a negative effect, and in contrast, prior experience (proxied by age) had a highly significant positive impact Schooling also produced results in line with expectations, with all groups having a lower re-entry wage than the control group of returnees with bachelor degrees or higher Respondents for whom interruptions were associated with study were, as expected, found to have higher re-entry wages, though the effect was perhaps less statistically significant than expected. After controlling for these factors, gender was still found to have an impact on the re-entry wage, with returning males receiving higher re-entry wages.

The results in Table 8 were generated from a regression utilizing information on all 2615 ALS respondents who reported a current wage for both the 1985 and 1988 surveys, as well as generating valid data for all explanatory variables. The dependent variable is the change in the log of real hourly earnings between the 1985 and 1988 survey dates. Sex interaction terms were included for all variables, as well as an intercept shift term, thus allowing derivation of separate regressions for male and females.

Table 7: Re-entry Wage Rate (Dependent Variable is the Log of Real Re-entry Hourly Wage After First Interruption)

Explanatory variable	Coeffient	t statistic
Length of interruption	-0 049	1.31
Prior non-experience	-0.047	1.43
Age	0.044	3 47[a]
Sex	0.125	2 16[b]
Primary[c]	-0.452	1.12
Junior High[c]	-0.169	1.41
Senior High[c]	-0.253	2.45[b]
Some post-school[c]	-0.190	1.43
Certificate[c]	-0.230	2.01[b]
Trade Certificate[c]	-0.336	2.64[a]
Diploma[c]	-0 233	1 52
Study during interruption	0 098	1.55
Presence of children in 1988	-0 040	0 42
$R^2 = 0.21$ F = 3 82		

[a] significant at 0.01, [b] significant at 0.05

[c] For educational variables, the control group is 'bachelor degrees and higher'.

Table 8: Real Wage Rate Change, 1985-1988

Explanatory variable		Males	Females
Constant		0.011[a]	1.257[a]
Number of interruptions		0.020	-0.015
Per cent of time interrupted		0.008[a]	-0.003[a]
Per cent of time worked		0.012[a]	-0 003[a]
Age[c]		-0.046	-0.029
Occupation change		0.001	0.007
Children		-0 007	-0 013
Education[b]	Primary	-	-1.188
	Lower secondary	0 113	-0 071
	Senior High	0 075	-0.031
	Some post-school	0.178	-0.052
	Trade Certificate	0.119	0.045
	Other Certificate	0.095	-0.031
	Diploma	0.154	-0.078
$R^2 = 0.10$ F = 10.39			

[a] The difference between the sexes is significant at 0 10

[b] For educational variables, the control group is 'bachelor degrees and higher'.

[c] Dummy variable equal to 1 if respondent aged 21 or over in 1985.

These results suggest that the effect of interruptions on wage growth is positive for males, for both number and length of interruptions. Moreover, in a separate regression, these effects were found to be statistically significant for males at the 0 05 level. For females, however, negative effects were evident, although length of interruption was not significant, the number of interruptions approached significance at 0.10. Table 8 thus provides some evidence that positive schooling and job search effects are dominant for males, whereas the negative effects of loss of training and experience, plus depreciation and obsolescence of skills, may be more important for females.

Other results suggest that educational attainment has little effect on rates of wage growth, a finding consistent with a highly centralized wage fixing system. Almost no educational groups were found to experience wage growth which was significantly different from that of the control group of respondents with bachelor degrees or higher. The presence of children (in 1988) was consistently found to have no significant effect on wage change over the period. Age was included in the regression in an attempt to capture institutional effects whereby young workers experience rapid wage growth as a result of award wages often being tied to age over the approximate range of 15-21 years The expected negative coefficient was found for both males and females, indicating more rapid wage growth for the younger workers in the ALS sample. Having controlled for this effect, the expected significant positive effect of work experience, measured as the per cent of time worked over the four year period, was found for males, but not for females for whom the effect was neither quantitatively important nor statistically different from zero.

8. Conclusions and Policy Implications

We have analysed the impact of interruptions to work between 1985 and 1988 on the youth cohort included in the ALS study. Our principal findings are:

1. Although interruptions are common for both sexes, females are less likely than males to have worked continuously. Furthermore, women who interrupt their work careers do so, on average, for longer periods than men
2. Regardless of the number of impending interruptions, in 1985 males had higher hourly wages than females and this advantage increased between 1985 and 1988
3. Real wages, prior to an interruption, tend to be lower the greater the number and length of impending interruptions. For example, the median wage for females in 1985 who worked continuously between 1985 and 1988 was 16 per cent above the median wage for females who had 2-3 interruptions during the period and 80 per cent above females who had an interruption lasting more than fifty-two weeks. Similar results were found for males but the impact is more likely to affect females as they tend to have longer interruptions. This data is consistent with the hypotheses that

individuals anticipating an interruption are likely to invest less in education and may crowd into a narrow range of occupations.

4. Real wages were also lower in 1988 (the last year of observations) for those who had more and longer interruptions. For example, the median wage for males who had worked continuously between 1985 and 1988 was 12-18 per cent above those who had 2-3 interruptions. The median wage for males after a 2-4 week interruption was 32 per cent greater than that of males who experienced an interruption of more than fifty-two weeks.

5 Real wages after the first employment interruption were generally higher than before the interruption The average increase in real wage was 8 6 per cent for males and 9.3 per cent for females. The reason for the increase in wages after an interruption is not entirely clear and this finding is in contrast to overseas studies. We can think of two possible explanations: (i) the results are dominated by job search and further education which have positive effects on wage growth; and (ii) the nature of the award wage structure in Australia which, for young people, rewards age rather than experience, may not penalise those whose skills and knowledge have atrophied or become outdated during an interruption These factors may explain in part why young people have higher unemployment rates. The opportunity costs of an interruption are mitigated by institutional factors which encourage young people to search for a new job after becoming unemployed rather than while in employment.

6 The increase in real wages following an interruption is particularly large for those who undertake study during the interruption and for those who are relatively young.

7. Both males and females appear to use short interruptions as part of strategic job search, following an interruption they may change employers and/or occupations and obtain significantly higher real wages in the process.

8. When regression analysis is used to control for variables such as education and age, longer interruptions are found to have a negative effect on the level of re-entry wages. This is consistent with the hypothesis that skills and knowledge depreciate due to atrophy and obsolescence during long periods of disuse

9. Regression analysis also suggests that the growth in male real wages between 1985 and 1988 was enhanced by increases in the number and length of interruptions. In contrast, the growth in female real wages declined as the number and length of interruptions increased. This asymmetrical impact may be due to the fact that males are more likely to engage in further study during an interruption and females are more likely to withdraw from the labour force due to family responsibilities.

In conclusion, our findings using the data from the ALS survey are broadly consistent with the human capital model outlined in section 2. Whether an interruption has a positive or negative impact on re-entry wages and lifetime earnings will depend in large measure on the reasons for the interruption and on the activities undertaken during the interruption. Short interruptions for the purpose of job search and longer interruptions for further education may substantially increase earnings. For example, those who engaged in further study during an interruption experienced an increase in wages 20-30 per cent greater than those who did not. On the other hand, real wages prior to and after an interruption tend to be lower the greater the number and length of interruptions

These findings have several policy implications. Individuals may freely choose to interrupt their employment with full knowledge of the likely consequences. We suspect, however, that many young people are not fully aware that numerous or long interruptions, for purposes other than study and job search, may have a deleterious effect on wage growth and lifetime earnings. If this is true, a case could be made for a government policy to inform young people, especially those still in school, of the likely consequences of interruptions. This is particularly true for young women as our regression analysis indicates that the growth in real wages for females declines as the number and length of interruptions increases.

At the same time, interruptions for the purpose of job search or further study may be highly productive investments and efficient ways for young persons to increase their lifetime earnings. As such they should be encouraged.

The collection of ALS data should be extended to older age groups so that the effect of interruptions over the entire life-cycle can be analysed. In the mean time we must rely on overseas studies which suggest that very long interruptions (usually a result of childbirth and family obligations) can have a deleterious effect on female earnings. The negative effects of an interruption (the atrophying and dating of skills and knowledge) appear to be particularly acute when individuals are out of the labour force for more than one year.

Overseas studies indicate that women often accept a position below that for which they are qualified when they first return to work following a long interruption. Additional assistance for women seeking employment in such circumstances could help reduce the mismatch between job requirements and the skill and experience of women returning to the labour force.

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The Effect of Child Care Costs on Women's Market Work

Francis Teal*

1. Introduction

Two major changes which have occurred in the Australian labour market since the 1960s are the increased participation of women with dependent children and the much greater increase in part-time employment than in full time employment Women with dependent children, who wish to enter the labour market, need to make some provision for care of the children. In recent years the public provision of child care places has expanded rapidly and the costs of such places and the extent of subsidy provided have become important policy issues

Cross-section studies have shown that the presence of children, particularly young children, very substantially reduces both the probability of a woman having a market job and the number of hours worked (Heckman 1974a,b; Joshi 1986; Ross 1986, Perry 1988, 1990, Beggs and Chapman 1988, Apps and Savage 1989) These studies have been interpreted as showing that children are expensive in the sense that having children implies substantial forgone earnings Consistent with this interpretation of the effects of children on the labour participation decision are related studies which show that a reduction in child care costs increases female participation (Heckman 1974b, Robins and Spiegelman 1978, Blau and Robins 1988, Gustafsson and Stafford 1988) Child care payments are one instance of the costs to women of market work which have been studied by Cogan (1980, 1981) for the US and by Kawaguchi (1990) for Australia

However, no Australian study has quantified the specific effects which the costs of child care might have on female labour force participation. The principle objective of this paper is to show how the ALS data can be used to estimate the effects of child care costs on the decision of women with children to enter the paid work force, and on the number of hours they decide to work.

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Most of the analysis in this paper is focused on married women as it is possible that single mothers and married mothers face different constraints.[1] The effect of child care costs is of some importance for several reasons. First, if the primary objective of subsidising child care is to facilitate female labour market work then whether present subsidies are sufficient to meet this objective is clearly of interest. It has been widely argued that such subsidies may cost relatively little when the tax take is allowed for (Anstie, Gregory, Dowrick and Pincus 1988). The net cost to government revenue of such subsidies must hinge on their effects on participation Second, if present policies permit only part-time participation, does such a result militate against the acquisition of work experience which has been shown (Rummery 1991) to be an important determinant of differences in the life time earnings profiles of men and women?

The plan of this paper is as follows. Section 2 sets out the use of child care shown by other data sets. Section 3 outlines the extent to which the ALS data modify and extend our understanding of the use of child care. The information from both the ALS and other sources is combined in Section 4 to provide estimates of the effects of child care costs on female market work. A final section sets out the policy questions which can be addressed with the findings of the paper.

2. The Use of Child Care: ABS Data

We begin by examining child care data provided by the ABS Child Care Surveys. This data complements that provided by the ALS and data from both sources is required to assess the effects of child care costs on female market work.

In Table 1 the use of child care given in the ABS data for 1984 is set out for three groups of children: those under six years of age and, within that total, two sub-groups—those aged 3-5 years and those aged 0-2 years. The reason for this division is that preschool only becomes available as a source of care when children reach the age of three, and it is by far the least expensive type of formal care (Teal 1990). Children are classified as 'both parents 'employed' or 'one parent employed' families Formal care is comprised of preschools, child care centres, and family day care. Informal care is any other child care arrangement, except parents caring for the child.

The category of children aged less than six years is considered first. The data show that 30 per cent of these children were in 'both parents employed' families and 70 per cent in 'one parent employed' families (Table 1 col. (6)). The middle and bottom sections of Table 1 show a marked increase in the proportion of children in 'two-parents employed' households when the children are aged 3-5 years and thus eligible for preschool. It is also possible to see the different patterns of child care use by family type. The proportion of children under six years old in a 'both parents employed' family and using care is lower than the proportion in a 'one parent employed family'

1 Ross and Saunders (1990) examine the issue as to whether or not the labour market behaviour of single mothers differs from that of married mothers.

Table 1: The Proportion of Children Using and Not Using Types of Child Care by Family Type 1984

	Formal care only	Informal care only	Combined formal & informal	Using care	Not using care	Total
	(1)	(2)	(3)	(4)	(5)	(6)
			Children < 6 years			
Both parents employed	0.06	0.11	0.04	0 21	0.09	0 30
One parent employed	0 10	0.15	0 03	0 28	0.42	0.70
Total	0 16	0.26	0 07	0 49	0.51	1.00
			Children aged 0-2 years			
Both parents employed	0.03	0 13	0 02	0 17	0 08	0.25
One parent employed	0 02	0 2	0.01	0.23	0 52	0 75
Total	0.05	0 33	0.03	0.40	0.60	1 00
			Children aged 3-5 years			
Both parents employed	0 10	0 10	0 07	0 26	0 08	0 34
One parent employed	0 18	0 11	0.05	0 34	0 32	0.66
Total	0 28	0 21	0 12	0 60	0 40	1.00

Source ABS (1984) data tape

and using care (Table 1, top section) The use of formal care increases markedly for the older group of children, for both the 'both parents employed' and 'one parent employed' families, while the use of informal care declines, although less markedly. The probability of being in a 'both parents employed' family rises from 25 to 34 per cent as children get older, while the probability of using care rises from 40 to 60 per cent and the probability of using formal care rises from 5 to 28 per cent Thus the data from the ABS 1984 Child Care Survey clearly show that as the child ages from 0 to 5 years the woman is more likely to participate in the work force and the child is more likely to use formal care

Preschools clearly play an important role in meeting the demand for care They cost about half as much as other formal care sources, Teal (1990), and the data suggests that as the cost of formal care falls with the age of the child there is a substantial rise in the demand for formal relative to informal care. There is also a rise in the woman's labour force participation which, while far less than the rise in demand for formal care, is nevertheless substantial

Another dimension of the demand for care, hours of use, is illustrated in Table 2. The categories are the same as for Table 1 with one addition—the distinction between full and part-time employment A 'full-time employed' family is one in which both partners are employed full-time; a 'part-time

Table 2: Average Hours of Child Care Per Week by Whether or Not in Full or Part Time Employed Family 1984

	Formal care only	Informal care only	Combined formal and informal	Total care
	(1)	(2)	(3)	(4)
		Children > 6 years		
Two parent employed	18.8	18.4	25.6	20 0
Full time	27.3	27.8	35.4	29 1
Part time	13 6	13 3	20 0	14.7
One parent employed	9.9	8 7	16 7	10.0
Average	13.2	12 8	21 9	14 3
		Children aged 0-2 years		
Two parent employed	23 5	18 9	29.6	20 7
Full time	32 7	29.7	39 9	31 7
Part time	15 8	13 7	19.3	14 4
One parent employed	6 1	7 9	10.1	7 8
Average	15 6	12 2	22.6	13 3
		Children aged 3-5 years		
Two parent employed	17 3	17 7	24 6	19 4
Full time	25 1	25 4	33.7	27.3
Part time	13.0	12 9	20 2	14 9
One parent employed	10 3	10 3	17 7	11.5
Average	12.8	13 8	21 7	14 9

Source: ABS (1984) data tape.

employed' family is one in which both partners are employed but at least one has a part-time job. The data in Table 2 show that the distinction between one- and two-parent employed and between full- and part-time families are both important.

The average hours of use of child care for 'two parents employed' families was twice that of 'one parent employed' families, as was the use of child care by full-time families relative to part-time ones (Table 2, top section, col. 4) The use of care in terms of hours, however, is largely a function of whether the job is full-time and not whether both parents are employed. In other words the amount of additional child care needed to move from not participating in the labour force to having a part time job is quite small (about 5 hours) while to move to a full time job requires a lot more child care.

A comparison of hours of use by age of children, the middle and lower sections of Table 2, shows that changes in the average hours of use for children of different ages is much less pronounced than changes in the proportion using care While the proportion of children in formal care rises as the child gets older, average hours of use falls. This pattern is consistent with the importance of preschool as a form of formal care. The rising female participation rate as the child ages between 0 and 6 years is associated with part-time employment, which is geared to the use of preschool as the cheapest form of formal care Thus the main difference between formal care function provided by preschool, compared to that provided by school after the child reaches five years, is that preschool hours are less convenient for employment and may impose an additional constraint on full-time work.[2]

3. The ALS Data

The ALS data enable us to extend the findings of the ABS data in several respects. First it is possible to examine changes in employment and child care over time. Second, the ALS survey asked detailed questions as to the nature of the constraint for those women who were not in the labour force. Third, the ALS data contain detailed information on the characteristics of the women that is lacking from the ABS Child Care data

Table 3 presents ALS Survey Data on the employment status of women with young children, for 1986-1988. The sample size rises over the period as the women in the sample have children The proportion of employed women who are responsible for young children rises markedly over the three years from 31.5 to 40.4 per cent In all three years about 60 per cent of those employed worked part-time, although this percentage dipped rather sharply in 1988. The proportion seeking employment is the same in 1988 as it was in 1986 so all the rise in employment comes from those classified as outside the labour force. Another point to emerge from the table is that most of those in part time work do not want a full time job, a finding consistent with ABS data [3] The final point, and the one most relevant to the child care issue, is that more than half of those not in the labour force give 'problems with child care' as their reason for not seeking a job. There is a problem with interpreting this finding as a substantial number of those who give 'child care problems' as their reason for not being in the labour force, when asked to specify the nature of the problem, answer that they prefer to look after the children themselves.

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2 In Tables 1 and 2 the data covers children aged 0 to 5 years. While children can start school at five there are many children of that age who are not at school because if a child's fifth birthday is after a certain date in the year, the child will not be able to start school until the following calendar year. In the remainder of the paper children will be classified as less than five years, five to nine years, and over ten years. This classification conforms to that used in other studies of female participation and ensures that all children in the youngest age group are not at school

3 ABS The Labour Force, Australia (Cat. No. 6203 0) asks those who work part time whether or not they would prefer to work more hours In August 1988 the proportion of married women who preferred not to work more hours was 85 per cent.

Table 3: ALS Data: Child Care and Employment Status 1986-1988

All women responsible for young children			
	1986	1987	1988
Proportion employed	31.5	35 5	40 4
Proportion employed			
Part time	61 2	61.9	56.9
Full time	38.8	38.1	43 1
Proportion seeking employment	9.2	6.2	9.2
Proportion not in the labour force	59.3	57 8	50.3
Sample size	622	742	866
Percentage of those employed part time who prefer more hours	11 7	13.4	17.1
Like present hours	88 3	87.2	82.9
Percentage of those not in the labour force who would like employment	83.5	83 3	84 2
Cite child care as reason for not being in labour force	52.3	57 3	53 4

Source: ALS 1986, 1987, 1988

Our analysis in the next section is based on a subset of ALS data consisting of women who were married in 1988 The data comprise two of the cross sections from the ALS, for 1986 and 1988. In Table 4 data on the major characteristics of these women for 1986 and 1988 is presented. The nominal variables, wages and incomes, are converted to 1988 prices. The top section of the table shows wages in the main job and hours worked per week. The bottom section of the table shows the percentage of women in employment and their number of children. Two cross classifications are presented in the table, the level of the highest qualification and whether there are children under five years.

Wages rise with qualification and if women have young children In 1988 a move from being unqualified to holding a degree increased the wage by 62 per cent without a child and by 33 per cent if the family has children. For all women the presence of young children increased the wage in 1986 by 18 per cent but by only 3 per cent in 1988. Hours worked per week drop by 30 to 40 per cent if the woman has young children, an effect which varies little by qualification. Participation also responds to education levels and the presence of young children. The employment rate for women with a degree is 40 percentage points higher than for women with no qualifications. The effect of children on the participation probability is equally marked. On average over 80 per cent of those with no children are employed while less than 40 per cent of those responsible for young children participate. In contrast to the hours decision, participation rises markedly with qualification level for women with, and without, dependent children.

Table 4: Women in the ALS Survey Who Were Married in 1988

	Wage major job (1988 $/hour)			Hours worked per week		
	No children	Young children	All women	No children	Young children	All women
1986						
All women	9 1	10.8	9.3	36.5	22.7	33.9
Degree	11 8	10 7	11.6	39.2	27.5	37.6
Postsec	9 5	12 3	9 8	37 0	19.9	34.9
High School	8.9	12.9	9.3	34.6	20.4	32.9
Unqualified	8.1	9 7	8.5	36.6	23.7	32.9
1988						
All women	9 6	9.9	9 7	37 9	25.0	33.4
Degree	13 3	12 7	13 2	38.7	28.8	37.3
Postsec	9.5	10.8	9.9	38 2	24.2	34 2
High School	9.2	8 7	9 2	37 2	24 0	33 1
Unqualified	8 2	9 6	8 7	37 8	25 6	31.9
	Percentage in employment:			Number of children aged:		
	No children	Young children	All women	0-4 yrs	5-9 yrs	>9 yrs
1986						
All women	81 5	30 2	61.7	0.533	0.092	0 006
Degree	94.3	72 7	90 6	0 203	0.016	0.016
Postsec	87.6	29 2	70 4	0.395	0.040	0
High school	83 9	31 1	69 6	0.344	0.057	0.004
Unqualified	72.8	28 6	50.4	0.721	0.143	0.009
1988						
All women	86.2	38 6	60 6	0.73	0 231	0 025
Degree	94 0	55.6	86.0	0.256	0.058	0.012
Postsec	90 6	44 9	69.4	0.655	0.141	0
High school	90.0	52.4	73.7	0.540	0 155	0.028
Unqualified	76.8	32 1	46 5	0 920	0.338	0.040

Source ALS 1986 and 1988

Another major difference between women in the various qualification categories, is that women with a degree have less than a third of the number of children of those who have no formal qualifications. This may simply reflect the stage of the life cycle being observed.

In comparing 1986 with 1988 two facts stand out. First, real wages were practically constant on average and fell by 10 per cent for women with young children. Second, the participation rates rose markedly over this period particularly for those with young children. It is possible that

changing child care costs played some role and the next section considers both the size of these costs and their effects.

4. Child Care Costs, Female Participation and Children

There are two dimensions to the labour supply decision of women: whether to participate in market work, and how many hours to spend in such work. Child care costs may affect both dimensions. In addition one (rather effective) way of altering child care costs is to alter the number of children. As was noted in the last section high wage young women have far fewer children at any age than less well paid women. Thus at least the timing, and possibly the number, of children may be decided by women in the light of market opportunities open to them but this dimension will not be explored further in this paper

How much do participation and hours change if child care costs are altered? To answer that question we proceed in three stages. First, the costs of child care are assessed by using both ABS Child Care and ALS data. Second, for reasons to be discussed, we use the more comprehensive ABS data set to estimate how formal child care costs vary by the age of the child and we infer the price of formal care facing women in the ALS sample Finally, the variable measuring the price of formal care is entered into a standard model of female labour supply to estimate the effects of child care costs on both the participation and the hours decision.

The costs of child care are presented in Table 5 The data have been organised to show whether child care costs vary with the age of the child. The ABS and ALS data can be directly compared for women in the labour force who use formal child care No other direct comparison is possible as the ABS data tape does not contain the costs of informal care while the ALS data does not have child care costs for those women not in the labour force.[4]

For 1986 the ALS data show a small decline in the price of child care for families in which the youngest child is aged four For 1988 the effect depends on the sample chosen. For the ABS data, which relates to 1984, there is a marked fall in the price of care as the youngest child in the family reaches four. The small sample size and sensitivity of results to outliers makes the ALS data unreliable as a basis for inferring child care costs to non-users of care. In contrast, the ABS data has over a thousand observations

4 The sample used from the ALS reported in Table 5 is the pooled 1986 and 1988 data set used in the formal equations reported in the Appendix. As will be noted from the Table the number of observations in the ALS is small and the results, particularly for 1988, are very sensitive to the sample size. There are two reasons why there are a small number of observations in the ALS data set. First, the costs shown in Table 5 are for families which pay for care. About half the women who use child care pay nothing and while there may well be non-monetary costs of such arrangements they are not ones that can be measured from the data Second, the child care questions in the ALS were only asked of women in the labour market. As the data from the ABS shown in the second section of Table 5 reveal, about half of those using formal care do not enter the labour force

Table 5: The Price of Child Care for Those With Children Under Five Years of Age

ALS Data[1]	1986 (1988 $/hour)[2]	1988 (1988 $/hour)[2]
Hourly cost of child care if paying for and using care[3]	2 05 [49]	2.05 [103]
Hourly cost of child care if paying for and using care youngest child is 0 to 3 years	2.06 [43]	2.01 [83]
Hourly cost of child care if paying for and using care and youngest child is 4 years	1 99 [6]	2.21 [20]
Hourly cost of formal[4] child care if paying for and using care	2 19 [25]	1.96 [58]
Hourly cost of formal[4] child care if paying for and using care and youngest child is 0 to 3 years	2 22 [20]	1 83[5] [41]
Hourly cost of formal[4] child care if paying for and using care and youngest child is 4 years	2 09 [5]	2.17 [17]

Notes

1 Appendix 2 shows the summary characteristics of the pooled data set on which these figures are based The prices for 1986 have been scaled by the consumer price index which rose 17 per cent between 1986 and 1988

2 Figures in [ ] are the number of observations on which the average cost figure is based

3 Some employed women in the sample with young children reported not using child care while many paid no cost The data reported in this section is confined to those who used and paid for child care

4 Formal child care is defined as a childcare centres, preschool, kindergarden, family day care or other community based childcare service, or private childcare centres In the 1988 area sample, i e. wave 4 level 2, it is answering yes to the first three categories in question G 209 (or similar questions asked elsewhere in the survey). Formal care is not synonymous with paid care.

5 This figure is very sensitive to the choice of sample. If all available 1988 observations are used then the sample size would be 48 and average cost $2.32 per hour The seven observations are lost due to the selection procedure used for the reasons set out in Appendix 2

Table 5 continued...

Table 5 (continued)

The Price of Child Care for Those With Children Under Five Years

ABS Data for Employed Women [1]	1984 (1988 $/hour)[2]
Hourly cost of formal child care if paying for and using care	1 6 [505]
Hourly cost of formal child care if paying for and using care and age of youngest child 0 to 3	1.71 [362]
Hourly cost of formal child care if paying for and using care and age of youngest child is 4	1 33 [143]
ABS Data for All Women	
Hourly cost of formal child care if paying for and using care	1.37 [1141]
Hourly cost of formal child care if paying for and using care and age of youngest child 0 to 3	1 44 [860]
Hourly cost of formal child care if paying for and using care and age of youngest child is 4	1.19 [281]

Notes

1 The definition of formal care is that of the ABS and follows very closely the categories of the ALS survey that we have used 'Formal child care includes any care arrangements made for the care of children (when the children are not in the care of the person responsible) at a pre-school, a child care centre (such as a creche, playgroup, kindergarden or occasional care centre), or through a family day care scheme' ABS (1984, p vii) It is not possible in this ABS source to distinguish the public and private centres

2 Figures in [ ] are numbers of observations

and, as a regression reported in Appendix 1 shows, age of child has a very significant effect on the price of formal child care

We would argue that both the comprehensive nature of its coverage and its much larger sample size make the ABS data a more reliable source for estimating prices of formal child care than the ALS data.

To infer the effects of child care cost on female labour supply we use the ABS data to estimate the child care costs for women in the ALS sample The price of child care from the ABS data is regressed on the age of the child The coefficients from this regression are then used in the ALS sample to calculate the price of child care per hour (Pfcc) facing families with children of different ages. This price of formal child care variable is scaled by the average price of child care in 1988 shown by the ALS data so that the formal child care cost is at 1988 prices. The price of formal child care (Pfcc) falls with the age of the child because preschool as a form of formal care is much cheaper than other forms of formal care However preschool care is available only for a limited number of hours so the cost of care may vary with hours. We have not yet incorporated this possibility into the analysis.

In Appendix 2 the price of formal child care is included in a standard labour force participation equation. Three sets of results are reported. The first set (Appendix Table 2(a)) excludes a price of child care variable and reports the effects of qualifications and of ages of children on participation and hours worked. Extensive experimentation was carried out with the children variables. It was found that both the number of children aged 0 to 4 years, and the age of the youngest child, when entered into the specification, provided the most satisfactory measure of the effects of young children on the participation decision.

The second set of results (Appendix Table 2(b)) report the effect of including the price of child care in this general specification The number of children aged 0 to 4 years enter the specification in two different ways. The time with the child has some value to the woman, so it can be anticipated that the number of young children will adversely affect participation. However the price of formal child care, Pfcc, rises with the number of children and insofar as participation is adversely affected by child care costs it may not be possible to identify both the number of children effect and the price of child care effect As shown by the results reported in Appendix 2, the effects are indeed highly collinear.

In the third set of results (Appendix Table 2(c)), the number of children aged 0 to 4 years is dropped from the equation. The price of formal child care then enters as a highly significant determinant of the woman's labour force decision While the collinearity of the variables induces some caution in interpreting the coefficient, it seems useful to use the estimate to show the effects of formal child care costs on the woman's labour force decision The results of this exercise are reported in Table 6

The results in Table 6 col (1) show that if child care costs are excluded from the equation, the effect of having a child aged 0 years reduces the probability of participation by 56 percentage points As the child ages to four years participation rises by 21 percentage points Our objective is to identify how much of this rise in participation as the child ages from 0 to 4 years is due to the changing valuation of the woman's time with the young child and how much is due to differences of child care costs.

Table 6 col.(2) reports the result of including the price of formal child care in the equation for participation Now as the child ages from 0 to 4 years participation rises by 16 percentage points, rather than by 21 percentage points as was the case in col. (1). These results indicate that if the price of child care to the family is reduced by $1 (i e by 45 per cent) then the participation probability rises by 6 percentage points Thus the results suggest that child care costs may be a significant determinant of participation but this effect is small. Most of the change in participation that occurs as the child ages from 0 to 4 years is due to the different valuation the mother places on her time with the child as the child ages.

Table 6 reports results for the hours of work on the same basis as that for participation. The results are broadly consistent with those already reported for the participation decision Table 6 col.(3) shows that hours of work decline by 21 3 hours per week on arrival of a child; by the time the child is

Table 6: Participation and Hours Effects of Children, Qualifications and Child Care Costs

	Participation Decision:		Hours of Work Decision:	
	Marginal impact of a unit change in a variable		Marginal impact of a unit change in a variable	
Variable	**Excluding child care costs**	**Including child care costs**	**Excluding child care costs**	**Including child care costs**
	(percentage points)		(hours)	
	(1)	(2)	(3)	(4)
Number of children aged 5-9	-0 17	-0.17	-7 9	-7 6
Having a youngest child aged:				
0	-0 56	-0 55	-21 3	-20 1
1	-0 47	-0 47	-22 1	-21.4
2	-0 45	-0.45	-22.3	-22 0
3	-0 46	-0 48	-18 3	-19 4
4	-0 35	-0 39	-16 8	-20.9
Having a				
Degree	0 23	0 24	4 4	4 2
Post-secondary qualification	0 09	0 10	1 8	1.8
High School certificate	0 11	0.09	0 4	0.3
Price of formal child care		-0 06		-8.3

Source

Columns (1) and (3) from Appendix Table 2(a). To obtain the effect of having a youngest child aged 1 it is necessary to add the coefficient for the N04 variable to the C1 variable in the appendix table Columns (2) and (4) are from Appendix Table 2(c).

The effect reported in the Table is the marginal impact of a unit change in the variable which is obtained by multiplying the coefficient in the probit equation by f(Zi) which is the normal density at Zi valued at the sample mean The value of this variable for the probits reported in the appendix is 0 3725

four years old the hours worked per week rise by 4.5 When the price of child care is included, Table 6 col.(4), there is no effect on hours worked of the child ageing from 0 to 4 years. A subsidy of $1 (45 per cent of the average price of care to the family) would raise hours worked per week by eight Thus hours of work rise as the price of child care falls but this effect is small relative to the child effects. On the basis of the reported coefficients a complete elimination of child care costs would still leave the woman a part-time, rather than a full-time, worker.

5. Summary and Conclusion

The pattern of labour force work for women responsible for young children has undergone important changes in the later 1980s. The amount of market work supplied by women responsible for young children has grown rapidly and this growth has been due almost entirely to rises in participation rather than in hours worked per week. Part-time work dominates employment for women responsible for dependent children. Most of these part-time workers are happy with their hours and are not seeking full-time employment. However many women who are responsible for young children and not in the labour force state that they would seek employment if suitable child care was available

An attempt has been made to quantify the effects of child care costs. The focus of the analysis has been on formal child care prices which are most readily measured. It has been shown that both the participation probability and the hours worked per week are functions of the age of the youngest child in the family. It has also been shown that the price of formal child care varies by the age of children This fact has been used to infer a price of formal child care facing women in the ALS sample we have chosen. It appears there is a highly significant effect of the price of formal care on both participation and hours decisions A child care subsidy of nearly 50 per cent would raise participation by six percentage points, and time spent at work would increase by eight hours per week.

Two major qualifications must be entered regarding this conclusion. First, the structure of child care cost by the age of the child may have changed over the period 1984 to 1988. If this is so, the results reported may be misleading Second, while the price term measures accurately the price relevant for participation, the same is not true for the hours decision. A more complex model than that considered in this paper is necessary to capture this dimension of the problem.

Finally, we draw attention to the implications for part time work of the findings of the paper. While qualifications raise wages and greatly increase the probability that a woman with a child will have a job, qualifications affect only rather marginally the number of hours worked Thus part time work is the norm whatever the qualifications of the woman There is no evidence that further subsidising child care costs would alter this position. Child care subsidies will thus be ineffective as a means of generating full-time rather than part-time work. If other research establishes that part-time work is ineffective as a means of bringing the life time earnings profiles of women closer to those of men, the implication would be that child care subsidies will have no effect on this problem. However these are speculative issues at present.

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Appendix 1

The Price of Formal Child Care

Equation 1[1]

ABS (1984) Child Care Data

Pfcc = 1.33 - 0.03N0 - 0.07N1 - 0.03N2 - 0.19N3 - 0.45N4
(0.07)* (0.07) (0.06) (0.07) (0 07)* (0 06)*

Number of Observations: 1141

Adjusted R^2 0.05

Pfcc is the hourly cost of formal child care

Ni is a dummy variable = 1 if child aged i is present in the family, otherwise zero.

Notes: [1] The figures in ( ) are standard errors.

* Significant at the 1 per cent level.

Equation 2

ABS (1984) Child Care Data

Pfcc = 1 29 - 0.17N3 - 0.4N4
(0.05)* (0.06)* (0.06)*

Number of observations: 1141

Adjusted R^2 0.05

Equation 2 forms the basis for predicting the price of child care for the ALS sample

Pfcc (ALS) = 1.29 NC0 + 1.29 NC1 + 1 29 NC2 + 1.11 NC3 + 0.86 NC4

scaled to 1988 prices where

NCi is the number of children in the family aged i.

Appendix 2
ALS Sample and Variable Definitions

Definition of the Sample

Women who were in the ALS Survey in 1988 and who were married in that year were the base on which the sample was chosen. Cross sections for 1986 and 1988 were pooled. Women who were not in the sample in both years were dropped. Those with a market job were only included if they had one such job as information on the wage in the second job was not directly available

The women who were not married in 1986 had their 'husband's wage' for 1986 set to zero.

Observations were dropped if (a) the price of child care exceeded $20 per hour (1 observation lost), (b) the hourly wage exceeded $50 (3 observations lost) or (c) if hours worked exceeded ninety hours a week (1 observation lost).

The result was a sample size of 2302

Variable Definitions and Sample Means

		Sample Means		
Variable Name	Variable Definition	Not Employed	Employed	Average
N04	Number of Children aged 0-4 yrs	1 088	0 340	0.631
N59	Number of Children aged 5-9 yrs	0 266	0 095	0 162
N10	Number of Children aged >9 yrs	0.018	0.014	0 016
Degree	Dummy=1 if highest qualification is a degree, otherwise 0	0.020	0.094	0.065
Pstsc	Dummy=1 if highest qualification is post-secondary, otherwise 0	0.203	0.301	0 263
High	Dummy=1 if high school completed, otherwise 0	0.139	0 224	0.191
C0	Dummy=1 if age of youngest child 0	0 234	0 062	0 129
C1	Dummy=1 if age of youngest child 1	0 251	0.086	0.150
C2	Dummy=1 if age of youngest child 2	0 144	0 052	0 088
C3	Dummy=1 if age of youngest child 3	0 079	0 031	0.050
C4	Dummy=1 if age of youngest child 4	0.039	0.026	0.031
Age	Age	23.7	23.6	23.6
Hwage	Husband's Wage ($1988 per year)	19445	18521	18854
Nlbinc	Non-labour Income ($1988 per year)	4314	2882	3432
Pfcc	Price of Formal Child Care ($1988/hour) (created variable as described in Appendix 1)	2 483	2 076	2 23
λ	Heckman's sample selectivity bias term, the inverse of the Mills ratio			

Appendix Table 2 (a)

Participation and Hours Equations Excluding Price of Child Care [a]

	Participation	Hours of Work in Major Job	
Mean of dependent variable	[0.643]	[33.4]	
Constant	-3.29 [2 08]	-5.0 [24 0]	25.8 [19 6]
N04	-0 25 [0 09]*	-10.8 [1.7]*	-8 3 [1 2]*
N59	-0 46 [0.08]*	-7 9 [2.1]*	-3 8 [1 0]*
N10	0.07 [0 24]	4.0 [2 2]	2.9 [2 2]
Degree	0.63 [0.19]*	4 4 [1.8]**	1 2 [1.2]
Pstsc	0.26 [0 09]*	1.8 [1.2]	-0 1 [0 8]
High	0.29 [0.09]*	0.4 [1 2]	-1.5 [0 8]
C0	-1.26 [0.17]*	-10 5 [4 9]**	-0 6 [2 1]
C1	-1.02 [0 16]*	-11.3 [3 9]*	-3 9 [2.1]
C2	-0 97 [0 17]*	-11.5 [3.8]*	-4 4 [2.1]
C3	-0 99 [0 18]*	-7.3 [4 0]	0 1 [2 3]
C4	-0 69 [0.21]*	-6 0 [3 1]*	-1 8 [2.5]
Age	0 29 [0 18]	2.6 [1.9]	0 8 [1.7]
Age^2/10^2	-0 47 [0 39]	-4.2 [3 9]	-1 5 [3 7]
Hwage/10^6	4 77 [3 69]	43 6 [32 2]	18.9 [30 3]
Nlbinc/10^6	1.72 [4 37]	15 8 [39.5]	2.4 [39 4]
λ		16.0 [7 22]**	
Number of observations	1841	1184	1184
Adjusted R^2		0.281	0.278
Log of likelihood	-913 5		

(a) The hours equation is reported both with and without the the Heckman correction term. It will be noted that it is significant at the 5 per cent level. The results reported in table 6 use this version of the equation and not the one where no correction has been made for sample selection bias.

Standard errors are in [ ] by the coefficients

* significant at the 1 per cent level

** significant at the 5 per cent level

Appendix Table 2 (b)

Participation and Hours Equations Including Price of Child Care [a]

	Participation	Hours of Work in Major Job	
Mean of dependent variable	[0 643]	[33.4]	
Constant	-2 38 [2.18]	12 7 [24.2]	35 4 [21.8]
N04	0.49 [0.52]	2.5 [7 7]	-0 7 [7.6]
N59	-0 46 [0.08]*	-7.7 [2.1]*	-3.8 [1 0]*
N10	0 07 [0 24]	3.9 [2.2]	2.9 [2 2]
Degree	0 65 [0 19]*	4.3 [1.9]**	1.2 [1.2]
Pstsc	0.28 [0.09]*	1.9 [1 2]	-0.1 [0.8]
High	0.25 [0.09]*	0 4 [1 2]	1.5 [0.8]
C0	-1 97 [0.52]*	-22.8 [10 2]*	-7.9 [7.5]
C1	-1.76 [0.54]*	-24.2 [9.8]**	-11 4 [7.7]
C2	-1 73 [0.55]*	-24.9 [9 9]**	-12 1 [7.9]
C3	-1 87 [0 63]*	-22.7 [11 2]**	-8.8 [9 1]
C4	-1.73 [0 75]*	-24 6 [12.3]**	-12.5 [10 9]
Age	0.29 [0.18]	2.5 [1 9]	0.8 [1.7]
Age^2/10^2	-0.48 [0.39]	-4 1 [3 9]	-1 4 [3.7]
Hwage/10^6	4.82 [3.69]	43.1 [32.2]	19.4 [30.3]
Nlbinc/10^6	2.20 [4 37]	23 3 [40.2]	9.1 [39.7]
Pfcc	-0 46 [0 32]	-8.3 [4.9]	-4.7 [4.7]
λ		15.3 [7.1]**	
Number of observations	1841	1184	1184
Adjusted R^2		0.281	0.278
Log of likelihood	-912 4		

(a) The hours equation is reported both with and without the the Heckman correction term. It will be noted that it is significant at the 5 per cent level.

Standard errors are in [ ] by the coefficients

* significant at the 1 per cent level.

** significant at the 5 per cent level

Appendix Table 2 (c)

Participation and Hours Equations Including Price of Child Care (Excluding the Number of Children Aged 0-4) (a)

	Participation	Hours of Work in Major Job	
Mean of dependent variable	[0.643]	[33.4]	
Constant	-2 96 [2.09]	10.4 [23.3]	36.2 [19 8]
N59	-0.45 [0.08]*	-7.6 [2.1]*	-3.8 [1.0]*
N10	0.07 [0.24]	3.9 [2.2]	2.9 [2.2]
Degree	0.64 [0.19]*	4.2 [1.9]**	1.2 [1.2]
Pstsc	0.27 [0.09]*	1.8 [1.2]	-0.1 [0.8]
High	0 24 [0.09]*	0.3 [1.2]	-1.5 [0.8]
C0	-1.49 [0.12]*	-20.1 [5.7]*	-8 6 [1 4]*
C1	-1.27 [0.11]*	-21.4 [4.6]*	-12.1 [1.3]*
C2	-1.22 [0.12]*	-22.0 [4.6]*	-12.9 [1.4]*
C3	-1.29 [0.15]*	-19.4 [5 0]*	-9.7 [1 9]*
C4	-1.06 [0.19]*	-20 9 [4 2]*	-13.5 [2.2]*
Age	0.29 [0 18]	2.4 [1.9]	0.8 [1.7]
Age^2/10^2	-0 48 [0.39]	-4.0 [3 9]	-1 5 [3.7]
Hwage/10^6	4 78 [3.69]	42 5 [32.2]	19 4 [30.3]
Nlbinc/10^6	1 93 [4 36]	23.2 [39 7]	9.61 [39 2]
Pfcc	-0.17 [0.06]*	-6.7 [1.1]*	-5.2 [0.8]*
λ		14.9 [7 1]**	
Number of observations	1841	1184	1184
Adjusted R^2		0.281	0 279
Log of likelihood	-912.9		

(a) The hours equation is reported both with and without the the Heckman correction term. It will be noted that it is significant at the 5 per cent level The results reported in table 6 use this version of the equation and not the one where no correction has been made for sample selection bias.

Standard errors are in [ ] by the coefficients.

* significant at the 1 per cent level.

** significant at the 5 per cent level.

Section IV

Unemployment, Poverty and Health

Predicting the Long-Term Unemployed:
A Primer for the Commonwealth Employment Service

Bruce J. Chapman and Peter N. Smith

The Dynamics of Youth Unemployment:
An Analysis of Recurrent Unemployment

P.N. Junankar and Margaret Wood

The Dynamics of Underutilisation of Youth Labour

Russell Ross

Poverty in Australia: A Study of the Implications
of Education, Household Formation and the
Labour Market Experience of the Young

David N.F. Bell, Russell J Rimmer, Sheila M. Rimmer

Health Consequences of Employment and Unemployment

Brian Graetz

Predicting The Long-Term Unemployed: A Primer For The Commonwealth Employment Service

Bruce J. Chapman and Peter N. Smith*

1. Introduction

In the contemporary Australian labour market long-term unemployment (LTU) is emerging as one of the most important policy issues for macro-economic management. In the last few years important economic research has clarified the causes and consequences of LTU, with the very important point being made that there appear to be considerable and adverse implications for both efficiency and equity from increases in LTU. The current and expected short-term future of the labour market is decidedly weak, implying strongly that the issue of LTU will become even more significant in the medium-term.

It is of particular policy relevance that only a small percentage of those who become unemployed remain out of work for a period of twelve continuous months or more—the usual definition of LTU. For reasons explained later, it may be extremely important to identify those individuals experiencing short-term unemployment who are at most risk of remaining jobless. This is the aim of the paper.

The basic motivation for this research is that LTU has serious consequences for the individual both in income terms and in terms of the decreasing probability of ever returning to mainstream employment. Theoretical and empirical studies indicate that there will also be serious consequences for macro-economic efficiency if the pool of those experiencing LTU continues to increase It is these issues which underlie the current study Their relevance to the contemporary Australian labour market are canvassed in section 2.

Our principal conceptual contribution is that there may be important gains to be made, for both individuals and the macro-economy, from the existence of easy ways for the Commonwealth Employment Service (CES) to identify the potential LTU. This point is stronger the more it is possible to influence the probabilities of particular short-term unemployed individuals gaining jobs, and the greater are the overall benefits of this happening. While these ideas are not difficult to understand, some of the statistical issues are a bit tricky and are explored in a third section.

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* We are very grateful for the superb and committed computing assistance of Margi Wood and the tireless advice of Geoff Parkinson and the word-processing of Eileen Berry. We are indebted to the Department of Employment, Education and Training for financial assistance All errors are ours.

Even though the econometric methodology employed, the hazard function, is probably not standard fare for line managers in the CES, the underlying framework and rationale for its use are easy to explain. If the goal is to test the efficacy of particular readily observable characteristics as predictors of LTU, and we know which persons actually do experience LTU, it is important that the independent role of unemployment duration on the process(so called 'state dependence') is controlled for in the analysis. The hazard function allows us to do just this.

The exercise could be done only poorly, if at all, with cross-sectional data. One reason is that when we observe persons at a particular point in time characterised by different measured periods of unemployment duration, it is not clear what role changes over time in the aggregate state of the labour market have played as influences on the composition of the pool of the unemployed observed. Further, from a cross-section it is difficult to determine what the contribution of (usually unobserved) individual characteristics are to LTU. Consequently we have used panel data, from the Australian Longitudinal Survey (area sample), focussing on persons who were unemployed initially for less than three months in 1985. The strengths and weaknesses of the data are considered in section 4.

Results are presented in section 5. A small number of readily identifiable characteristics are found to be important in understanding unemployment duration. Different samples are used, depending on the final labour market state in which individuals find themselves. The results vary to some degree.

In the concluding section we consider the usefulness of this exercise for policy and the operation of the CES. Caveats and qualifications are noted, as are some suggestions for the use of the techniques employed for future research.

2. Theoretical and Background Issues

Macro-efficiency and equity

The first major reason for a concern with unemployment duration relates to efficiency. During the 1980s there were important developments in this area of economic analysis, most significantly with respect to the concept of 'hysteresis', in which the long-run position of the non-accelerating inflation rate of unemployment (NAIRU) is seen to depend on current and past rates of unemployment. It is of particular relevance to this paper that in the literature LTU is considered to be an integral part of the hysteresis process.

It is argued that as unemployment duration increases, skill depreciation (atrophy) and attitudinal change occur. Such changes markedly increase the differences between the longer-term unemployed (the outsiders), the employed (the insiders), and the short-term unemployed. Given that employers are likely to view the LTU as poor employment prospects, it follows that at any given unemployment rate job vacancies will be filled less quickly and with a poorer match when there is a higher proportion of LTU. From this perspective a reduction in LTU increases the likelihood of there being a more favourable matching between the pool of unemployed and job vacancies.

Budd, Levine and Smith (1987, 1988) have demonstrated empirically for the UK that increases in LTU adversely affect the operation of the aggregate labour market There is similar (although somewhat weaker) evidence that increases in LTU have affected the relationship between unemployment and vacancies in Australia (Hughes 1987, Williams 1989). Macro-economic modelling tends to support these latter findings with respect to estimations of changes in the NAIRU (Simes and Richardson 1987). It would appear that increases in the proportion of unemployment which is long-term and the absolute number of LTU make the filling of vacancies more difficult and the rate of wage inflation higher at any given level of unemployment.

From the perspective of long-term macro-economic efficiency there would thus seem to be compelling reasons for minimising the incidence of LTU Since it is also clear that in a labour market characterised by increasingly high levels of LTU, *ceteris paribus*, there will also be increasing inequalities in income distribution. Equity issues are therefore of great importance and provide a further rationale for our research.

There is little doubt that those with high unemployment duration are some of the most disadvantaged members of the labour force (Junankar, 1988) Not only does this group have low current incomes, but they also seem to have few skills and low education levels, generally making them poor employment prospects Thus particular issue—the dynamic side of distribution—warrants some attention

Employed persons become, over time, increasingly different to unemployed persons The incomes of the former group typically increase, through real wage gains that average around 2 or 3 per cent a year, because of increasing labour market experience. The dynamics are such that being employed leads not only to increased labour market experience, skill acquisition, and increases in current income, but also to higher potential earnings. In other words, the life-time job opportunities and acquired human capital levels of the employed systematically become significantly greater than those of the unemployed, the longer their relative labour market states remain unchanged.

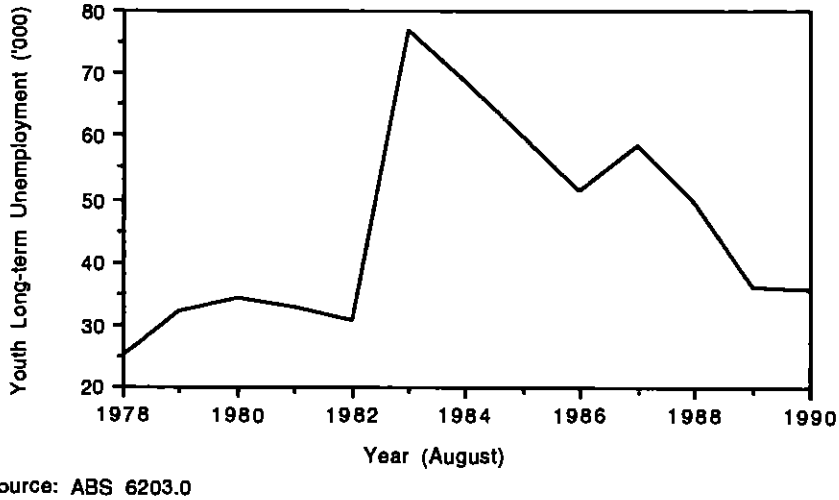
LTU and the Contemporary Australian Youth Labour Market

Conditions in the Australian labour market in 1990 are clearly different to those prevailing in the previous seven years. In stark contrast to the period 1983-89, job growth is now stagnant. As a consequence, the unemployment rate, which had steadily fallen from the post-war high of 10.3 per cent recorded in August 1983, has recently increased significantly.

During 1983-89 (on an August to August basis) employment grew by an annual average of 3.6 per cent, with the lowest change being 2.7 per cent (in 1986-87), yet for 1989-90 the figure was 0.8 per cent. While the unemployment rate fell by about four and a half percentage points after 1983, from the end of 1989 to mid-1991 it increased from 5.9 per cent to about 9.5 per cent. In the last short period, and at least in the next year or so, the aggregate labour market has been and is expected to remain distinctly unhealthy.

The important point for our purposes is that after a short period of economic stagnation LTU increases in absolute numbers. Because the data used later are focused on youth, we present in Figure 1 the LTU experience (unemployed longer than 12 months) of young people (defined as those aged between 15-24 years) over the last decade or so. The extraordinary expansion of the numbers in 1983-84, following with a lag the severe recession of 1982-83, is immediately obvious.

It should also be noted from Figure 1 that although the level of LTU can increase extremely quickly (as it did in 1983-84), it takes a long period of sustained, rapid employment growth (such as that experienced in 1984-89) to decrease it. This asymmetry is likely to be a consequence of two things One, when an economy grows quickly the active labour force also expands, implying that some proportion (possibly as high as 40 per cent, see Dowrick 1988) of new jobs are filled by persons previously outside the labour force. Two, that the LTU are continually pushed to the back of the hiring queue, implying that it takes very rapid economic growth before the size of the group starts to fall substantially. In the context of the contemporary Australian labour market the point is clear: once unemployment starts to increase, the probability of the LTU obtaining jobs diminishes substantially, which highlights the relevance of investigations into the factors allowing early identification of potential LTU.



Source: ABS 6203.0

Figure 1: Youth Long Term Unemployment

In order to illustrate how important these issues are likely to become for policy makers in Australia in the near future, we need to have some idea of the likely extent of overall levels of LTU. It is possible to make such an estimate by virtue of there being a positive relationship between the unemployment rate and the proportion of the unemployed who are LTU This information can be used in conjunction with unemployment rate projections to estimate the likely future aggregate LTU situation

Econometric work in this area is reported in Chapman, Dowrick and Junankar (1990) Their analysis suggests that a one percentage point increase in the unemployment rate is associated with an increase in the proportion of unemployment which is LTU of around 3 percentage points, after about a year. Given this, and in combination with expected future unemployment rates, it is uncontroversial to suggest that LTU levels in 1992 will be the highest ever recorded (Stretton and Chapman, 1990).

Conclusion

Several points emerge from the above discussion Firstly, the greater the proportion of all unemployment that is of long duration, the less efficient is the functioning of the macro-economy. This is manifested in both the unemployment-vacancies relationships and in the positioning of the NAIRU. Secondly, there is an obvious equity side to the unemployment issue, with the dynamic dimension being of most importance: as individuals' unemployment duration increases, their relative human capital endowments and life-time employment opportunities diminish. Finally, research which aids the identification of those recently unemployed who are at greatest risk of experiencing continuing joblessness is particularly relevant for Australian economic policy in the early part of the 1990s. There is little doubt that in the next short period the labour market will deliver very high (the highest ever) levels of LTU.

3. Modelling Issues

There are two distinct approaches taken to modelling the reasons why individuals remain jobless and searching for unemployment. A brief overview of these perspectives will set the scene for the conceptual discussion.

The most rigorous and, in its purest form, the least helpful approach seeks to understand continuing unemployment as being the result of individuals' preferring not to take offered jobs because the valuation they put on their search and/or leisure time exceeds the wage rate offered by employers. In this perspective the unemployed have a 'reservation wage', which serves as a benchmark for the decision of whether or not to accept employment: if the wage offered is lower than the reservation wage, individuals will choose to remain jobless If offered wages continue to be lower than the reservation wage, the unemployed will eventually lower their reservation wages (seeing them as unrealistic) with employment ensuing once it falls below the offered wage

A quite different way of looking at the underlying factors of continuing joblessness gives a greater weight to quantity aspects of labour demand and

employer discretion than does search theory. In this view employers make judgements about the desirability of particular applicants for vacancies, making job offers to those considered suitable. The major difference between this and the search theory perspective is that here the principal variable is the number of job offers made, rather than the associated wage. If employers consider that some applicants will never reach a necessary standard, those applicants will receive no offers. For reasons that will become clear from the following discussion, it is plausible that there are specific reasons why the LTU have a higher probability of being in a group that is offered few jobs.

It is not necessary for our empirical work to specify which theoretical model is in operation although, given the results, it may be important to sort out the policy implications in this context. Our brief rather is to determine which readily observable or quantifiable characteristics, including measures of individuals' reservation wages, are useful predictors of continuing unemployment. The major conceptual issues are as follows.

The most obvious quantity to examine in order to explain whether someone newly unemployed becomes LTU is the probability of leaving unemployment. In general, this probability falls as the length of spell increases since the LTU find it increasingly difficult to find a job. There are two reasons for this: there may be a reduction in the intensity of job search, and there is a reluctance on the part of employers to hire those who have been unemployed for an extended period. These effects could be caused by demoralisation as the length of the unemployment spell increases, and/or through employers regarding length of unemployment spell as an indicator of poor labour market qualities

There is a further distinction in the causes of increased duration which should be emphasised. The analogy with a flower shop introduced by Budd, Levine and Smith (1988) is useful in describing the processes at work. In the florists' stock of flowers there are blooms of varying age and brightness, with customers operating a double process of discrimination between blooms. The newest flowers will be bought first and, if any are bought among the older flowers, for those of any particular age, they will be the brightest. So for every passing day, each cohort of remaining flowers both appears older and loses the relatively bright blooms.

In a labour market context these processes may apply to the duration of current unemployment spell and a bundle of skills related to experience, education and so forth. It is likely then an employer will unfavourably compare someone unemployed for twelve months, against someone unemployed for only three months, for any given common bundle of attributes. This is known as the state, or duration, dependence effect.

The other effect can be explained by noting that the cohort which has been unemployed for twelve months is different from a very recently unemployed cohort, since for the long-term group those with the better bundle of attributes will have already found jobs. This is known as the heterogeneity effect The two effects work in the same direction and imply

that the probability of leaving unemployment falls as the duration of the spell increases.

In order to examine these effects, and in common with most of the literature in this area, we use the relationship known as the hazard function (Kiefer 1988). In the context of unemployment duration this relationship describes the probability of an event occurring depending on how long an individual has been currently unemployed. This is known as the conditional probability of leaving unemployment. The hazard function thus provides a method for readily interpreting the unemployment duration data.

We begin the analysis with a population of unemployed people who appear to have a reasonably homogeneous experience of unemployment as defined by the length of spell at the time of their interview in 1985 (less than three months) Essentially this implies that there is some left censoring, a point which needs to be kept in mind in an interpretation of the results (particularly with respect to the existence, or otherwise, of state dependence).

The hazard function describes the conditional probability that an individual will end a spell of unemployment in any particular week x, given that the person has been unemployed for x weeks. This seems a natural way to model the probability that an individual will leave unemployment.

The sequence of conditional probabilities in the hazard function that we use applies from the initial spell length of one week up to the end of the longest spell, which in our data is 170 weeks Unlike most of the literature in this area all of our data consist of completed spells, which means in essence that we were able to follow every person from the beginning to the end of this particular unemployment experience. While multiple spells are likely to be an important aspect of some individuals' labour market experience, to keep the problem tractable we have chosen in this first instance to focus on a single unemployment event.

The hazard function approach is also a convenient way of representing the process of sorting of the unemployed that was described above. In particular we expect state or duration dependence to be negative, meaning that the probability of an individual exiting from unemployment falls with the duration of the spell In technical parlance, the hazard function l(t) is such that $dl(t)/dt < 0$ at any $t=x$, ie that there is decreasing hazard over the range of spell lengths.

In the discussion above emphasis was put on the distinction between the outcomes for two groups, namely the short and long-term unemployed. In the specification of the hazard function we will be more general and allow for duration dependence over the whole range of spell lengths.

In the estimation below we use two specifications of the proportional hazard model originally proposed by Cox (1972). These allow the roles of state dependence and heterogeneity to be laid out clearly. The first form is the most general. There are two parts, one which allows for heterogeneity and the other which allows for state dependence. It is written as:

$$l(t,x/\beta,\alpha) = h(x/\beta).s(t/\alpha)$$

where the hazard function l(.) is a function of a set of explanatory variables x with parameters β and duration dependence α. The function is made up of the proportional factor h, which represents the heterogeneity effect, and s, which captures the state dependency effect. The so-called Weibull form for this function is:

$$h(.) = \exp(\beta 0+\beta 1x)$$

$$s(.) = t^{**}(\alpha-1)$$

$$\text{ie} \quad l(.) = \exp(\beta 0+\beta 1x)t^{**}(\alpha-1)$$

where we assume that the explanatory variables x are included linearly. There will be negative state or duration dependence in this formulation when $\alpha<1$. We also examine a special case of this specification known as the exponential model where no state dependence is allowed (ie $\alpha=1$). In that case the function becomes :

$$l(.) = \exp(\beta 0+\beta 1x)$$

and duration dependence is zero Below we test for the restriction $\alpha=1$ and for the appropriateness of this choice of functional form.

4. The Data and Estimation Approach

The Australian Longitudinal Survey (ALS) is a panel survey of around 9000 individuals. Commenced in 1985, data from annual interviews is now available up to 1988. The sample is of young people, the age range in 1985 being 15 to 26 years There are a rich set of personal and labour market variables, which make the ALS close to ideal for our purposes

Most importantly, because of the longitudinal nature of the panel we were able to concentrate on a group that had all only recently become unemployed, and from there construct actual completed unemployment histories of individuals. Consequently, the exercise may not suffer unduly from the usual problems inherent in cross-sectional work of not knowing the characteristics of persons who have already left the sample, or how much longer the currently unemployed will remain in that state.

There are several unusual and valuable aspects of the ALS for our purposes. First, there is information concerning respondents' complete job histories, which allows us the opportunity to include a rich set of controls for respondents' labour market experiences and inherent attitudes to work Second, questions were asked concerning the lowest wage rate that individuals would be prepared to work for, so some insights are forthcoming as to the role of initial reservation wages as an influence on unemployment duration. Third, the data include many individual characteristics that are readily and easily observable by, for example, CES officers interested in identifying those at most risk of remaining jobless; these characteristics include sex, age, education, location, ethnicity, industry, occupation, and other characteristics of last job.

An issue of some importance for the exercise is that a fairly large proportion of the original sample—around 35 per cent—ended their spell of unemployment not by finding jobs, but by ceasing employment search. There are many reasons why individuals cease searching for work even though they have not found a job. Given that the CES is concerned with finding employment for its clients, it matters for our analysis that a distinction is made between those that successfully find work and those that leave the labour force, for example to pursue alternative activities (such as child-rearing or returning to formal education).

Because of the above-noted issue, we have chosen to estimate the models separately depending on the labour market state individuals entered after the completion of their unemployment spell Sample A refers to the subset of respondents who left unemployment for a job, and Sample B refers to the full set of respondents, regardless of the labour market state experienced after unemployment. A histogram illustrating the spells of unemployment that we model below is given in Figure 2. It shows that almost half of the spells finish within three months.

Ten per cent of the spells last for more than a year, with half of these lasting for more than eighteen months, which is broadly true for data sets A and B

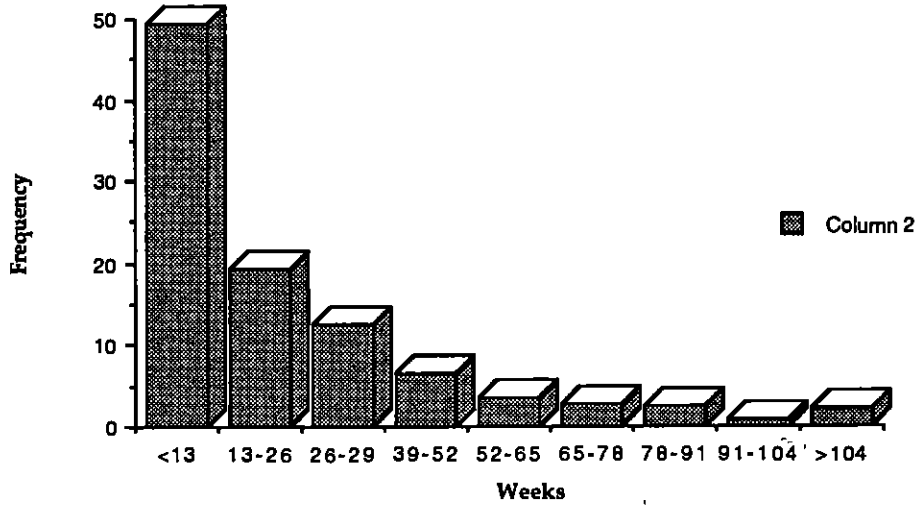


Figure 2: Relative Frequency of Spell Lengths

Table 1: Statistical Characteristics of the Data

Variable	Sample A		Sample B	
	Mean	Standard Deviation	Mean	Standard Deviation
VED	.399	.491	.394	.489
VCAPC	.508	.501	.530	.499
VOTHC	.260	439	251	.434
VCTOWN	.186	.390	.173	379
VAGEYR	20.08	2.66	20.12	2.62
VHEALTH	.139	.347	.147	.355
AUSBORN	.824	.382	811	.392
ESMBORN	.099	.299	106	308
MALE	598	491	.540	499
VMARRY	195	397	.199	.399
VMARSIN	.0124	.111	0179	.133
RW ($/hour)	4.43	2.55	4.17	2.65
RWM	102	302	.141	349
VJTPAY ($/week)	128.31	102.74	116 10	103.46
NPREVJ	.254	.436	303	.460
NCURRINC ($/week)	92.20	99.02	89 97	94 11
NCURRM	.0960	.295	.0956	294
DOLE ($/week)	48.20	39 34	46.12	39 78

Table 1 presents the main statistical characteristics of the data Apart from the completed period of unemployment duration, UPER, measured in weeks, all the data apply to the survey week in 1985. The continuous variables are. VAGEYR, age in years; RW, the after-tax hourly reservation wage, adjusted using the tax scales for the 1984-85 financial year; DOLE, an estimation in 1985 dollars of the amount of unemployment benefits received, calculated on the condition of receiving some unemployment benefits and on the basis of individual characteristics; VJTPAY, the after-tax weekly wage of the previous job in 1985 dollars; and VCURRINC, weekly current after-tax income from all sources in 1985 dollars.

The dummy variables used are: VED, for having formal education to year 12 and beyond; VCAPC, VOTHC and VCTOWN for living respectively in a capital city, non-capital city and country town (the omitted dummy being living in a rural area); AUSBORN and ESMBORN, respectively for having been born in Australia or in another English-speaking country (the omitted dummy is having been born in a non English-speaking country); VMARRY and VMARSIN, respectively are being married, and having been married but now single (the omitted dummy is never married); MALE, being male;

VHEALTH, for having a health problem which limits work; VJTM, for not having had a previous job; RWM, for there being no information on reservation wage; and NCURRM, for there being no information on current income.

5. The Results

Before considering the estimates it should be noted that we employed the method of censoring, at 52 weeks of unemployment duration. This technique fully utilises the information on spells greater than 52 weeks except that it constrains the slope of the hazard function estimated for the data up to one year to continue beyond this, so as to avoid the slope of the hazard being unduly affected by a few unusual observations at the extreme of the duration data.

The first set of results applies to the sample of respondents who ended their spell of unemployment by gaining employment. We estimated the model in the two ways motivated by the conceptual discussion, with and without allowance being made for state dependence. The procedure was to test down from a relatively general model (the results of which are available in the Appendix), to a parsimonious specification presented in Table 2, with equations (i) and (ii) respectively allowing, and not allowing, for state dependence.

One way of examining the behaviour of outflows from unemployment implied by these estimates is to consider the survival curve, shown in Figure 3 This is a plot of the probability that the spell is longer than each given duration As the curve is given for the exponential functional form its shape is unsurprising, with the low probability of spells exceeding a year mimicking the histogram of actual spell lengths given in Figure 2.

These results also allow us to examine the issue of state dependence. It is clear from the estimate of α given in column (i) that it is not significantly different from one. Thus we cannot reject the hypothesis that there is no state dependence in the outflow probabilities. This result conflicts with that found by Lynch (1985) on a sample of young men in the UK, and Brooks and Volker (1986) using gross flows data for Australia, both of which found evidence of significant negative duration dependence (that is, the chances of leaving unemployment decrease as duration goes up)

One explanation for the differences between our study and that of Brooks and Volker is that the latter make no allowance for heterogeneity, ie the presence of x variables in the estimated equation Indeed, if we exclude all of the explanatory variables from the model above we get an estimate of α of 0 956 with a standard error of 0.05367. This suggests that ignoring heterogeneity biases down the estimate of the degree of state dependence. This is not a surprising result

Evaluated at the sample means, the implied hazard rate from the estimates in Table 2(ii) is 3.5 per cent per week This appears to be a little smaller than that obtained by Brooks and Volker on a roughly comparable basis, which means that the chances of leaving the unemployment pool

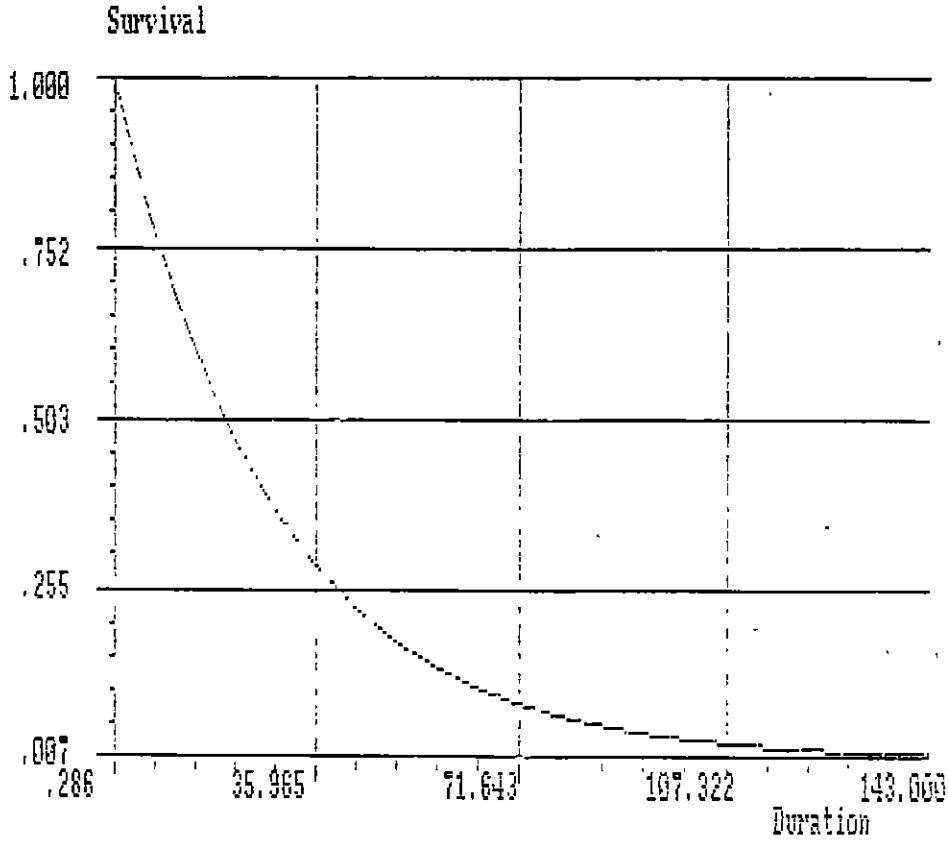


Figure 3

were higher for this group. Given that the aggregate unemployment rate was much lower for their study than for ours, this is as expected.

In terms of statistical significance the most important variables are. education to at least year 12; location in a capital city or in a country town; age; the reservation wage at the start of the spell, and sex. There is no evidence of duration dependence as the parameter α is not significantly different from 1.

The variables which apparently had no effect on unemployment duration are also of interest: ethnicity; the amount of unemployment benefits received; the initial level of income; and marital status. We tested but have not reported other specifications related to previous job characteristics, such as any aspects of previous employment -occupation, industry, former pay and the receipt of training- none of which was significant.

It is interesting at this juncture to illustrate the sizes of the coefficients of the variables that seem to matter for unemployment duration. The expected unemployment duration is given for three standardised individuals, who might be described as having good, poor, and average characteristics.
An individual with 'good' characteristics, in terms of having low expected unemployment duration, lives in a capital city, is female, and has completed education at least to year 12 With these characteristics, and giving her one standard deviation above the average age (to age 23), and one standard deviation below the average reservation wage (to $1.88 per hour, after tax), her expected unemployment duration is 12 14 weeks, compared to the average of 28 76 weeks predicted by the model.

An individual with 'poor' characteristics has not completed high school, is male, and lives in a rural area. Giving him one standard deviation below the average age (to age 17), and one standard deviation above the average reservation wage (to $6 98 per hour, after tax), his expected unemployment duration is 92.59 weeks, which is about fifteen months higher than the mean, and almost eight times higher than the expected unemployment duration of a person with 'good' characteristics These are profound differences, but it should be remembered that an important contribution to the result is the effect of living in a rural area, where less than five per cent of the data fell

A second way of demonstrating the effect of individual variables on unemployment duration is to ask. by how much do particular characteristics alter the length of the unemployment spell? This is shown in Table 3, using the results from the exponential model in column (ii) of Table 2, for one unit changes in the dummy variables and a one standard deviation increase and decrease respectively in the reservation wage and age. These calculations are based on someone with 'good' characteristics, varying these characteristics one at a time

Some limited testing of the adequacy of the model has been carried out. First, we determined whether the parameters estimated were the same for males and females. The likelihood ratio test of this hypothesis gives a value of 7 74 which is clearly less than the 95 per cent critical value of the X^2 (7) distribution of 14.1 Secondly, we examined whether the functional form was sensitive to adding RW^2, $VAGEYR^2$ and RW* VAGEYR. The likelihood ratio test of their exclusion was 2 38 which is clearly less than the X^2 (3) 95 per cent critical value of 7.81

Among other things it is clear from Table 3 that location plays an important role in determining spell length We might expect this to be related to local unemployment rates, although the pattern of coefficient estimates on various locations makes interpretation a little difficult. Education and gender also have important effects

Another way of illustrating the results is to ask how well the models fare in a predictive sense. This is shown in Table 4, which compares the numbers of observations predicted to be still unemployed at various points durations with the actual data.

Table 2: Estimated Proportional Hazard Functions*

Independent Variables	(i)	(ii)
CONSTANT	-4.520 (-9 10)	-4.524 (-8.88)
VED	0.2939 (2.56)	0.2946 (2 51)
VCAPC	0.8477 (3.33)	0.8521 (3.27)
VOTHC	0.3042 (1 14)	0.3045 (1.11)
VCTOWN	0 9071 (3.25)	0.9096 (3.19)
MALE	-.2892 (-2.47)	-.2903 (-2.42)
VAGEYR	0 04329 (1.80)	0.04365 (1.77)
RW	-.06459 (-2.07)	-.06485 (-2.04)
RWM	-.4736 (-2.14)	-.4748 (-2.09)
α	1.0170 (18 13)	1 000 (Fixed Parameter)

* t-statistics in parentheses.

Table 3: Mean Unemployment Spells by Selected Characteristics

	Weeks
Education beyond Year 12	24.09
Education to Year 12 or less	32.32
Locality:	
Capital City.	24.21
Other City	41.86
Country Town	22.86
Rural	56.76
Male	32.30
Female	24.16
Age:	
17 yrs	32 66
23 yrs	25.32
Reservation Wage:	
$2 00 per hour	24.57
$7 00 per hour	33.67
Average Characteristics	**28.76**

Table 4: Predicted Continuing Unemployment by Duration

	≥ 13	≤ 26	≥ 52
Actual	205	76	42
Table 2 (ii)	206	78	53
Weibull, no x variables	218	78	73
Exponential, no x variables	209	78	57

It is apparent that the model corresponds to (predicts) the unemployment numbers quite closely up to at least six months, but over-predicts somewhat after a year. The form is apparently superior to the Weibull with no variables, but may not be a great improvement over the exponential with no explanatory variables.

In selecting the individuals in data set A we only included spells of unemployment which resulted in a new job within four weeks We are not entirely convinced that this method necessarily selects all of the appropriate spells, because some individuals may have taken working holidays travelling abroad or otherwise ended their spell with activities close to formal employment.

To allow for the possibility that the individuals leaving unemployment for employment are different to the whole sample leaving unemployment, and as a test for the robustness of our results, we examined data set B. Not surprisingly these data had more women and married people, who *a priori* were expected to be more likely to have concluded their unemployment spell with a period out of the labour force.

The results of estimating both the Weibull and exponential models on data set B are given in Table 5. Again, we present parsimonious results with the more general specification from which it is derived being shown in the Appendix.

There is some evidence of negative state dependence, but it is rather weak The main differences with the earlier results are that gender is not now important, but ethnicity is. The results imply that women, and individuals born outside Australia in English-speaking countries, are both more prone to leave the workforce after a spell of unemployment.

Carrying out similar calculations to those with sample A above shows that the mean spell length is 26 53 weeks. An individual with 'good' characteristics has an expected spell length of 11.14 weeks, and an individual with 'bad' characteristics 63.40 weeks. In these estimates location and ethnicity provide the most important quantitative effects, both increasing spell length by over five weeks at the less desirable settings of non-English-speaking origin and rural resident. Absence of education to year 12 increases spell length by over three weeks, but initial reservation wage is somewhat less important.

Table 5: Proportional Hazards - Whole sample Equations

Independent Variables	(i)	(ii)
CONSTANT	-4.677 (-10.81)	-4.671 (-12 92)
VED	0.2780 (2.71)	0.2715 (3.22)
VCAPC	0.3932 (4.08)	0.3798 (4.76)
VAGEYR	0.05739 (2.78)	0 05652 (3.28)
AUSBORN	0.3066 (1.74)	0.2983 (2 03)
ESMBORN	0.4223 (1.92)	0.4065 (2.22)
RW	0 06423 (-2.37)	-.06448 (-2.84)
RWM	-.4787 (-2 54)	-.4781 (-3 05)
α	0.9022 (23.33)	1.000 (Fixed Parameter)

*t-statistics in parentheses.

6. Policy Assessment and Conclusion

Reducing unemployment duration has important potential benefits, both for the individuals involved and for the macroeconomy. The redistribution of income and job opportunities, and the possibility of affecting the long-run positioning of the NAIRU, are two obvious reasons for government to be interested in the issue.

Our contribution has been to ask whether or not it is possible to use easily obtainable or observable individual characteristics to ascertain expected unemployment duration. Given that we were able to focus on a group of individuals at the start of an unemployment spell and to follow their unemployment experience to its completion, we are confident that the data are able to inform us of what characteristics might matter in this context. The question was complicated by the fact that about a third of the sample left unemployment without going to a job, but even given this some decision rules for CES officers can be suggested.

The variables that are generally statistically significant predictors of high expected unemployment duration are: living in a rural area; having education that is less than graduating from high school; being young; and having a high reservation wage. Considering just those people who find jobs we can add to the list of those most at risk males, and for the group that

leave unemployment for whatever reason, those born in countries where the language is not English have high expected unemployment duration.

It was interesting to find little evidence of state dependence, which suggests that focussing on heterogeneity, or the role of individual characteristics, is a useful way to proceed in terms of predicting the potential LTU. The econometric modelling is fairly restrictive however, so the results should not be seen as a definitive rejection of state dependence. As well, the sample could be generating the result: some of those not observed in the initial stages of unemployment, if they were included, could give rise to more state dependence. But the estimates in general do suggest that some of the observable characteristics of the short-term unemployed might be useful indicators of the likelihood of continuing joblessness.

The policy importance of our results depends in part on how much CES officers and others are able to change the employment prospects of the group seemingly at risk of continuing joblessness, and at what cost. Establishing who they are, at least in an observable sense, at the beginning of their unemployment experience, should provide some indication of where placement and/or training resources might usefully be directed.

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Appendix

Full Models

Independent Variables	Coefficient (i)	t-statistic (i)	Coefficient (ii)	t-statistic (ii)
CONSTANT	-4 107	-5.46	-4 718	-9.87
VED	0.3421	2.08	0.293	2.85
VCAPC	0.8030	2 65	0 637	3 24
VOTHC	0.1633	0.50	0.217	1.00
VCTOWN	0.7510	2.23	0.362	1.58
MALE	-0 3155	-2 28	-0 142	1.43
VHEALTH	-0 02038	-0.10	0.0440	0 36
VAGEYR	0.01994	0.60	0.0413	2 10
AUSBORN	0.2267	0.91	0.3326	2.03
ESMBORN	0 2384	0.82	0.3969	1.97
VMARRY	0 1339	0.57	0.1011	0.63
VMARSIN	-0 03721	-0.3	-0.4911	-1.19
VICTRN	0 3865	1.28	0.1088	0.68
VOCTRN	0 1726	0.62	0.2060	1.01
VUJI	-0.1169	-0.49	0.0626	0.41
VJTPAY	0 001013	0.89	0.00116	1.66
VJTM	-0 005977	-0.23	0.1515	0.96
DOLE	-0.002201	-1.24	-0.001647	-0.138
VMASS	-0.1321	-0.70	0.01784	0.12
VSASS	0 026179	0.121	0.02758	-0 16
VASSM	-0.1602	-0 79	-0.04677	-0 31
NCURRINC	0.0001212	0.18	0.0001782	0.33
NCURRM	-0 1975	-0 82	-0.04732	-0 27
RW	-0.07352	-1 98	-0.06413	-2 32
RWM	-0.4116	-1 44	-0.472239	-2 46

The Dynamics of Youth Unemployment: An Analysis of Recurrent Unemployment

P.N. Junankar and Margaret Wood*

1. Introduction

In this paper we focus on recurrent unemployment using the Australian Longitudinal Surveys Earlier studies on recurrent unemployment include Heckman and Borjas (1980), OECD (1985), Hui (1986a,b), Corcoran and Hill (1985), Stern (1986), Trivedi and Alexander (1986, 1989), and Adena (1989). The aim of this paper is to determine whether there are some people who are more likely to face recurrent spells (defined as those people who have more than one spell in a calendar year) and whether they are more likely to have had prior spells of unemployment, i.e. whether there is occurrence dependence, or scarring. We study whether people who come from poor socio-economic and poor educational backgrounds enter into secondary labour markets with low wages and insecure employment and hence face recurrent unemployment or spells in the not-in-the-labour-force (NILF) category. Our results show that there is clearly a problem of recurrent unemployment faced by a sub-set of the youth labour market and that there some is evidence for occurrence dependence. Those people who have recurrent spells account for a large proportion of the total weeks of unemployment experience, as well as facing a cumulatively large number of weeks of unemployment. Section 2 briefly outlines some theories; Section 3 describes the data we have used from the Australian Longitudinal Surveys, the methods used, and some results; and Section 4 concludes the paper.

2. Some Explanations

Let us consider the various ways in which individuals may have *recurrent spells* of unemployment, that is more than one spell of unemployment in (say) one year. If we consider the labour market in terms of flows then the recurrent spells may originate from individuals losing their jobs frequently either due to voluntary separations (quits or termination of short term contracts) or involuntary ones (redundancy or being fired for poor performance). But in either case, unless a person receives acceptable job offers soon after becoming unemployed they cannot have *recurrent spells* of unemployment. The one exception is when a person leaves the

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unemployment state simply to leave the labour force temporarily and then re-enters the labour force by joining the unemployed pool. For many young people, it has been argued, there is a fuzzy boundary between unemployment and NILF states. Hence, in our econometric work we consider the case of recurrent spells of unemployment as well as recurrent spells of unemployment or not-in-the-labour-force. It is clear that if an individual has a long spell of unemployment, then s/he cannot have too many repeat spells of unemployment in a (calendar) year, or more formally the probability of recurrent spells is not independent of the duration of spells Some people (those in the so-called 'fast lane') may hold a series of jobs in a short spell of time, but they would not have any unemployment spells in between the different jobs. Section 3 provides some evidence on this issue. To summarise, to have recurrent spells of unemployment an individual must have a high probability of losing a job (either voluntarily or involuntarily) as well as a high probability of receiving acceptable job offers. One way of presenting this schematically is given below.[1]

Table 1: A Taxonomy of Recurrent Spells

Probability of Job Loss:	Probability of Obtaining a Job:	
	Low	High
Low	Few long spells	Few short spells
High	Repeat long spells	Repeat short spells

To have a high probability of obtaining a job a person must have a high probability of receiving (good) job offers and a high probability of accepting the offers (or, in other words, must have a low reservation wage).

The probability of job loss depends either on the employee (voluntary separations), on the nature of the employment contract, or on involuntary separations—the probability of being fired by the employer.

Some workers may have very weak attachment to a job, employer, or geographic location and may voluntarily quit to look for different employment. This decision may be affected by the availability and magnitude of unemployment benefits.[2] They may quit because they do not like the nature of the work, or the employer (or their supervisor), or they may wish to try their luck in a different part of the country. Some young people may sample a sequence of jobs in an attempt to choose an optimal career while others may change jobs frequently to increase their incomes. Workers in the secondary sector in dead end jobs, no career structure, with little or no firm specific training are more likely to quit Some workers have, due to personal reasons (e.g. poor health), a very unstable employment record.

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1 We are grateful to John Creedy for suggesting this framework.

2 This assumes that on-the-job search is less efficient than off-the -job search. However, there is very little evidence to support this view

In many cases the job loss is simply due to the ending of a short term contract, for example, the workers in seasonal industries/occupations (such as agriculture, tourism, hotels, restaurants, building trades, ice cream sales persons, etc.) are hired only for short periods.

Involuntary job separations could be due to: (a) the firm becoming bankrupt and all employees losing their jobs; or (b) redundancy, that is the job comes to an end because of financial stringency or due to technological change; or (c) due to the worker being fired for inefficiency, incompetence, or corrupt behaviour. The latter requires an employer to have good monitoring practices or a workforce that does not like shirkers. Redundancies obviously depend on the buoyancy of the product market in general and the success of the firm in particular In buoyant markets a worker may simply have to shift from one line of work to another even if his/her particular work has been superseded by new technology. Early school leavers, unskilled workers with little training, and in non-unionised jobs are more likely to be laid off, or made redundant, or dismissed.

The probability of obtaining a job depends on the joint probability of receiving an offer and the probability of accepting the offer. The probability of receiving an offer would depend on the state of the labour market and on the personal characteristics of the worker searching for work. A person with better education, skills and experience would be more likely to receive an offer. If the employer uses unemployment as a negative signal of a worker's productivity, then (*ceteris paribus*) the probability of an offer would be lower. Similarly, the probability of receiving an offer would depend on the search intensity of the worker, and the duration of unemployment may decrease the search intensity.

The probability of accepting the offer depends on the individual's reservation wage which in turn is determined by the distribution of wage offers and the costs of search, hence it may be affected by unemployment benefit. Young people are often posited to sample jobs in their early career in order to find their optimal career, and this would explain recurrent spells of unemployment. In other words, age or experience should explain recurrent spells of unemployment.

Another reason for having recurrent unemployment spells is that people may leave unemployment due to sickness, or they join a labour market program, or because they get discouraged and leave the labour force. Subsequently they may rejoin the unemployment stock and appear to have had multiple spells of unemployment even though they have not held a job in the intervening period. This means that they do not fit in the earlier conceptualisation of people losing and gaining jobs. People who are in this category would have, it has been argued, similar characteristics to those who go through multiple jobs. A proper treatment of this issue would require us to look at the probabilities of transition from one labour market state to another. Some indirect evidence on this issue is provided later in the paper when we look at the number of unemployment spells cross tabulated against the number of jobs held.

According to the segmented labour market hypothesis, workers in the bottom segment have a higher probability of job loss and a higher probability of obtaining a (short-term) job because they have low expectations, a low reservation wage, and work in occupations with short term contracts [3] However, this is also consistent with human capital theory where people with less training would be the most likely to be dismissed, as well as having a lower probability of employment. *The main difference is that the segmented labour market hypothesis would suggest recurrent spells of unemployment while the human capital hypothesis would suggest long spells of unemployment.*

This analysis suggests a set of economic variables that should be included in reduced form cross-sectional, or longitudinal models: local unemployment rates, age (or experience), migrant or Australian born, state of health, previous occupation, urban or rural, educational and training variables, unemployment benefits, union membership, and so on. An important aspect of such studies is to look for scarring effects, that is does the experience of unemployment increase the probability of remaining unemployed. This may be due to decreasing search intensity as the person becomes despondent, or because the prospective employer regards a previous spell of unemployment as a negative signal, and treats the searcher as having some unmeasured poor characteristics including depreciated human capital. there must be something wrong with an unemployed person! In the context of studying *recurrent* unemployment we shall look for occurrence dependence, that is, whether previous spells of unemployment affect the probability of facing recurrent spells of unemployment

In summary, the probability of recurrent spells of unemployment depends on a high probability of job loss *and* on a high probability of obtaining another job. Both probabilities depend on the nature of the employer and the employee.

3. Data, Methods and Results[4]

The data we have used are extracted from the Australian Longitudinal Surveys In this study we have used the Area Sample (a stratified multi-stage random sample) of 4515 male respondents between the ages of 16 and 25 in 1985 who were then followed through until 1988 by which time sample attrition led to a sample of 3026 *For our econometric analysis we have looked at those males in 1988 for whom data existed on all the relevant variables. In other words, the sample excludes those males in 1988 who had 'missing values' for the regressors. This left us with a sample of 2255 males that we used in our econometric analysis.* Thus sample attrition

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3 See Atkinson (1990) for an analysis of an interesting theoretical model.

4 Earlier studies of youth labour markets include Miller and Volker (1987), Junankar (1987), and Lynch (1989).

over time plus the deletion of observations due to missing values may have led to some unknown biases in our results.[5]

Data description

Before we carry out formal econometric analysis let us look at some some descriptive statistics for the sample of male respondents who were in each wave of the survey over the period 1985-88. Table 2 provides information,for each year, on the percentage of the sample who were unemployed, in long term unemployment (defined as being unemployed continuously for over a year), or who faced recurrent spells of unemployment or unemployment or NILF. Recurrent spells are defined here as more than one spell of unemployment or NILF experienced by a person in one year. The sample we used is a sub-set of the original sample of 4515 males: as a result of attrition the sample size decreases and due to incomplete information on relevant variables some observations had to be deleted from the sample.[6]

Table 2: Unemployment, Long Term Unemployment, and Recurrent Spells (Sample of survivors with complete data)

	1985	1986	1987	1988
Percentage Unemployed in Sample	9.8	7 4	7.1	4 0
Percentage LTU in Sample	2.6	2.5	2 1	0 9
Percentage of sample with recurrent spells of unemployment	2 9	10.1	8 9	5.2
Percentage of sample with recurrent spells of unemployment or NILF	5.6	15 7	12 0	7 8
Sample Size	2255	2255	2255	2255

Source: ALS Calendar Dataset

The percentage of unemployment in the sample decreases with time as does the long term unemployment (LTU), although the fall is much greater in the reduced sample of 2255 males. The number of males facing recurrent spells increases suddenly between 1985 and 1986 and then declines, again the decline is more rapid in the smaller sample. It is interesting to note that this picture is the same whether we look only at unemployment spells or whether we include NILF spells. *It appears that the problem of sample attrition and missing values is biased towards those males who are unemployed and have recurrent spells of unemployment: the percentages*

5 In subsequent work we hope to look at females in the sample.

6 Missing values of UNEMPSP were set equal to zero, and hence are likely to underestimate the problem.

are consistently higher for the larger samples.[7] Thus our econometric results should be interpreted with some caution.

A feature of this sample (whether the larger or smaller sub-sets) is that for some reason there is a sudden increase in recurrent spells between 1985 and 1986 followed by a gradual decline. It is curious that this occurs at a time when the percentage unemployed in the sample falls over the entire period (as is true of youth unemployment rates in the whole population). This is another issue that needs further investigation.

In order to exploit the longitudinal nature of the sample, we look at the number (and percentage) of the sample in 1985 who continued in the same state. That is, those people who had zero (one, and more than one spells) in 1985 who continued to have zero (one, and more than one) spells in 1986, 1987, and 1988. These data are presented in Tables 3, 4, and 5.

These tables show the persistence of spells from one year to another. If we look at Tables 4 and 5 we see that a fairly high percentage of the sample seem to have repeat spells of unemployment (or unemployment and NILF spells). For example, of the 65 who had more than one spell of unemployment in 1985, 26 per cent had more than one spell in 1986 and 6 per cent in 1987. Of the 201 who had more than one unemployment spell in 1987, 19 per cent had more than one spell in 1988. Similarly, about 30 per cent of those who had recurrent spells of unemployment or NILF had a repeat experience in the subsequent year. At the other end of the spectrum, a huge majority (between 58 to 90 per cent) of those who had zero spells usually continued to have zero spells In particular, 63 per cent of the sample had no spells of unemployment throughout the period, or, in other words, 37 per cent of the sample had at least one spell of unemployment over the period. This suggests that there is a concentration of unemployment experience among some groups. Further evidence presented below supports this finding.

Results from our sample are similar to those of Clark and Summers (1979) who found that most people (males in our sample) have short spells. *However, they account for a very small proportion of the total weeks of unemployment.* For example over the period 1985-88, 20.1 per cent of the males (who had at least one spell of unemployment) had spells of less than 4 weeks but accounted for only 1.2 per cent of the total weeks of unemployment and 42.2 per cent who had spells longer than 26 weeks accounted for 84.9 per cent of the total weeks of unemployment. Diagram 1 shows how the longer durations account for a large percentage of the total weeks of unemployment experience. The data reveal an increase in inequality from 1985 to 1986, and then remained constant for the next two years.

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7 Tables showing this bias are available from the authors on request.

Table 3 (a): Unemployment Spells = 0

	1985	1986	1987	1988
1985	1715 (100.0)	1334 (77.8)	1169 (68.2)	1076 (62.7)
1986		1524 (100 0)	1318 (86.5)	1199 (78.7)
1987			1654 (100.0)	1483 (89.7)

Table 3(b): Unemployment and Not-in-the-labour-force Spells = 0

	1985	1986	1987	1988
1985	1238 (100.0)	946 (76.4)	822 (66.4)	727 (58.7)
1986		1257 (100.0)	1066 (84.8)	931 (74.1)
1987			1470 (100 0)	1248 (84 9)

Table 4(a): Unemployment Spells = 1

	1985	1986	1987	1988
1985	475 (100.0)	196 (41 3)	62 (13.1)	22 (4.6)
1986		503 (100.0)	164 (32.6)	51 (10.1)
1987			400 (100.0)	118 (29.5)

Table 4(b): Unemployment and Not-in-the-labour-force Spells = 1

	1985	1986	1987	1988
1985	738 (100.0)	223 (30.2)	67 (9.1)	20 (2.7)
1986		461 (100.0)	116 (25.2)	37 (8.0)
1987			374 (100.0)	97 (25.9)

Table 5(a): Unemployment Spells > 1

	1985	1986	1987	1988
1985	65 (100 0)	17 (26 2)	4 (6 2)	0
1986		228 (100.0)	68 (29.8)	14 (6.1)
1987			201 (100 0)	39 (19 4)

Table 5(b): Unemployment and Not-in-the-labour-force Spells > 1

	1985	1986	1987	1988
1985	279 (100.0)	131 (46 9)	53 (19 0)	15 (5.4)
1986		537 (100 0)	212 (39.5)	69 (12 8)
1987			411 (100.0)	126 (30.6)

We now look at the number and duration of spells experienced by the unemployed over the period 1985-88, see Tables 6 and 7. Table 6 shows that although 40.6 per cent of those who experienced unemployment had short spells (less than 13 weeks) they accounted for only 6.0 per cent of the total weeks of unemployment experienced. At the other end of the spectrum, 3 per cent with very long spells (greater than 157 weeks) accounted for almost 15 per cent of the total weeks of unemployment. In other words, although a majority of the unemployed had fairly short spells (less than 26 weeks) they account for only 15 per cent of the total weeks of unemployment.

Table 7 shows that over the period 1985-88 although 42.6 per cent of the sample (who experienced unemployment) had only one spell, they accounted for a small percentage (19.18 per cent) of the total number of spells of unemployment and accounted for a small percentage (22.58 per cent) of the total weeks of unemployment. Or put another way, over three quarters of the total weeks of unemployment were accounted for by males who had more than one spell of unemployment. Diagram 2 illustrates the point. In general we find that the more the spells of unemployment, the longer the average duration of weeks of unemployment faced by the individual. For example the average duration per person increases from 19.21 weeks for those who face only one spell to 84 83 weeks for those who experienced six spells. The problem is probably worse as we are ignoring many people whose unemployment spell ends not in a job but simply in NILF Evidence presented in Kryger (1990) suggests that the longer the duration of a spell the less likely is an exit into a job and the more likely the exit is into NILF. (See Kryger 1990, Table 25.)

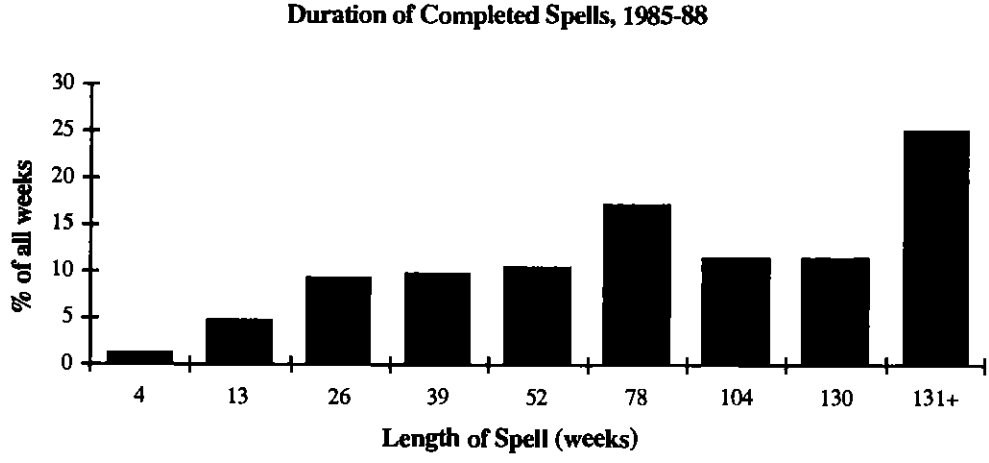

Diagram 1

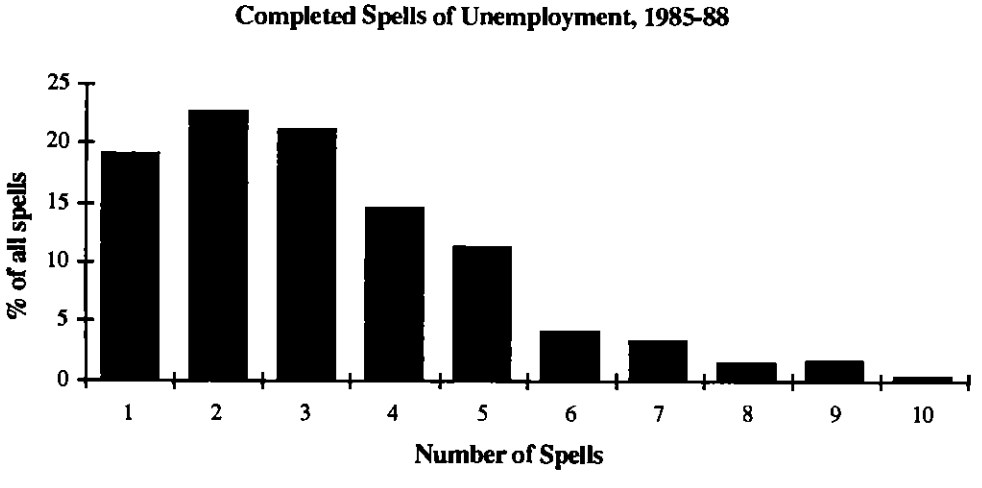

Diagram 2

Table 6: Total Weeks of Unemployment, 1985-88

Spell Length	Number	Percent	Weeks	% of all Weeks
1-4 weeks	308	20 1	655	1 18
5-13 weeks	314	20.5	2643	4.76
1-26 weeks	264	17.2	5092	9 16
27-39 weeks	165	10 8	5380	9.68
40-52 weeks	125	8 2	5747	10.34
53-65 weeks	77	5 0	4482	8.06
66-78 weeks	70	4 6	4997	8.99
79-91 weeks	37	2.4	3156	5.68
92-104 weeks	32	2.1	3137	5.64
105-117 weeks	37	2.4	4132	7 43
118-130 weeks	18	1 2	2233	4.02
131-143 weeks	20	1.3	2728	4.91
144-156 weeks	21	1.4	3161	5.69
157+ weeks	46	3.0	8035	14 46
All	1534	100 0	55578	100.0

Table 7: Unemployment Spells, 1985-88

Unemp. Spells	Males		No. of Spells	% of all Spells	Total Weeks	Mean Weeks/ Person	% of all Weeks
	No.	%					
1	653	42 6	653	19.18	12547	19.21	22 58
2	387	25 2	774	22.73	15057	38.95	27 12
3	240	15.6	720	21 15	11353	47.30	20.43
4	124	8.1	496	14.57	7635	61.57	13.47
5	77	5.0	385	11.31	5076	65.92	9.13
6	23	1 5	138	4 05	1951	84 83	3.51
7	16	1 0	112	3 29	719	44.94	1.29
8	6	0 4	48	1 41	487	81.17	0 88
9	6	0 4	54	1.59	590	98 33	1.06
10	1	0.1	10	0 29	31	31 00	0.06
15	1	0.1	15	0 44	114	114 00	0.21
All	1534	100.0	3405	100.0	55578	36 23	100.0

Source: ALS Calendar Dataset (for Tables 6 and 7)

Table 8: Duration of Unemployment Spells, 1985-88

Unemp. Spells	Males	1st Spell	2nd Spell	3rd Spell	4th Spell	5th spell	6th Spell
				(Mean Weeks)			
1 spell	653	19.21	0	0	0	0	0
2 spells	387	20.87	18 09	0	0	0	0
3 spells	240	17 08	15.22	15.00	0	0	0
4 spells	124	18.90	15.00	14 37	13 30	0	0
5 spells	77	16 38	12 23	13.97	10 84	12 49	0
6 spells	53	17 85	10 34	8 38	10 47	10 30	7 70

Source: ALS Calendar Dataset

This suggests that the recurrent spells are not a rational search strategy (job shopping) being practised by optimising workers They appear much more likely to be an involuntary response to the market

Table 8 provides interesting information on the average duration of a spell for those people who have recurrent spells In general, for those with multiple spells of unemployment the duration of *each subsequent spell* gets gradually smaller For example if we look at the period 1985-88, those males who have *only* one spell have a mean duration of 19 21 weeks For those who have *four* spells the mean durations are 18 9 weeks for the first spell, 15 00 weeks for the second, 14 37 weeks for the third, and 13 30 weeks for the fourth and final spell

Another interesting aspect of the problem of recurrent unemployment is revealed by looking at a cross tabulation, see Table 9 of the number of unemployment spells by the number of jobs held over the period 1985-88 We find that 21 per cent of our sample held more than five jobs, and a massive 35 per cent held more than four jobs This table also reveals that frequent job changers have very few spells of unemployment, and that almost 28 per cent of those who held four jobs, 25 per cent of those who held five jobs, and 20 per cent who held 6 or more jobs *had zero spells of unemployment* If frequent job changers went through an intermediate labour market state of unemployment, then we should find that the elements of the principal diagonal in Table 9 should dominate the off-diagonal elements However, a casual glance at the table reveals that (generally) the off-diagonal elements dominate the principal diagonal. In other words, those people who have several spells of unemployment are not job shopping and voluntarily 'taking' unemployment as a rational search strategy. almost 50 per cent of the multiple job holders (four or more jobs) had no more than one spell of unemployment

Table 9: Unemployment Spells by Jobs Held, 1985-88

Unemployment Spells		Number of Jobs: 0	1	2	3	4	5	6	Total
0 spells·	(a)	17	556	304	201	108	59	75	1320
	(b)	0 60	19 48	10.65	7 04	3.78	2.07	2.63	46 25
	(c)	1.29	42.12	23 03	15.23	8 18	4.47	5.68	
	(d)	38 64	75.24	49.43	42 86	28.35	25.54	20.00	
1 spell:		22	128	181	108	97	54	63	653
		0 77	4 48	6.34	3 78	3.40	1.89	2.21	22 88
		3 37	19.60	27.72	16 54	14.85	8.27	9.65	
		50 00	17 32	29.43	23 03	25.46	23 38	16.80	
2 spells		3	44	94	84	81	36	45	387
		0.11	1.54	3 29	2 94	2 84	1 26	1 58	13.56
		0.78	11 37	24 29	21 71	20.93	9.30	11.63	
		6.82	5.95	15 28	17.91	21.26	15.58	12 00	
3 spells:		2	8	31	51	49	44	55	240
		0.07	0 28	1.09	1 79	1.72	1 54	1.93	8.41
		0 83	3 33	12.92	21 25	20 42	18 33	22.92	
		4 55	1 08	5.04	10.87	12 86	19.05	14 67	
4 spells·		0	3	3	21	35	19	43	124
		0.00	0 11	0 11	0.74	1.23	0 67	1.51	4.34
		0.00	2.42	2 42	16.94	28.23	15.23	34.68	
		0.00	0.41	0.49	4 48	9 19	8.23	11 47	
5 spells:		0	0	2	4	8	16	47	77
		0.00	0 00	0.07	0.14	0.28	0.56	1.65	2.50
		0.00	0 00	2.60	5.19	10.39	20 78	61.04	
		0.00	0.00	0.33	0.85	2.10	6 93	12 53	
6+ spells		0	0	0	0	3	3	47	53
		0.00	0.00	0.00	0 00	0.11	0.11	4 65	1.86
		0.00	0.00	0.00	0.00	5.66	5.66	88.68	
		0.00	0 00	0.00	0.00	0.79	1.30	12.53	
Total		44	739	615	469	381	231	375	2854
		1.54	25 89	21.55	16.43	13 35	8.09	13 14	100.0

Note· For each of the spell blocks 1 - 6+
Row (a) = Frequency; Row (b) = Percent of total;
Row (c) = Percent of row total; Row (d) = Percent of column total

Source: ALS Calendar Dataset

Table 10

YSPELLS	0 spells N=1788	1 spells N=349	>1 spells N=118	All N=2255
NSWACT	0.4044	0.4413	0.3814	0.4089
VIC	0.2321	0.1633	0 1780	0.2186
QLD	0.1560	0.1404	0 1525	0.1534
SANT	0.1051	0.1089	0 1271	0.1069
WA	0.0727	0.0974	0 1356	0 0798
TAS	0.0296	0.0487	0 0254	0 0324
YMARRIED	0.2863	0.1748	0 2542	0.2674
VHEALTH	0.0095	0.0143	0.0339	0.0115
WHEALTH	0 0056	0.0200	0.0593	0.0106
XHEALTH	0.0006	0.0315	0.0678	0.0089
YCAPCITY	0 5487	0 6246	0.5169	0 5588
YOTHCITY	0.2338	0 2178	0.2288	0 2310
YTOWN	0.1572	0.1347	0.2034	0.1561
YRURAL	0.0604	0.0229	0 0508	0.0541
LOOK82	0.0291	0.0372	0 1186	0.0350
LOOK83	0.0503	0.0974	0 1102	0 0607
LOOK84	0.0610	0.1519	0.1441	0.0794
PROF	0 2824	0.1719	0 0932	0.2554
CLERCAL	0.1057	0.1261	0 1356	0 1104
MANUAL	0 0861	0.1891	0 2627	0 1113
SALESER	0.1342	0.1633	0 1525	0 1397
TRADE	0 2679	0.2120	0 2203	0 2568
MANUF	0 2125	0 1862	0 2119	0 2084
CONSTR	0.1186	0 1289	0 1186	0 1202
TRADIND	0 2075	0 1948	0.2373	0.2071
FINADM	0.1560	0 1289	0.0678	0.1472
SERIND	0.0660	0 1375	0.1186	0 0798
YRS4	0 0140	0.4069	1.0000	0 1264
VUN	0 0777	0 1633	0.2034	0.0976
WUN	0.0447	0 1948	0.1610	0 0741
XUN	0.0056	0 2779	0 4576	0.0714
XHHSIZE	3.4111	3 5903	3.7203	3.4550
AUSNZ	0.8714	0 8768	0 79661	0 8683
WHITE	0.9592	0 9312	0 9661	0.9552
ENGLISH	0.9217	0 9226	0.9152	0.9215
AUSQUAL	0.2640	0 1404	0.1356	0.2381
VSCHL10	0 2013	0.2751	0 3136	0.2186
VSCHL12	0 3389	0.3267	0 3220	0.3361
YUNION	0 4284	0.2493	0 2034	0.3889
XINDCURR	367.68	207.36	198.64	334.03
UNEMPSP	0 2405	0.3926	0 4746	0.2763
WUNEMPSP	0 3552	0.7393	1 0254	0.4497
XUNEMPSP	0.2220	0 9112	1 2627	0.3832
MIGRANT	0.1286	0 1232	0 2034	0.1317
VLNGSTAY	1.5962	1.5301	2 4407	1.6302
YLTU	0.0000	0 0430	0 0424	0.0089
TOTSP	0.8177	2.0430	2 7627	1.1091
TOTUN	8.8384	28.60	32.407	13.129
YAGE	23 32	22.42	22.60	23.14

Table 11

YSPNILF	0 spells N=1583	1 spells N=387	>1 spells N=285	All N=2255
NSWACT	0 3961	0.4419	0.4351	0 4089
VIC	0.2281	0.2041	0.1860	0 2186
QLD	0.1604	0.1292	0.1474	0.1534
SANT	0 1093	0.1034	0 0982	0.1069
WA	0 0745	0.0853	0.1017	0.0798
TAS	0 0316	0.0362	0.0316	0.0324
YMARRIED	0 3032	0 1938	0 1684	0.2674
VHEALTH	0 0082	0.0181	0 0210	0.0115
WHEALTH	0.0044	0 0129	0.0421	0 0106
XHEALTH	0.0006	0 0258	0 0316	0.0089
YCAPCITY	0.5370	0.6176	0 6000	0.5588
YOTHCITY	0.2382	0 2145	0 2140	0.2310
YTOWN	0.1630	0.1292	0 1544	0.1561
YRURAL	0.0619	0.0388	0.0316	0 0541
LOOK82	0.0284	0.0388	0.0667	0.0350
LOOK83	0.0505	0.0749	0.0982	0.0607
LOOK84	0.0619	0.1163	0.1263	0.0794
PROF	0 2817	0.2067	0.1754	0.2554
CLERCAL	0 1131	0 0982	0.1123	0.1104
MANUAL	0 0796	0 1628	0 2175	0 1113
SALESER	0.1200	0 1860	0.1860	0.1397
TRADE	0.2817	0.2067	0.1860	0.2568
MANUF	0.2198	0 1835	0.1789	0.2084
CONSTR	0.1181	0.1318	0.1158	0.1202
TRADIND	0.2028	0.2067	0.2316	0.2071
FINADM	0.1630	0.1137	0.1053	0.1472
SERIND	0.0575	0.1266	0 1403	0 0798
YRS4	0.0000	0.0000	1 0000	0.1264
VUN	0.0739	0.1447	0.1649	0.0976
WUN	0.0373	0.1447	0.1825	0.0741
XUN	0 0031	0 2067	0.2667	0.0714
XHHSIZE	3.4037	3 5711	3.5825	3.4550
AUSNZ	0 8800	0.8398	0.8421	0.8683
WHITE	0 9627	0.9302	0.9474	0.9552
ENGLISH	0.9255	0.8992	0.9298	0.9215
AUSQUAL	0.2704	0.1886	0.1263	0.2381
VSCHL10	0.2085	0.2300	0 2596	0.2186
VSCHL12	0.3354	0.3282	0 3509	0.3361
YUNION	0.4523	0.2662	0.2035	0.3889
XINDCURR	378.69	258.00	189 16	334.03
UNEMPSP	0 2293	0 3773	0.4000	0.2763
WUNEMPSP	0.3342	0.6615	0.8035	0.4497
XUNEMPSP	0 2028	0.7338	0.9088	0.3832
MIGRANT	0 1200	0.1602	0.1579	0 1317
VLNGSTAY	1.4902	1.9948	1.9123	1 6302
YLTU	0.0000	0.0362	0 0210	0.0089
TOTSP	0.7663	1.7726	2 1123	1.1091
TOTUN	8.0120	24 837	25.656	13.129
YAGE	23 39	22.74	22 32	23.14

Tables 10 and 11 provide summary statistics on some of the variables used in our analysis. The results are presented by the number of unemployment spells in 1988.

It is interesting to note that for all those who have had at least one spell of unemployment, the mean number of unemployment spells increased over time. For example, looking down a column for those with two or more spells in 1988 the mean number of spells increased from 0.47 in 1985 to 1.3 in 1987. Again, looking along the rows of unemployment spells in previous years, we see that the mean number of spells in (say) 1987 increases with the number of spells in 1988. Similarly, mean unemployment increased over time for each spell group, for example for those with two or more spells in 1988 the mean went up from 0.20 in 1985 to 0.46 in 1987. Turning to occupation, the greater the number of spells the less likely they are to be professionals and more likely to be manual workers. We now turn to some more formal analysis.

Results

In this study we use maximum likelihood estimation of multinomial logit equations to analyse the probability of having zero, one, or recurrent spells (two or more spells) of unemployment and not in the labour force in 1988. As mentioned earlier there is reason to believe that for youths, unemployment and not in the labour force are very similar labour market states.

The models we estimate are of the form

$$P_j = \exp(x\beta) / \Delta \qquad (j=1,2,.,m-1)$$

and

$$P_m = 1/\Delta$$

$$\Delta = 1 + \Sigma \exp(x\beta)$$

where P is the appropriate probability and x is a vector of regressors and β is an appropriately defined vector of parameters.

Our main hypotheses are. (a) whether we can discern a secondary labour market, and (b) whether there is evidence of scarring or occurrence dependence. In this paper we estimate reduced form equations which cannot really distinguish between the segmented labour market hypothesis and an amended neoclassical model which allows for scarring. However, as mentioned earlier, the segmented labour market hypothesis provides an explanation for recurrent spells while the human capital/neoclassical model is more an explanation for long term unemployment.

In our estimation we have used a set of variables which describe the characteristics of the individual (e.g. age, education, marital status, union membership, etc.); labour market history variables (e.g. previous unemployment spells); occupation and industry of last previous employment, etc..

List of Variables

LHS Variables:

Spells of Unemployment in 1988.
Spells of Unemployment or Not-in the-Labour-Force in 1988.

RHS Variables:

Most of the variables have been recoded to one-zero variables. A variable name beginning with V,W,X,Y stands for the date of that variable and is for 1985, 1986, 1987, 1988 respectively.

LOOK 84(83,82)	Looking for work in 1984(83,82) = 1 0 otherwise
UN	1 if Unemployed in the reference period, 0 otherwise
LTU	1 if unemployment duration greater than 1 year, 0 otherwise
UNEMPSP	Number of unemployment spells in one year
YMUR	Male Unemployment Rate in 1988 in State of residence in 1985
AGE	In years
MARRIED	1 if married or de facto, 0 otherwise
SCHL10	SCHL10 = 1 if 10 or less years of school, 0 otherwise
SCHL12	SCHL12 = 1 if 11 or 12 years of school, 0 otherwise
EXP	Years of experience
MIGRANT	1 if born overseas, 0 otherwise.
TOWN	Other city location = 1, 0 otherwise.
RURAL	Rural location = 1, 0 otherwise.
UNION	Union member = 1, 0 otherwise.
WHITE	Race, English or European = 1, 0 otherwise.
HEALTH	Health problems looking for work = 1, 0 otherwise.
INDCURR	Derived Current Income ($)
YFIRED	1 if fired from the last job held, 0 otherwise.
MANUAL	1 if in manual occupations, 0 otherwise.

Table 12

Variable	Coefficient	Std. Error	T-ratio
	Outcome = YSPELLS= 1		
ONE	-0.9436	0.3741	-2.522
VIC	-0.3853	0.1972	-1.954
QLD	-0.3448	0.2130	-1.619
SANT	-0.1998	0.2497	-0.800
WA	0.3418	0.2515	1.359
TAS	0.4267	0.3854	1.107
YMARRIED	-0.2865	0 1941	-1.476
YFIRED	1.1351	0.1884	6 026
YTOWN	-0.4374	0.2148	-2.036
YRURAL	-1.2676	0 4189	-3.026
LOOK82	-0.2184	0.4126	-0.529
WUNEMPSP	0.0910	0.0944	0 963
XUNEMPSP	0.6009	0 0960	6.261
YUNION	-0.5177	0 1569	-3.299
XINDCURR	-0.0029	0 0005	-5.907
WHITE	-0 3043	0 3154	-0 965
MIGRANT	-0.2597	0 2259	-1 150
YEXP	0 0031	0 0271	0.116
XUN	2 7246	0 3656	7.451
VLTU	0 5613	0 3611	1 554
VSCHL10	0 2707	0 1871	1.447
VSCHL12	0 1991	0 1635	1 218
YHEALTH	18.4658	1407 3300	0.013
MANUAL	0 2651	0 2101	1.262
	Outcome = YSPELLS= 2		
ONE	-4 2491	0.7031	-6.043
VIC	-0 1029	0 380	-0.324
QLD	-0 1473	0 3379	-0.436
SANT	-0 0376	0 3884	-0.097
WA	0 7454	0.3667	2.032
TAS	-0 5484	0.7179	-0.764
YMARRIED	0 0213	0.2906	0.073
YFIRED	0.9510	0.2839	3.350
YTOWN	0 0456	0.3087	0 148
YRURAL	-0.3555	0 5368	-0 662
LOOK82	0 6830	0 4736	1.442
WUNEMPSP	0 3313	0 1285	2.579
XUNEMPSP	0 6904	0 1307	5.284
YUNION	-0 8853	0 2743	-3 227
XINDCURR	-0 0015	0 0008	-1 808
WHITE	0.7607	0 6065	1 254
MIGRANT	0.5295	0 3084	1.717
YEXP	-0.0195	0.0426	-0.458
XUN	3.5723	0.4229	8.4446
VLTU	0 7112	0.4801	1.481
VSCHL10	0 2847	0.2930	0.972
VSCHL12	0.2906	0.2664	1.091
YHEALTH	18 6893	1407.3300	0.013
MANUAL	0.4070	0.2955	1.377

Table 13

Variable	Coefficient	Std.Error	T-ratio
		Outcome = YSPNILF= 1	
ONE	-0.6522	0 3437	-1.898
VIC	-0 1686	0.1687	-1 000
QLD	-0.4843	0.1981	-2.444
SANT	-0 3576	0.2276	-1.571
WA	0 0740	0.2396	0.309
TAS	-0.0836	0 3844	-0.217
YMARRIED	-0.4028	0.1687	-2 388
YFIRED	1.0689	0 1838	5.815
YTOWN	-0.4298	0.1949	-2.205
YRURAL	-0.6765	0.3135	-2.157
LOOK82	-0.0268	0.3715	-0.072
WUNEMPSP	0 1341	0.0892	1.502
XUNEMPSP	0 4819	0.0947	5.090
YUNION	-0.6466	0 1396	-4 632
XINDCURR	-0.0014	0 0004	-3.637
WHITE	-0.3701	0.2875	-1.287
MIGRANT	0.2558	0.1910	1.339
YEXP	-0.0003	0.0242	0.012
XUN	3.2353	0.4861	6.656
VLTU	0.4898	0 3701	1.323
VSCHL10	-0 1464	0.1744	-0.839
VSCHL12	0.0040	0.1454	0.027
YHEALTH	17.0282	1474.0900	0.012
MANUAL	0.3588	0.2013	1 782
		Outcome = YSPNILF= 2	
ONE	-0 9346	0.4154	-2.250
VIC	-0.2703	0 2049	-1.320
QLD	-0.38`8	0.2264	-1.687
SANT	-0.5105	0.2764	-1.847
WA	0.2507	0.2748	0.912
TAS	-0.1743	0.4617	-0.377
YMARRIED	-0.4477	0.2159	-2.073
YFIRED	0 9958	0.2149	4.633
YTOWN	-0 2439	0.2215	-1.101
YRURAL	-1 1550	0.4109	-2.811
LOOK82	0.5890	0.3782	1.557
WUNEMPSP	0.2328	0.0982	2.370
XUNEMPSP	0.5388	0.1043	5.167
YUNION	-0.9017	0.1777	-5.073
XINDCURR	-0.0041	0.0006	-7.261
WHITE	0 0745	0.3581	0.208
MIGRANT	0.3310	0.2235	1 481
YEXP	-0 0137	0.0294	-0 466
XUN	2.9195	0.4941	5.909
VLTU	0.3875	0.3934	0.985
VSCHL10	0.0691	0.2071	0.334
VSCHL12	0.3288	0.1746	1.883
YHEALTH	18.5184	1474 0900	0.013
MANUAL	0.5716	0.2165	2.641

Tables 12 and 13 - Diagnostics

Table 12 YSPELLS		
Log-likelihood	=	-1010.0
Restricted (Slopes=0) Log-likelihood	=	-1414.2
Chi-squared (46)	=	808.4
McFadden's R squared	=	0.29
n	=	2255
Table 13 YSPNILF		
Log-likelihood	=	-1443.0
Restricted (Slopes=0) Log-likelihood	=	-1831.7
Chi-squared (46)	=	777.3
McFadden's R squared	=	0.2
n	=	2255

In some preliminary work we considered a simple binary logit model allowing for those who had two or more spells (recurrent spells) as against those who had either zero or one spell, or one spell only. In this framework we tried several variables describing the individuals characteristics, including type of school, region of origin of migrant, English language ability, previous industry and father's occupation, but most were not significant.[8]

Tables 12 and 13 provide results of multinomial logit estimation for spells of unemployment and for spells of unemployment and NILF respectively. Because of the fewer numbers of males who had two or more spells we decided to allow for three alternatives: males who had zero spells (the reference group), those who had one spell, and those who had two or more spells.

Table 12 shows that the probability of having one spell of unemployment (compared to zero spells) is less if the male is married, lives in a town or rural area (compared to the reference group, those living in cities) in Victoria, is a union member, or had a high income in the previous year. He would have a greater probability of facing a spell of unemployment if he had been fired from the last job he held, the greater the spells of unemployment in the previous year, and had been unemployed at the interview date in the previous year. Manual workers and those who left school early were more likely to have one spell, although the variables have low t-values.

The probability of having recurrent spells of unemployment was less for union members and those who had a high income in the previous year. The probability was greater if they lived in Western Australia, had been

8 Due to the restrictions of the LIMDEP version on the mainframe computer, we could only allow for a limited number of variables in the multinomial logit equations.

fired from the previous job held, the greater the number of previous spells, and if they had been unemployed in the previous year at interview date, and if they were migrants. Curiously, the experience variable is not significant nor was age (used in previous runs), and education variables had low t-values. Manual workers, and those who had a spell of long term unemployment in the first year of the sample were more likely to have unemployment spells but with low t-values.

Table 13 for unemployment and NILF spells tells (essentially) the same story with generally stronger t-statistics. In effect the results support the view that there is occurrence dependence, that those with low incomes and who are not union members are more likely to face recurrent spells. The main difference is that manual workers are more likely to have more than one spell of unemployment or NILF, and those who had 11 or 12 years of schooling were more likely to have recurrent spells. This provides some support to the view of a secondary labour market where the same people face recurrent spells of unemployment, those who are migrants, who are non-union members, and had low paid work in the past, and those who had previous experience of unemployment. Of course these results could be rationalised in terms of a neoclassical story: those who are low paid are those with few skills and limited education, have a weak attachment to the labour market, are low quality workers and hence are more likely to be fired and less likely to be hired. However, it does not explain why they would have *recurrent spells of unemployment*. In either case these people get trapped in a lower segment of the labour market. The main finding of interest in this study is the impact previous unemployment and previous spells of unemployment play in reinforcing the problems of this group of males.

The surprising part of this analysis was the mixed performance of education variables. This may be because previous unemployment experience was proxying for the education levels. Similarly, the insignificance of age and experience was unexpected. We would expect the younger males to go through a job shopping period, but perhaps because the sample is fairly restricted over the age variable (19-28 years) it may not show up. We were also surprised at the low significance of occupation dummies and insignificance of industry dummies. Again, this may be because of the previous unemployment experience proxying for them. Finally, we did not find a significant effect for the unemployment rate in the state of residence. This may have been because we only had the state of origin of the respondent in 1985. Ideally we would like to use the unemployment rate in the local labour market, but these data are not available to us.

4. Conclusions

Our study of recurrent unemployment suggests that recurrent unemployment is an important problem which has not received sufficient attention in the past. We found that people who had recurrent spells over the period 1985-88 cumulated several months of unemployment experience, even though, on average, each spell may only have been about 13 to 20

weeks long. We found, for example, that those people who had six spells had an average total duration of 85 weeks We also found that the percentage share of unemployment experience of short spells, and of those people with single spells, was very small. Long spells and people with multiple spells accounted for a very large percentage of the total weeks of unemployment experience. We found evidence for spell repetition, and for spell lengths to decline for people with recurrent spells.

Our evidence from estimation of multinomial logit equations suggests that there is occurrence dependence (scarring), and that males who had been fired from their last job, are migrants, non-union members, had low paid work in the past seem to face recurrent spells. This provides some support for a segmented labour market interpretation of the labour market. However, it is also consistent with some versions of a model that is based on human capital theory, but we cannot discriminate between the models.

The ALS data set provides a unique information base for the study of the Australian youth labour market. We hope that subsequent work will be able to throw some light on the transitions between different labour market states. Policy makers are especially concerned about the high rates of youth unemployment and we need to find ways of preventing the recurring spells of unemployment which lead some people to accumulate very long periods of time in unemployment or not in the labour force. We believe our study provides some insights into this relatively under-researched area

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The Dynamics of Underutilisation of Youth Labour

Russell Ross*

1. Introduction

In most analyses of the labour market position of youth the emphasis is on unemployment, especially official unemployment This is despite the fact that it is becoming increasingly evident that official unemployment statistics are no longer an adequate guide to the state of the labour market. This inadequacy is especially important in an examination of the labour market position of youth as these years encompass a period associated with major changes in many individuals' lives As such it is a period of considerable flux in labour market participation.

This paper examines the dynamics of underutilisation All aspects of underutilisation, including underemployment, official unemployment, and marginal attachment, are considered.

The research questions addressed include.

* what are the patterns of underutilisation among youth?
* how does underutilisation vary by age at any given time?
* how does underutilisation vary by age for the same cohort across time?
* who are the most vulnerable members within each cohort?
* what factors are the key determinants of underutilisation status?

The analysis is based on the sub-set of 5,391 individuals in the ALS for whom information is available in all four years 1985 to 1988 and for whom there is no missing information on any of the variables used in this paper.

Section 2 presents an aggregate picture of underutilisation, indicating the extent of underutilisation for a range of groups. A series of uni-variate comparisons are made on the basis of gender, marital status, age, place of birth, language, racial origin, place of residence, level of education, and receipt of government cash transfers

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In Section 3 a multivariate, probit analysis of these factors is presented. This analysis attempts to model the processes which produce particular labour market outcomes and to determine which individuals are at most risk of being underutilised. In this disaggregate analysis, some attention is given to the role of labour supply disincentives and barriers in determining labour market outcomes. In particular, the magnitude of poverty traps and the correlation of these, and other potential barriers, with underutilisation is addressed.

Section 4 discusses the policy implication of this research. It is concluded that for some youth there are significant barriers to labour market success and that policy initiatives to reduce or overcome these barriers are called for.

There has been very little research on the concept of underutilisation among Australian youth with the emphasis being much more on unemployment; especially official unemployment and to a lessor extent hidden unemployment. Following the discussion in Ross (1985a), underutilisation occurs when any of the following arise:

Official Unemployment: Unemployment as measured by the Australian Bureau of Statistics (ABS) in its monthly labour force surveys. Official unemployment covers only those persons who satisfy all of the following are not employed; want to work; are available to start work immediately; and have undertaken prescribed forms of active job search within the previous four weeks (ABS, 1984, p. 5).

Underemployment: Covers all employed persons who want to work longer hours than they do in their current employment. It includes: part-time workers who want to work full-time or longer part-time hours; full-time workers who want to work more overtime; and full-time workers who did not work full-time hours in the survey week due to economic reasons such as being stood down, short work and insufficient work (ABS, 1984, p. 4). There is also a qualitative aspect to underemployment but this is not analysed here.[1]

Marginal Attachment: covers all persons who are not employed but want to work, and either (a) have not undertaken any active job search in the previous four weeks but can start work immediately, or (b) have undertaken active job search in the previous four weeks but are not available to start work immediately (ABS, 1984, p. 6).

It is apparent from these definitions that underutilisation is indicative of imbalances in the labour market Given the brief for this paper, the theoretical issues are not addressed in detail here. Whatever the reason, demand for labour is insufficient to absorb all the available supply of labour. This is not to say that underutilisation is demand-determined, although the assumption is usually, and at least implicitly, made that the problem is one

1 The International Labour Organisation (hereafter ILO) distinguishes between visible underemployment and invisible underemployment (see, for example, ILO (1982) Only the former is analysed here The latter covers those situations where employed individuals are working in jobs in which their skills are not fully utilised.

of inadequate demand, rather than excessive supply. It is likely, however, that part of the problem stems from structural unemployment, i.e. the available supply of labour is not equipped with the skills being demanded by employers

Within each of the four broad categories of underutilisation, a distinction can be made between those individuals who want to work part-time and those who want to work full-time. The labour force status classification used to determine the incidence of underutilisation in this paper is shown in Table 1

Ross (1985a, 1985b) presents a framework in which the extent of underutilisation is measured as a percentage of total available hours of labour supply, as did Maddison (1980). This is in contrast to most measures in which a 'headcount' measure is presented· e.g. Hauser (1974, 1977) and Sullivan (1978). However, in order to accurately measure the extent of underutilisation relative to aggregate labour supply, it is necessary to be able to measure both actual hours of labour supplied and actual hours of labour used In the ALS data, it is possible to measure the latter (i.e. hours actually worked) but not the former (i.e. hours supplied). All that is known about labour supply is whether the person wants to work full-time or part-time; nothing is known about the actual hours desired within either of these broad groupings. It is, therefore, not possible to estimate underutilisation as a percentage of aggregate *hours* of labour supply Consequently, the headcount approach, in which underutilisation is measured relative to the *size* of the population, is followed here

In this paper several other compromises have had to be made. The data collected in the ALS does not permit identification of full-time workers who are unhappy with their hours, nor does it permit identification of the full-time/part-time work aspirations of marginally attached persons. It is, therefore, impossible to separate Category 1 from Category 3, and also Category 8 from Category 9. Thus, the abridged, eight category classification presented in Table 2 is used as the basis for the analysis reported in this paper.

The categories which are of special interest to this study are 3, 4, 5, 6, and 7, being those in which underutilisation occurs.

2. Aggregate Analysis

The eight-point classification system shown in Table 2 is used to highlight the incidence of underutilisation among various sub-groups of the youth population A broad picture of the incidence of underutilisation is presented in Table 3. That table summarises a very detailed description of a series of one-dimensional comparisons made on the basis of: gender, marital status, age, place of birth, language, racial origin, place of residence, level of education, and (current and/or past) receipt of government cash transfers. The detailed tables, in which data is presented for each of the eight categories of labour force status itemised in Table 2, are omitted here for reasons of space. They can be found in Ross (1991) together with graphical representations of the same material

Table 1: Labour Force Status Classification

1.	Employed full-time, happy with hours worked
2.	Employed part-time, happy with hours worked
3.	Employed full-time, want to work longer hours
4.	Employed part-time, want to work full-time
5.	Employed part-time, want to work longer part-time hours
6.	Officially unemployed, want to work full-time
7.	Officially unemployed, want to work part-time
8.	Marginally attached, want to work full-time
9.	Marginally attached, want to work part-time
10.	Not interested in employment

Table 2: Abridged Labour Force Status Classification

A. Fully Utilised - Employed	
1.	Employed full-time
2.	Employed part-time, happy with hours worked
B. Underutilised	
3.	Employed part-time, want to work full-time
4.	Employed part-time, want to work longer part-time hours
5.	Officially unemployed, want to work full-time
6.	Officially unemployed, want to work part-time
7.	Marginally attached
C. Fully Utilised - Not Employed	
8.	Not interested in employment

The figures in Table 3 indicate, for each year from 1985 to 1988, the percentage of the relevant sub-population who were underutilised, i.e. were in any of labour force status categories 3, 4, 5, 6, or 7 at the time of the survey; see Table 2.

Inspection of Table 3 reveals that in each year, females were more underutilised than males (see the rows labelled A1 and B1). Although underutilisation decreases over time for both sexes, the gender gap remained virtually constant, at around thirteen percentage points. There are marked gender differences in the incidence of underutilisation by marital status. Underutilisation is greatest among married females (row A3) and previously married females (row A4) and lowest among married males (row B3).

Table 3: Rates of Underutilisation, Selected Sub-groups By Year (%)

	N*	1985	1986	1987	1988
A1 Females	2,596	36 4	33.1	30.2	27.6
A2 Never married	1,390	33 8	30.4	25 4	22.1
A3 Married	1,115	40 7	38.5	34 7	31.2
A4 Previously married	95	68 1	64.0	59 3	59.3
A5 Aged 20 or less in 1985	1,420	40 4	36.1	30 3	26.0
A6 Aged 21 or more in 1985	1,176	32.3	31.6	30.0	29.5
B1.Males	2,673	22.2	20.9	17.4	14.1
B2 Never married	1,870	26.7	23.1	19.3	16.3
B3 Married	762	16.3	10.4	10.6	7 8
B4 Previously married	41	14.3	17.4	20.7	23 8
B5 Aged 20 or less in 1985	1,476	31 8	27.1	21 6	17.6
B6 Aged 21 or more in 1985	1,197	17.0	13.2	12.2	9.7
Place of Birth					
C1 Australia	4,626	29 8	26.4	22 8	19.6
C2 Overseas	765	35.7	31.9	28.5	26.2
Language Background					
D1 English	4,961	30 0	26.9	23.0	20.1
D2 Non-English	430	37.7	35 0	30.2	26.3
Racial Origin					
E1 English/European	4,512	29.6	26 1	22.5	19.3
E2 Aboriginal	55	49.1	40.0	49.1	36.0
E3 Asian	11	27.2	36.3	27.3	9.1
E4 Other	43	30 3	34.9	20 9	23.2
Place of Residence					
F1 Capital city	2,904	28.1	24.7	20.3	17.4
F2 Other cities	1,204	33 2	30.1	26.8	26 6
F3 Towns/rural	1,283	34.1	30 0	27.8	22 1
Post-Secondary Education					
G1 Degree	461	12.3	10.2	9.5	8.5
G2 Diploma	835	17.3	19.3	16.9	15.9
G3 Apprenticeship	706	15.4	10.2	8 7	8.3
G4 Other	289	26 1	24.8	23.6	19.5
G5 None	3,321	35 5	32.4	28.3	26.3
Government Cash Transfer Payments					
H1 Received this year	1,303	55.7	51.5	52.2	50.8
H2 Not received this year	4,088	21.6	17.2	12.8	10.9
H3 Received last year	1,477	-	43.3	41.8	40.7
H4 Not received last year	3,914	-	21.4	16.8	13.0
GRAND TOTAL	5,391	29.3	27.0	23.8	20.9

Note: N indicates sample size in 1988.

As was expected, the incidence of underutilisation is inversely related to age. Underutilisation fell in each cohort as the cohort aged, especially for those who were under twenty-four in 1988 (i.e. those who were aged twenty or less at the beginning of the ALS in 1985; c.f. rows A5 and B5). Curiously, for females who were over twenty-four in 1988 (i e. those who were aged twenty or more at the beginning of the ALS in 1985) the time profile of underutilisation is much flatter than was expected (row A6).

Australian born youth experience less underutilisation than youth born overseas (rows C1 and C2), as do youth of English speaking background compared to youth from a non-English speaking background (rows D1 and D2).

The statistics on the relationship between underutilisation and ethnic background presented in rows E1 through E4 must be interpreted with care. According to the statistics, underutilisation is greatest among Aborigines (row E2) and lowest among individuals of English/European background (row E1). In addition, there would appear to be some curious patterns, especially among youth of Asian or Other backgrounds (rows E3 and E4). For individuals in these two categories, underutilisation was higher in 1986 than in 1985 whereas the time trend in virtually all other rows of Table 2 is of a decline in underutilisation reflecting the ageing of the individuals in the ALS sample. However, for all groups other than the English/European category, the sample sizes are extremely small and therefore not too much should be made of these statistics as the measured variability may simply be a reflection of these relatively small sample sizes

Underutilisation is lowest in the capital cities (row F1), although there appears to be little difference between non-capital cities (row F2) and other geographic areas (row F3) This comparison between underutilisation and residency is, strictly speaking, of most relevance for 1988 which appears to be the only year for which the place of residency information is available on the unit record tapes.

Educational attainment is measured in Table 3 by a series of year-specific dummy variables indicating whether, at any time prior to the survey date, the person has completed a university degree (row G1), a diploma (row G2), an apprenticeship (row G3), or any other post-secondary qualification (row G4).[2,3] The pattern of underutilisation indicates that those who have completed degrees or apprenticeships are the least underutilised, while those with no post-secondary qualifications (row G5) are the most underutilised.

Not surprisingly, people receiving government cash transfers are more underutilised than are other people (rows H1 to H4) These figures suggest

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2 I am grateful to Bruce Chapman for his willingness to share the SAS codes used to construct the education variables for Chapman and Tan (1991, this volume).

3 Note that an individual may have more than one of these qualifications; i.e in contrast to the information in all other parts of Table 3, the education categories are not mutually exclusive.

that people receiving transfer payments tend to remain on them [4] Although not conclusive, this evidence does lend support to the notion that a poverty trap exists for people receiving transfer payments.

The analysis in this Section clearly indicates that there is a significant incidence of underutilisation among Australian youth. It is further evident that underutilisation is inversely related to age, but that within age cohorts some individuals are more at risk of underutilisation than are others from the same cohort. This suggests that there is considerable value in a more disaggregate, multivariate analysis of the characteristics which are related to the likelihood of an individual being underutilised.

3. Disaggregate Analysis

In order to determine the underlying causes of the patterns of underutilisation evident from Section 2, a multivariate, probit analysis was carried out to ascertain the factors which influenced the probability of individuals being underutilised. Data on the sample of 5,391 individuals who were in the sample in all four years were used to predict the likelihood that individuals were underutilised in a particular year. In this analysis, a dichotomous variable was defined as:

$UNUT_{ij}$ = 1 if person i was underutilised in year j

= 0 otherwise

That is, $UNUT_{ij} = 1$ if in year j the i^{th} person was classified as being in labour force status categories 3, 4, 5, 6, or 7 (see Table 2).

The likelihood that a person will be underutilised in a particular year is the likelihood that (s)he will have $UNUT_{ij} > 0$. This likelihood function is estimated here using probit analysis. The exact formulation of the likelihood function used is:

$$\Phi = \prod F(Z_i)^{(1-UNUT)}.[1-F(Z_i)]^{UNUT}$$

where Φ is the value of the function, $F(Z_i)$ is the cumulative frequency of a standard normal variable Z_i. Z_i is defined as

$$Z_i = -\beta_i.X_{1i}$$

where β_i is the vector of coefficients to be estimated in the probit analysis and X_i is the vector of variables used in the probit analysis. The variables used in this analysis are listed in Table 4, while Table 5 contains year-specific summary statistics for each variable. The results of the probit analysis are presented in Tables 6 and 7. Table 6 presents the results of three probit equations, one each for 1986, 1987 and 1988 It was felt that the most appropriate way to test for the severity of the potential poverty trap was to

4 The simple correlation coefficients between receipt of cash transfers in successive years are all within the range .40 to .45. This also suggests that there is a poverty trap as many people remain in receipt of a transfer payment from year to year.

Table 4: Variables Used in the Probit Analysis

UNUT	1 in underutilised, =0 otherwise
GENDER	1 if female; = 0 if male
AGE	actual age at time of the survey, in single years
MARRY	1 if currently married and living with spouse, = 0 otherwise
EXMARRY	1 if formerly married, = 0 otherwise
CAPITAL	1 if living in a capital city, = 0 otherwise
CITY	1 if living in any other city, = 0 otherwise
TOWN	1 if living in a town,= 0 otherwise
RURAL	1 if CAPITAL = CITY = TOWN = 0, = 0 otherwise
ENGLISH	1 if racial origin is English or European, = 0 otherwise
ASIAN	1 if racial origin is Asian, = 0 otherwise
ABORIGINE	1 if racial origin is Aboriginal, = 0 otherwise
OTHER_GN	1 if racial origin is none of the above, = 0 otherwise
MISSING	1 if racial origin could not be ascertained, = 0 otherwise
DEGREE	1 if completed a degree, = 0 otherwise
DIPLOMA	1 if completed a diploma, = 0 otherwise
APPRENT	1 if completed an apprenticeship, = 0 otherwise
OTHER_QL	1 if completed any other post-seconday qualification, = 0 otherwise
BENEFIT	=1 if received a pension or benefit (other than TEAS/AUSTUDY) at any time during the twelve months prior to the survey, = 0 otherwise
BENEFIT-1	BENEFIT lagged twelve months

include as a regressor a lagged value of the transfer payments variable rather than the current value of the transfer payments variable In this data set, the information on transfer payments relates to receipt of such payments at any time during the twelve months prior to the survey date. Thus the transfer payment variable could be lagged by one year. Consequently, no equation could be estimated for 1985. Other than this lagged variable, all variables reported in Table 6 use the year-specific values of the regressors Table 7 indicates the magnitudes of the marginal impact of each variable on the index of the probability of a specific individual being underutilised in a particular year. These figures are derived from the coefficients presented in Table 6, evaluated at year-specific sample means.

The results in Table 6 shed considerable light on the factors determining underutilisation. The estimated coefficients indicate both the relative magnitude and direction of impact, of unit changes in each variable although the impact of a change in an explanatory variable on the

Table 5: Summary Statistics for Variables used in the Probit Analysis

Variable	1986	1987	1988
UNUT	0.270	0 238	0.209
GENDER	0.491	0.491	0.491
AGE	21.113	22.113	23.113
	(2 90)	(2.90)	(2.90)
MARRY	0 250	0.296	0.353
EXMARRY	0 018	0.022	0.025
CAPITAL	0 539	0.539	0.539
CITY	0 223	0 223	0.223
TOWN	0.178	0 178	0.178
RURAL	0 060	0 060	0.060
ENGLISH	0.800	0 800	0.800
ASIAN	0 002	0.002	0.002
ABORIGINE	0.010	0.010	0.010
OTHER_GN	0.008	0 008	0.008
MISSING	0 143	0.143	0.143
DEGREE	0.046	0.064	0.081
DIPLOMA	0 135	0.167	0.193
APPRENTICE	0 096	0.108	0.123
OTHER_QL	0 092	0.120	0 147
NO_QUAL	0 631	0.541	0.456
BENEFIT	0 290	0.274	0 242
BENEFIT-1	0 265	0.290	0 274

Note: Entries are arithmetic means Entries in parentheses for AGE are standard deviations

probability index is non-linear.[5] Given the definition of the dependent variable, UNUT, a positive (negative) coefficient in Table 6 indicates that an increase in the value of that variable will increase (decrease) the probability of underutilisation.

The reference group used in Table 6 comprises capital city dwellers who have never been married, have completed no post-secondary education and are of English/European racial origin. Table 7 presents, for each statistically significant variable, the estimated marginal impacts of a unit change in the value of that variable on the probability of specific individuals being underutilised. These figures, which are derived from the coefficients presented in Table 6 by the method outlined in footnote 5, indicate the relative size of the marginal impacts.

5 The non-linearity occurs because the marginal impact of an explanatory variable is equal to the product of that variable's probit coefficient and $f(Z_1)$, the individual-specific value of the density function of Z_1. As $f(Z_1)$ is always strictly positive for the normal distribution, the marginal impact always has the same sign as the probit coefficient (Ross 1986)

Table 6: Estimated Coefficients of the Index of the Probability of Being Underutilised (dependent variable: UNUT)

Variable	1986	1987	1988
Constant	0.390	-0.732	-1.599
	(0.18)	(0.19)	(0.19)
GENDER	0.363	0.358	0.442
	(0.04)	(0.04)	(0.04)
AGE	-0.062	-0.019	0.010
	(0.01)	(0.01)	(0.01)
MARRY	0 223	0.177	0.112
	(0.05)	(0.05)	(0.05)
EXMARRY	0 691	0.524	0.535
	(0.14)	(0 13)	(0.12)
CITY	0.144	0 119	0 217
	(0 05)	(0.05)	(0.05)
TOWN	0 159	0.228	0.107
	(0.05)	(0 05)	(0.06)
RURAL	-0 030	-0.057	0 011
	(0.08)	(0 09)	(0.09)
ASIAN	0.411	0 330	-0 672
	(0.38)	(0 40)	(0 58)
ABORIGINE	0.023	0.367	0 363
	(0.18)	(0.18)	(0 18)
OTHER_GN	0 250	-0.153	-0 054
	(0.20)	(0.23)	(0.23)
MISSING	0.207	0 193	0 230
	(0.05)	(0.05)	(0 05)
DEGREE	-0.591	-0.630	-0.572
	(0.12)	(0.10)	(0.09)
DIPLOMA	-0.399	-0.394	-0.339
	(0 06)	(0 06)	(0 06)
APPRENTICE	-0.552	-0.589	-0.480
	(0 08)	(0 08)	(0 08)
OTHER_QL	-0 182	-0 116	-0 163
	(0.29)	(0.32)	(0 45)
BENEFIT-1	0.662	0.765	0.871
	(0.07)	(0 04)	(0.00)
Sample mean of UNUT	0.270	0.238	0.209
Predicted mean for UNUT	0 272	0 235	0 206
Log likelihood	-2834	-2581	-2341
F-statistic	643.0	742.7	795.9

Note: Figures in parentheses are standard errors of the estimated coefficients.

Table 7: Estimated Impact of Selected Characteristics on the Probability of being Underutilised (evaluated at year-specific sample means)

Variable	1986	1987	1988
GENDER	0 110	0 120	0.098
AGE	-0.018	-0.006	-
MARRY	0 067	0.059	0.025
EXMARRY	0 209	0.176	0.119
CITY	0.035	0 040	0.048
TOWN	0.048	0.076	0.023
ABORIGINE	-	0 123	0.081
MISSING	0.062	0.064	0.051
DEGREE	-0 179	-0.211	-0.128
DIPLOMA	-0.121	-0.132	-0.076
APPRENTICE	-0.167	-0.198	-0.107
BENEFIT-1	0.200	0.257	0.194

Notes: Entries are calculated using the procedure outlined in footnote 5. This procedure involves multiplying the coefficients in Table 6 by the value of the density function for the standard normal variable Z_i evaluated at the sample mean values for Z_i in each year. The values used were:

	1986	1987	1988
Mean of Z_i	0.5478	0.3456	1.1608
$f(Z_i)$ at mean of Z_i	0.3033	0.3356	0.2232

Estimated probability of a member of the reference group being underutilised is.

1986	1987	1988
0.1587	0.1020	0.0594

The coefficients in Table 6 and the marginal impacts presented in Table 7 indicate that, other things being equal (and relative to the reference group where applicable):

* being a young woman increases the risk of underutilisation by around ten percentage points compared to that for a young man;
* in 1986, youth who had previously been married were around fourteen percentage points more likely to be underutilised than those in marriages, who were themselves around six percentage points more likely to be underutilised than were those who had never been married, but by 1988 these figures had been reduced to nine percentage points and two-and-a-half percentage points respectively;

* youth living in towns and cities are more likely to be underutilised, by around three to six percentage points, compared to youth living in capital cities, but youth living in rural areas are no more likely to be underutilised than are those in capital cities;

* age was a factor in determining underutilisation in 1986 and 1987 (but not 1988), although the age profile was very flat with the marginal impact of an extra year's maturity reducing the probability of underutilisation by just under two percentage points in 1986 and less than one percentage point in 1987;

* the only identified ethnic group which was at greater risk of underutilisation than other ethnic groups was those youth of Aboriginal descent; being Aboriginal increased the probability of underutilisation by around eight to ten percentage points in 1987 and 1988, although persons for whom the racial background question was not answered[6] are also at greater risk of underutilisation, by around five percentage points;

* the impact of human capital acquisition on the risk of underutilisation is quite noticeable, with youth who have completed degrees or apprenticeships being less at risk of underutilisation than are youth with no formal post-secondary qualifications by as much as twenty percentage points (1987) and youth who have acquired diplomas being less at risk by around seven to twelve percentage points; and

* youth who had been in receipt of a government cash transfer in the previous year were more likely to be underutilised in the current year by as much as twenty to twenty-five percentage points.

The marginal impacts presented in Table 7 isolate the effect of each characteristic. To estimate the impact of a combination of factors, the individual effects need to be added together Thus, for example, in 1987 the cumulative impact on the probability of underutilisation for a female Aborigine, who has previously been married, was on the Unemployment Benefit in 1986 and is living in a town, is estimated to be as much as seventy-five percentage points higher than that for the reference group. Given that in 1987 the probability of being underutilised was 10.2 per cent, this means that a woman with the characteristics given above will have almost a one hundred per cent probability of being underutilised

4. Policy Implications and Conclusions

Underutilisation does not occur evenly across the youth age group Persons who have received transfer payments are the most at risk, in part because of the poverty traps associated with such payments. Youth with low levels of

6 As Table 5 indicates, racial origin was not identified for fourteen per cent of this sample Of this group, 41 per cent were born in the UK, 21 per cent were born in Asia, and over 17 per cent were born in Europe.

educational attainment, and females who have previously been married are also very likely to be underutilised Being Aboriginal significantly increases the probability of underutilisation, even after allowing for all the other effects—especially lack of higher educational qualifications and greater concentration away from capital cities.[7]

The policy implications of this analysis include consideration being given to initiatives which reduce the magnitude of the poverty traps facing transfer payment recipients, and to encourage further participation in higher education by reducing barriers which make it difficult for many young people to continue in education

However, it must be recognised that it is inevitable that underutilisation among the youth population will be relatively high compared to the rest of the working age population simply because the youth years are times of considerable flux. Policy initiatives should be designed to even out the incidence of underutilisation within the youth population

7 At the time of the 1986 Census, 26 per cent of working age Aborigines resided in the major urban areas while the corresponding figure for the non-Aboriginal population was 64 per cent (Ross 1990, p.4).

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Poverty in Australia: A Study of the Implications of Education, Household Formation and the Labour Market Experience of the Young

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1. Introduction

The Australian Longitudinal Survey (ALS) has already become a focus of research interest on youth matters.[1] An objective of this ambitious survey is to enhance social scientists' understanding of dynamic, time-dependent processes in the transition stages of youth. The survey, developed in 1983 and first fully undertaken in 1985, follows a 'panel' of young people through their years of education, the transition from education to work and through the family-formation part of their life.

Interest in research on poverty in Australia has been rekindled by the attention given to child poverty by the Prime Minister in 1987. In this paper we use the ALS to study the incidence of poverty among young Australians. Over a decade ago, it was said that the

> ..ideal data base for a more formal exploration of lifetime patterns of income and need are derived from longitudinal studies, where the fortunes of selected families are followed for a period of years (Richardson, 1978, p39).

Now, the availability of such data in Australia allows us to make a detailed analysis of poverty. For example, we are able to investigate whether poverty is typically a permanent or a transient state. Further, we can seek to determine to what extent it is affected by labour force status, family composition and education. We are also able to investigate the relative importance of different factors on the likelihood of poverty

We are able to contrast the characteristics of individuals who experience brief, longer and recurrent spells of poverty. It appears that poverty is concentrated among students, those living alone, and those with dependent children Our clearest finding is that entering employment is the surest escape route from poverty, and we propose policies to enhance the employment prospects of those most at risk In section 2 we describe the

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1 See Kryger (1990, Appendix D) for a full listing of published work based on the ALS.

major characteristics of the ALS panel. In section 3 we discuss our classification of respondents into poor and non-poor income units. In section 4 we highlight some socio-demographic characteristics of the poor. Our econometric modelling is reported in section 5 We investigate the duration of poverty and the labour force status of individuals experiencing different length spells of low income in section 6. We also focus on some aspects of the relationship between studying and poverty Policy suggestions and issues for further research are given in the final section.

2. The Australian Longitudinal Survey

A stratified sample of individuals aged 16 to 25 years was interviewed for the first time in 1985 and re-interviewed in each of the following three years. By 1988 just over two-thirds of the original panel still responded to the interview. The ALS is well-designed to locate survey respondents. One important reason for individuals dropping out is their refusal, for their own reasons, to continue to participate at that time. Respondents are asked about other members of their household, about their birthplace, marital status, age, sex, educational background, their pathway to work, their labour force status and occupation, the state of their health and their earnings. They are also asked questions which enable a calendar to be compiled of their activities within the survey year. From this, one can discover how many jobs they have held, their spells of job search and job duration. The longitudinal nature of the data allows us to examine the impact of the respondents' experiences in one year on a later year's outcomes. For example, we can consider how far being poor in one year influences subsequent poverty We can thus check whether there exists a 'poverty culture' such that the past experience of poverty is itself an important determinant of current poverty, over and above the effects of other variables.

Respondents to the survey are asked questions about their own income and the income of the unit to which they belong. An income unit is the person or persons who form a single spending unit.[2] The ALS contains information about twenty-two income unit types. To aid the interpretation of our results, we have aggregated these to form five income unit types shown in Table 1. The first four groups are: sole person income units; married couples; married couples with children; and sole parents. The fifth group comprises young people who are still at school or are full-time students aged 15 to 20 years. They live with a parent and do not themselves have a spouse or children The first four income units relate to respondents who are defined as not being dependent on anyone outside their income unit. They may, however, live with people who belong to other income

2 See Appendix 1 for a full description of an income unit as defined in the ALS.

units. In Table 1, the percentages of respondents in the five types of income unit are shown for the start and finish of the survey period.[3]

There were some obvious shifts in the distribution of income units over the survey period. More than half of the respondents were sole person income units in both years. About twenty per cent were in couples in 1985 (and half of these had children). By 1988, a further 15 per cent were in couples. As in 1985 about half of the couples had children. The number of sole parents was small. In 1985 one in five respondents were dependent on their parents By 1988, there had been a dramatic decline to less than one in twenty-five of the respondents remaining dependent on parental support.

Table 1: The Distribution of ALS Respondents Across Income Units: 1985 and 1988

Income Unit	1985	1988
Sole Persons	56 0	57.5
Couples	10.7	17 8
Couples with children	10.2	17 9
Sole parents	1 7	2.9
Respondents with parents*	21 4	3.9
Total	100 0	100.0

* Respondent financially dependent on someone else

The income unit does not necessarily describe the household structure. All of the income units belong to either a household with no other members present or to households with other financially independent income units. The ALS distinguishes nine household types, which we have aggregated to the five classes shown in Chart 1 An examination of changes in living arrangements confirms the expected general tendency among the ALS respondents towards greater independence from their parents Almost all of the couples were alone in their own households. Sole parents too were less likely to be in their parents' households by 1988. In Chart 2 we show the shifts in the distribution of sole person income units across the household types The sole person income units mostly lived either with their parents or parents and siblings But over the survey period many sole person income units moved away from their parents to households on their own, to households with non-relatives, and to the 'other' household type. The data thus suggest that considerable changes occurred in household composition and income unit formation between 1985 and 1988. As mentioned above, these changes are consistent with the maturing of the cohort.

3 Our analysis relates to the 5854 respondents who participated in the ALS for every year from 1985 to 1988 The labour force status and educational attainment of an income unit relate to the respondent to the survey.

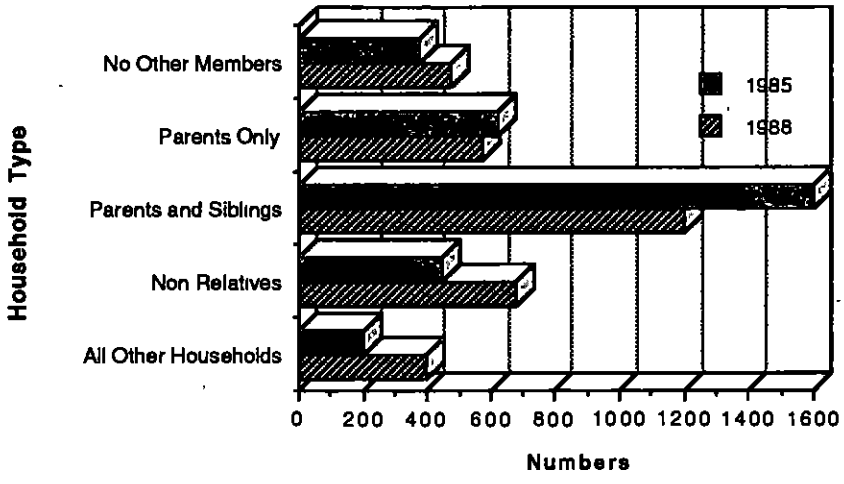

Chart 1: Distribution of Sole Person Income Units Accross Households 1985 and 1988.

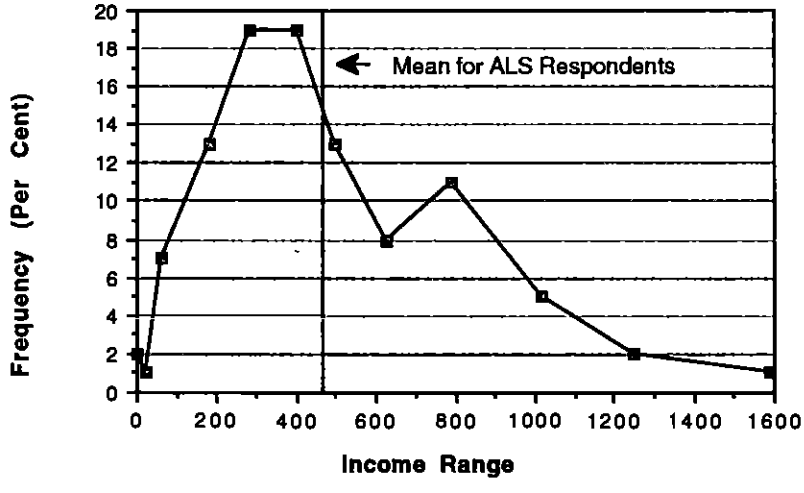

Chart 2: Distribution of Income Unit Income Among ALS Respondents 1988

Table 2: The Labour Force Status of Respondents in 1985 and 1988

	Labour Force Status:					
	Not in Labour Force		In Labour Force			
Income Unit	N 1985	N 1988	E 1985	E 1988	U 1985	U 1988
Sole persons	8 4	7.9	79.2	85 2	12 3	6 9
Couples	9 4	5.5	82.6	91.2	8.0	3 3
Couples with children	47.8	33 9	43.9	59 3	8 2	6 8
Sole parents	67 6	57 2	19 6	31 8	12.7	10.9
Respondents with parents*	58 4	34.1	33 6	57 5	8.0	4.9
All ALS respondents	24 2	14 6	65 2	79.0	10 5	6 3

* Respondent financially dependent on someone else
E = Employment
U = Unemployment
N = Not in Labour Force
E + U + N = 100 per cent

The survey period was one in which employment prospects generally improved in the Australian labour market. Further, with the aging of the cohort and the consequent completion of education, a larger proportion of the ALS panel would be expected to participate in the labour force, even at constant levels of labour market activity. The result of these effects was that the proportion of respondents not in the labour force fell from 24 2 to 14.6 per cent between 1985 and 1988 (see row 6 of Table 2).

However, there was some variation in labour market outcomes for the five income unit types From the first two columns of Table 2 it is apparent that for every income unit type, there was a tendency for more of the respondents to join the labour force. Only the sole parent respondents had a majority of members not participating in the labour force in both years. Respondents with children were many times more likely to be outside the labour force than those without children. Amongst couples with children, one would expect partners to specialise in either home or market production, particularly when children are young. For those in the labour force employment rates grew for each income unit type. By 1988 very few of the couples without children were unemployed, whereas, despite the general improvement in the labour market across the survey period, unemployment rates for income units with dependent children improved only slightly.

The age range represented in the ALS panel means that it includes people whose education is continuing as well as those whose formal study is over. The survey questionnaire allows us to distinguish 24 educational

Table 3: Educational Status, 1985 and 1988

Educational Attainment	1985	1988
At School	16 0	0 2
Up to Year 11	33.8	28.4
Year 12	23.1	25.6
Post-secondary	23.5	36.0
Other	3.6	9 8

attainments. We have aggregated these to the five categories shown in Table 3. The distinctive features are that few respondents remained at school by 1988. The acquisition of further qualifications over the four years is evidenced by the decline in the proportion of respondents reporting up to Year 11 as their highest educational attainment. Correspondingly, the share of those with Year 12 and post-secondary qualifications rises. These shifts are present for each income unit. Those at school are mainly respondents with their parents, while the greatest increase in the achievement of post- school education occurred for sole persons and sole parents.

3. The Detection of Poverty

We turn now to the identification of ALS respondents who are poor. Unfortunately, this study cannot address the issue of poverty among homeless young people, since almost by definition, ALS respondents must be in households or otherwise be traceable. There is no universally accepted definition of poverty. Recent debates have considered whether poverty should be defined in relative or in absolute terms and whether there are identifiable features of the state of poverty which distinguish it from the state of having a low income. The traditional approach has been to use 'poverty lines' set relative to average earnings as a means of identifying the poor. Blackburn (1990, pp. 54-57) discusses some problems in relation to the identification of the poor and the sensitivity of poverty trends to the measurement adopted. Although poverty lines are subject to the criticism that they simply reflect low relative incomes rather than poverty per se, there has been little success in finding alternative ways of calibrating poverty. Lewis and Ulph (1988) have argued that exogenously given poverty lines are not helpful in distinguishing poverty from inequality. They argue that individuals should be defined as poor if their income is so low that they are denied access to particular goods and services which they consider to be essential, and would therefore purchase as soon as their income rises above some critical level. In contrast, Donnison (1989) has argued that society should establish some form of consensus as to a minimum basket of goods and services. Those who do not have access to this basket would be defined as poor. As yet, however, none of these arguments has led to any operational alternative definition of poverty.

Thus, we are obliged to follow previous practice and use gross income from all sources as an indication of the resources available to support the particular income units For young people we might expect that there would be little asset accumulation and thus little income derived from assets. This is confirmed by Ruggles and Williams (1989) who show that in the USA, young people in poverty have less access to financial assets than do the elderly, and consequently are less able to offset the effects of spells of poverty by spending down their assets. However, most young people live in multi-person households (see Chart 1 above) There may be within-household transfers of income to them from people who are not part of the individual's income unit, yet who are part of the individual's household. These could be parents and siblings or unrelated people. Such intra-household transfers of income cannot be directly investigated with ALS data. One problem with respect to income is that many respondents seem not to know the income of other people in their income unit. This is evidenced by the higher non-response to questions concerning the income of other members of their income units, compared with questions on their own individual income. In addition, even if we were able to ascertain total household financial resources, we could not be sure about their within-household distribution. A more detailed study would estimate the dependency ratio, that is the ratio of consumers to workers in households. To date we have been able to make little advance on '....the virtually untouched question of the intra-family distribution of income' (Richardson, 1978, p. 53)

Not only does this distribution affect individual consumption levels, it will also influence labour supply decisions through a complicated structure of income and substitution effects. Here we assume that the only income available to support the respondent, and possibly the dependents of the respondent, is the reported income of the income unit. That is, we exclude from consideration the resources which could be provided by any other income unit. Where the unit is the only income unit in the household, this definition is clearly unambiguous. Where there are other income units in the household, it is impossible to ascertain whether the income unit of interest makes a full contribution towards household costs and thus is supporting itself fully from its own resources This is an important argument to clarify at this stage since, as we shall subsequently see, the male poor tend to be concentrated in households which contain other income units whereas the female poor tend to be concentrated in households with no other income unit present.

As stated above, to detect the income-poor individuals, our starting point must be an acceptable and measurable definition of poverty. The skewed distribution of income unit income among ALS respondents is shown in Chart 2 for 1988. The difference in the distributions between 1985 and 1988 is slight. In 1985, 25 per cent of respondents belonged to income units with incomes less than or equal to half of the mean level for the panel. For 1988 the proportion was 23 per cent. Sixty per cent of the income units had weekly incomes of less than or equal to the mean. The average weekly

income unit income was $305 in 1985 and $453 in 1988. Chart 2 cannot be used to identify the incidence of poverty. To do this we would need to present separate distributions for each of the 22 income units. Some studies have used proportions, say a half or three-quarters of median incomes, as the cut-off point for classifying the poor (see for example Lillard and Willis (1978) and Miller (1989)). On such a basis an individual with no reported individual income would be classified as poor, regardless of the resources of the income unit. We have adopted an alternative method of applying specific poverty lines for the different income units for each year to enable us to classify the ALS respondents into 'poor' and 'not poor' groups.

Our approach was to take as our bench-mark the Henderson poverty line for the two-adult two-child household (Johnson (1989)). As indicated above, although:

> .... researchers have debated the merits and limitations of the Henderson poverty line, ...few have challenged its usefulness for quantitative poverty research and no one has proposed an alternative. (Bradbury and Saunders, 1990, p.1).

Using equivalence scales we have modified the bench- mark income to calculate poverty lines to match the 22 income units in the ALS (see Bradbury and Saunders,1990, Table 3) We have used taxation statistics to produce poverty lines on a gross income basis to match the ALS income concept (see Collins and Madden, 1987, p.11) for the average taxes applicable). In all cases we have chosen lower, rather than higher, income levels to avoid overstating the incidence of poverty. Those respondents we have classified as poor, are truly income impoverished. Comparisons of numerous and varied poverty lines are made in Bradbury and Saunders (1990) and in Binh and Whiteford (1990). The incidence of poverty among individuals reliant on pension or benefit incomes in particular, is thought to be sensitive to the choice of the equivalence scales used to construct the poverty lines (Bradbury and Saunders, 1990, p.37). We have examined the ALS income data to assess the extent to which we may have understated the number of poor income units. Had we raised our poverty lines by 10 per cent, the number defined as poor would have risen by 10, 11, 10 and 12 per cent in the years 1985 through 1988, respectively We have been cautious not to exaggerate the extent of poverty among the young. However, we are mindful that those close to the margin are worthy of consideration with respect to their income needs. We do not analyse the characteristics of those who might be viewed as 'marginally' poor relative to those who are 'destitute', but as we note above, the classification of poor/not poor is sensitive to the definition of the poverty line. This will be increasingly true as poverty lines move towards heavily populated income bands. Thus, the numbers defined as poor depend on the distribution of income among the survey respondents.

4. Characteristics of the Poor

Based on our poverty thresholds there were between 750 and 850 respondents belonging to poor income units over the survey period 1985 to 1988. Here using simple cross-tabulations we describe the characteristics of respondents in poor income units by gender, labour force and educational status. We first examine the incidence of poverty across the five major types of income units set out in Table 4. As in section 2, we concentrate on the first and the final years of the available data. By 1988, few of the respondents were dependent on their parents; many had formed partnerships and families; and, fewer of the respondents were studying. Most had formed attachments to the labour market—reflected in high participation and employment rates (see Table 2) In 1985 82 per cent of poor respondents were in sole person income units At the end of our survey period this had fallen to 77 2 per cent. The underlying data show that about half of them were in households with their parents and siblings and about 20 per cent were with non-relatives. Sole person income units living alone accounted for 8 per cent of respondents in 1985 and 13 per cent in 1988. So far as the other poor income units are concerned, it is evident that income units with children present (couples with children and sole parents) increased from about 13 per cent to 20 per cent, that is, from one in eight in 1985 to one in five in 1988.

Table 4: The Distribution of Poverty Across Income Units: 1985 and 1988
(per cent)

Income Unit	1985	1988
Sole persons	82.4	77.2
Couples	1.5	2.8
Couples with children	7.6	12 9
Sole parents	5.0	7 0
Respondents with parents	3 5	0.1

Labour force status and poverty are likely to be closely linked, with absence from the labour market or failure to find employment a probable cause of poverty. This view is confirmed in Table 5. Labour force participation amongst the poor is markedly different to the whole panel. Many more of the poor respondents were outside the labour force in both years, and their participation rate fell. Whereas about two-thirds of the whole panel were employed in 1985, amongst the young poor only 14.1 per cent were in employment. Employment rates were reasonably similar across poor income units, except that a high proportion of poor respondents in couples with no children were in employment, and none of the poor sole parents were in employment. In 1988, it was still the case that a very small share of lone parents had found employment, but for other types of income unit, around one quarter were employed. The incidence of unemployment tended to fall between 1985 and 1988 but unemployment rates for income units with dependent children were three to four times the average rate. It is abundantly clear from Table 5 that poverty is closely linked to adverse labour market outcomes.

Table 5: Labour Force Status and Poverty 1985 and 1988 (per cent)

Labour Force	Not in the LabourForce		In the Labour Force			
			Employed		Unemployed	
Income Unit	1985	1988	1985	1988	1985	1988
Sole persons	32.6	39.0	14 3	25.3	53.1	35.7
Couples	30.8	52.4	46.1	23.8	23.1	23.8
Couples with children	56.9	55.1	13 8	19.4	29 2	25.5
Sole parents	83.7	73.6	0.0	9.4	16 3	17.0
Respondents	73.3	100.0	16.7	0.0	10.0	0.0
All Poor Respondents	**38.4**	**43.9**	**14.1**	**23.4**	**47.5**	**32.7**
All ALS Respondents	24.2	14 6	65.2	79.0	10.5	6.3

Table 6: Educational Status and Poverty 1985 and 1988[a] (per cent)

	1985					1988				
Income unit	1	2	3	4	5	1	2	3	4	5
Sole persons	3 2	42.6	33.3	15.8	5.1	0.7	23 2	42 7	24 1	9 2
Couples	0 0	23 1	23.1	46.1	7.7	0.0	19.0	19 0	52 5	9 5
Couples with children	0 0	67.7	7.7	20.0	4 6	0 0	65.3	7.1	18 4	9 2
Sole parents	0 0	74 4	7.0	7 0	11 6	0 0	62.3	1.9	26 4	9 4
Respondent with parents	76.7	10 0	10.0	3.3	0.0	0.0	0 0	100 0	0 0	0.0
All poor respondents	**5.4**	**44.6**	**29.1**	**15.7**	**5.2**	**0.5**	**31.3**	**34.7**	**24.3**	**9.2**

(a) Highest education level achieved.
1. At school
2. Up to and including Year 11
3 Year 12
4. Post-secondary
5 Other

It is popularly believed that low educational attainment is an important cause of poverty. However the evidence for this linkage between educational achievement and poverty is much less clear-cut than that between labour force status and poverty. This is evident from Table 6 which shows how poverty by income unit is broken down by educational achievement for the years 1985 and 1988. The table shows a general increase in educational standards between these years, consistent with the maturing of the cohort. It does not show that those in poverty have consistently low levels of educational attainment. Nor does it show that improving levels of attainment necessarily provide an escape route from poverty. In 1988, 68.2 per cent of the poor had been educated up to or beyond school year 12 (that is, levels 3 to 5 in the table). Of course, some individuals classified as poor were foregoing current income to acquire human capital and to attain higher income subsequently. Of the poor respondents who in 1985 gave year 12 as their highest educational attainment, two-thirds were involved in post-secondary studies. For the corresponding group in 1988, 24 per cent were post-secondary students. Thus the high incidence of poverty among those with a year 12 credential at the survey dates, is most likely associated with them continuing their human capital investment But these simple cross tabulations do not provide compelling evidence that low educational status and poverty are closely linked We return to this point in our regression analysis.

We turn briefly to the relationship between gender and poverty. In the whole panel males have a greater tendency to be sole person income units. They remain in households with their parents. By contrast female sole person income units are more prone to live in households having no other members or with non-relatives. In the other types of income units, particularly those including dependent children, females tend to predominate Almost invariably these income units are in households on their own. However, at least superficially, different household structures would not be clearly associated with a greater or lesser tendency to poverty. An analysis of age and of dependency ratios in households would probably clarify the incidence by gender, of poverty among the young. In both 1985 and 1988 all of the poor sole parents were women and in both years men accounted for more of the poor sole person income units. The very slight tendency to the feminisation of poverty over the survey period, is partly a compositional effect associated with increasing poverty among females in sole person income units and among couples with children

Single person income units are distributed across a range of different household types. The classification of these individuals as poor is subject to the qualification that we cannot detect whether they are being subsidised by other household members. While each of these tabulations provides insights into the characteristics of the poor, they cannot provide a complete picture of the determinants of poverty because of their failure to control for the effects of other variates To do this, we must construct a statistical model of the determinants of poverty. Such a model is described in the following section.

5. A Logit Model of Poverty

In this section, we investigate those factors which affect the probability of becoming or staying poor. Put another way, we seek to identify the influences which underlie our classification of individuals as poor in terms of the poverty lines we have used. We discuss the technical details of our estimation procedure in Appendix 2. The conditional logit technique was used to estimate the probability that an individual was in poverty at the survey date.

Based on the information from the cross-tabulations presented in the previous sections, we have specified a poverty model for persons which includes types of income unit, educational experience, labour force status and household type as explanatory variables. As far as income units are concerned, in the absence of information concerning the dependency ratio, we could form no definite view on whether being alone or with others would raise or lower the probability of being poor. Additional members of income units may change the dependency ratio, that is the ratio of consumers to income earners. For couples without children we might expect the ratio to be one. In other income units where there are non-working students or dependent children, and women who are not in the labour force, dependency ratios will be high. However for some of these income units, income is supplemented by the state. The current concern with child poverty would lead one to expect income units supporting children to be relatively more prone to poverty.

For the household type variables, we were ambivalent as to expected sign, as the dependency ratio was not known. Different sets of independent variables were used to estimate separate models for persons, males and females. Our prior inspection of the cross-tabulated data revealed a greater tendency for poor males to be spread across the household types within income unit one, whereas females in poverty appeared to be distributed across all types of income unit, but concentrated in households which did not contain members of other income units. Given the lack of variation in the relevant independent variables, we therefore expected that household type would contribute little to our understanding of poverty among young women, and correspondingly that income unit would contribute little to the explanation of poverty among young men These a priori beliefs were supported to the extent that separate models for each sex which included all variables failed to converge to (or in some cases to form an initial) solution to the conditional maximum likelihood problem. Thus in Table 7, our preferred model for males excludes the income unit variables, while the preferred model for females excludes household types

Stable employment would be expected to reduce the probability of poverty. However, for individuals working part-time, intermittently, or in low-wage jobs the expected poverty outcome is less clear. Similarly, the impact on the probability of poverty of the number of jobs held is unclear. For example, an individual may have either many or few low-wage jobs or many jobs which pay high casual rates.

Table 7: Binomial Logit Estimates of a Poverty Model 1985-1988[a][b]

	Persons	Males	Females
Income Unit			
Sole persons	6 53*		4.22*
	(11.62)		(7 21)
Couples	1.12***		-0 38
	(1.81)		(-0.52)
Couples with children	3 26*		1.06
	(5.36)		(1.54)
Sole parents	4 26*		2.01*
	(6.55)		(2.89)
Household Type			
No other member	1 61*	0.29	
	(6.26)	(0.89)	
Parents	0 49	1 69*	
	(1.62)	(4.50)	
Parents and siblings	0.16	1.04*	
	(0.64)	(3.24)	
Non-relatives	0 12	0 89**	
	(0 44)	(2 56)	
Labour Force			
Employed	-4.75*	-4.49*	-4.11*
	(-22 1)	(-17 3)	(-15 7)
Number of jobs	0.11	-0 08	0.06
	(1.57)	(0 93)	(0 61)
Education			
At school	2.53*	-1.84*	1 38***
	(3.82)	(-2.78)	(1.70)
< Year 11	1 24*	0.84	0.82
	(2 86)	(1.59)	(1.43)
Year 12	1 54*	1.44*	0.77
	(3.72)	(2 73)	(1 38)
Post-secondary	0.62	1 11**	-0.26
	(1.54)	(2 24)	(-0.49)
n =	3727	1996	1731

(a) Based on the ALS respondents who reported income unit income in every year

(b) Estimated t statistics in brackets
- * significant at the 1 per cent level
- ** significant at the 5 per cent level
- *** significant at the 10 per cent level

Recently Crossley (1990, p.7) has emphasised the link between low educational attainment and poverty, noting that

> ...nearly half of Australia's young people leave school before Year 12, and they are more than three times more likely to come from the poorest than from the wealthiest quartile. The handicap that such a lack of educational qualification imposes on workers' labour market opportunities is demonstrated by the low status of jobs they hold, and the frequency and duration with which they become unemployed.

The inclusion of variables modelling educational attainment in our regressions allows us to explore the relative importance of different levels of achievement. We expect that high educational attainment would be correlated with a low probability of poverty.

In the first column of Table 7 we see that respondents in each of the four income unit types included were more likely to be poor (other things being equal) than respondents in the excluded category: those who live with their parents. The logit estimates of the coefficients for the sole person income units, couples with children and sole parent variables were significantly different from zero at the one per cent level or better Being in a sole person income unit (with estimated $\beta = 6.53$) has associated with it a greater risk of poverty than any other income unit type. Income units with children present also have a significantly higher probability of being in poverty, ceteris paribus.

Our most significant result is in relation to the labour force. In the estimations for persons, males and females, having a job has a consistently negative effect on the chance of being poor However, the number of jobs did not add significantly to our explanation of poverty For persons, the conditional logit estimates in column 1 show that only for the household type where there are no other members (than the respondents' income unit), was there a statistically significant impact on the likelihood of poverty. Combined with our (significant) coefficient for sole person income units, we infer that the likelihood of poverty among the sole person income units living alone in households is quite high, relative to the excluded category (Other) For persons, being at school or leaving education at the end of year 12 or earlier, have relatively higher probabilities of poverty. Thus, when other variables are taken into account, low educational attainment has the expected influence on the likelihood of poverty, a view which could not be drawn from examination of Table 6. Nevertheless, the effects on the likelihood of poverty of educational attainment are weaker than those of being in employment.

For males living in income units within households having no other members, there is also a significant contribution to the probability of being poor. Male respondents who had, or who during a survey period acquired, a post-secondary qualification were rather more likely to be poor The estimated coefficient of the 'At School' variable for males is negative, meaning that being at school reduces the likelihood of poverty. An exploration of the data on income unit incomes for the ALS respondents

who were still at school (in any year) showed that, although their own individual incomes were very low, they were part of income units with aggregate income well above the respective poverty threshold. Mostly they were in their parents' income units. In 1985 for example, 60 per cent of the 'At School' respondents reported individual weekly incomes of $7 or less, but the average income of the income units was $467. One third of these 'At School' young people were employed, that is, they appear to have been kept out of poverty either by working and/or by being supported by others.

The coefficients on the 'At School' variables suggest a higher incidence of poverty among the females than the males. These females tended to have higher employment, unemployment and participation rates than the males. Those 1985 school students who were working were all part-time employees, and most of them earned less than $50 per week. Very few of these young people who were at school in 1985 were still at school at the end of our survey period, and so our logit model also includes observations on their post-school activities. The most likely explanation for the higher probability of poverty for the females than for the males, is a combination of factors. Initially there is a tendency for the males to work slightly longer hours per week than the females, but, at slightly lower hourly pay rates. By 1988 the males were still working relatively more hours, but their pay rate was about 12 per cent higher than for the females.

In the third column of Table 7 it can be seen that for the females living in sole person or sole parent income units there is a significant positive impact on the probability of being poor. Only the 'At School' educational variable matters, but the sign, like that for persons, is positive. This led us to estimate additional models (not tabulated here) for persons, females and males, which incorporated only educational and labour force variables. The coefficients on the 'At School' variable were negative and significant in each case For persons, males and females the specifications involving income units and household types significantly improved the explanatory power of the models (using a likelihood ratio test criterion). We therefore preferred the models reported in Table 7.

On the basis of these results, it is clear that employment provides the best protection from poverty. It appears that insufficient survey periods have passed to assess fully the relative importance of post-secondary education. Part of the panel was, during the survey period, still acquiring post-secondary qualifications, and others had newly begun their full-time labour market attachment. About 17 per cent of those surveyed in all four years were involved in post-secondary education in 1985, and thus had not qualified. Later waves of the panel will permit more definite conclusions to be drawn concerning the effects of higher education. The results suggest that curtailing education in years 11 or 12 has a significant, positive impact on the incidence of poverty. We have not included the state of the Australian labour market as an explanatory variable. Accordingly, it is unclear whether educational achievement or aspiration would be of more or less significance in a strong, rather than a weak labour market

Table 8: Binomial Logit Estimates of a Poverty Model for Students 1985-1988[a][b]

	At School:	Non-School Education:		
	Persons	Persons	Male	Female
Income Unit				
Sole persons		5.35*		4 64*
		(10.40)		(6 82)
Couples		0.89		-0.60
		(1.38)		(-0.69)
Couples with children		2.03*		-0.30
		(2 77)		(-0.31)
Sole parents		3.12*		1.25
		(3.56)		(1.16)
Household Type				
No other member	-0 24	0.67***	0.04	0.68
	(-0.49)	(1.87)	(0 09)	(1.46)
Parents	1.78**	0.30	2 03*	0.05
	(2.32)	(0.66)	(3.80)	(0 07)
Parents and siblings	2.50*	-0.18	2.01*	-0.21
	(4.34)	(-0.47)	(4 44)	(-0.44)
Non-relatives	1.77**	-0 21	1.30*	-0 54
	(2.13)	(-0 57)	(28.4)	(-1.12)
Labour Force				
Employed	-3 53*	-4.61*	-3 97*	-4.44*
	(-7.37)	(-15.37)	(-13.10)	(-11.17)
Number of jobs	0.35***	0.14***	0.20***	0.13
	(1.79)	(1.74)	(1 88)	(1.15)
n =	227	1492	821	621

(a) Based on the ALS respondents who reported income unit income in every year.

(b) Estimated t statistics in brackets:
- * significant at the 1 per cent level
- ** significant at the 5 per cent level
- *** significant at the 10 per cent level

For policy, the relationship between studying and poverty is important. Some further insights can be gained from our conditional logit models of the probability of poverty among students. We estimated models for respondents who were at school or who were in some other form of education on at least one of the survey dates. Results are set out in Table 8. In the first column we see that of the respondents who were at school, the probability of being poor is relatively higher for those living with their parents and siblings. Again, having a job helps an individual's prospects of not being poor, but having numerous jobs raises the poverty probability.

Those who were in some other form of education could have been at university or college, undertaking an apprenticeship, or being in a transition or adult education course The second column of Table 8 shows that for persons, the probability of being poor is enhanced for those in sole person income units, living alone, being a sole parent or being part of a couple with children. For young men, only the household type 'No other member' lacks significance. The young women in sole person income units are relatively more likely to be poor So far as the labour force variables are concerned, employment but not the number of jobs matters for women

6. Panel Information

So far, we have confined our analysis of poverty to the examination of cross-tabulations of data for those classified as poor at the survey dates and to the construction of a statistical model which is static in the sense that it does not take account of 'duration dependence' effects We now exploit the panel aspects of the ALS data in order to study the incidence of poverty through time. We are able to form some assessment of the extent to which people experience only one instance of poverty, up to four instances, and whether they experience poverty in successive years or intermittently

Our analysis is limited in two ways. Firstly, we cannot claim that respondents who were identified as poor at the survey date were poor for the whole year, nor that those who were poor in adjacent years were poor throughout the relevant years. We can only note that at the time of the survey, the income of the respondent's income unit was below our poverty threshold. Secondly, we cannot directly identify completed poverty spells For example, we cannot know whether those classified as poor in 1985 were poor previously. Thus, we cannot see to what extent their 1985 instance of poverty was part of a series of two or more successive years of poverty. Nor do we yet have sufficient data to be able to determine how far poverty is 'inherited' by one generation of households from its ancestors.

Nevertheless, we are able to highlight some features of the incidence of poverty. A summary of our observations throughout the four years of the survey is contained in Table 9. The interpretation of this table is as follows· column 1 shows the percentage of the poor in each year who were poor for that year only Column 2 gives the percentage of the poor who were poor for two successive years, one of which is the year of the relevant row. Column 3 gives the same statistics for those who have been classified as poor on three successive occasions, while column 4 shows the percentage who have been poor in all four years The reason the percentages in column 4 vary from year to year is due to fluctuations in the total number in poverty: the number who have been poor for four successive years is obviously the same for each of these four years The fifth column gives the percentage who were classified as poor in the relevant year, but have also been classed as poor in some non-successive year.

In the bottom row of Table 9 are recorded the percentages of all instances of poverty during the four years (1985 - 1988) which are accounted for by the periods indicated in the column headings. Only a small proportion (4 7 per

Table 9: The Incidence of Poverty Across All Survey Years (per cent)

Year	Only One Year	Successive Years			Non-Successive Years	Total
		2	3	4		
1985	38.8	15.1	12.0	12.6	21.5	100
1986	29.7	27.2	20.0	12 6	10 6	100
1987	27.8	25.5	21.1	13.2	12.4	100
1988	38.9	13.7	9.1	14 2	24 0	100
Average (all years)	50.7	14.6	7.5	4 7	22.9	100

cent) of those who have experienced poverty have been recorded as poor at the survey date in all four successive years. This is subject to two qualifications: first, it may be an overstatement if it is the case that sample attrition was disproportionately high amongst the long-term poor.[4] Offsetting this is the possibility that the evidently long-term poor individuals experienced a number of different spells of poverty rather than a single continuous spell. For example, if poverty is at all seasonal, individuals may be classed as poor in successive years if the survey is conducted at the same time each year, yet their income over the whole year could bring them above the poverty line.

Observations made at infrequent intervals will inevitably lead to the familiar length-bias associated with attempts to measure duration Further, as is evident from Ruggles and Williams (1989), attempts to measure spell duration are sensitive to the measure of poverty used and, in particular, to the time period over which it is defined. This is clearly an issue of importance, though not one which can be addressed easily with this dataset The classification of individuals as poor will vary according to the length of time over which their income is measured When designing policy to alleviate poverty, some understanding of the distribution of these spells will assist policy-makers to determine appropriate tests for the detection of poverty Such tests should set out criteria not only for income levels, but also for the period over which low income has been experienced

It is also clear from Table 9 that over half of the poor are recorded as being poor in only a single year. This figure would probably fall if data were available over a longer period, so that spells starting before 1985 and ending after 1988 could be included. Nevertheless, it is clear that, at least from the data available, the typical spell of poverty amongst ALS respondents is not more than two years and is probably considerably less.

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4 Tables for those who did not respond in all four years (that is, the unbalanced part of the data set) are included as Appendix 3.

Table 10: Labour Force Status of Respondents who were Poor in Only One Year and Respondents Poor in All Four Years

Year of Poverty	Labour Force Status:					
	Poor Year			Other Years		
	E	U	N	E	U	N
1985	16.2	49 5	34 2	83 1	3.8	13.1
1986	30.6	45 1	24.3	78.2	4.6	17.3
1987	25.6	44 9	29.5	72 7	4.2	23 0
1988	28.8	23 7	47.5	61.2	6.0	32 8
Average (all years)	25 3	40 8	33.8	73 8	4.7	21 6
Poor in all four years	10 7	50.9	38.4		n a.	

This begs the question of how those who experience poverty fare in the labour market at times when they are not poor In Table 10, the labour force status of those who were poor for only one year and those who were poor in all four years is shown. For the seldom (one year) poor, labour force status is shown for the year of their poverty and also for the years in which they were not poor. What is immediately apparent is that those who were seldom poor had very low unemployment rates when they were not poor. In fact their unemployment rates were considerably lower than those for all ALS respondents in 1985 and 1988 (see Table 2). It may be the case that our short-term `poor' group includes a significant number of individuals who endure a period of poverty in order to enhance their human capital. If they successfully complete some form of education or training, they then enter the labour market with enhanced employment prospects. Alternatively, the experience of poverty may make them willing to accept low-paid employment, rather than remaining unemployed or outside the labour force. In Table 2 about a quarter of ALS respondents are shown as being outside the labour force in 1985, compared with about a third of the seldom poor By 1988 nearly 15 per cent were not in the labour force, whereas the corresponding figure was 47.5 per cent for the seldom poor Those classed as poor in every year (the long- term poor) had particularly bad labour market outcomes Weak labour force attachment and very low employment rates are associated with both brief and long-term poverty.

Table 11: The Incidence of Poverty in the Student and Non-Student Populations of 1985

	1985		1986		1987		1988	
	P	N/P	P	N/P	P	N/P	P	N/P
1985 Post-School Students (a)	42.7	57.3	30 3	69 7	21.7	78 3	12.3	87.7
1985 Non-students (b)	16.1	83.9	14.5	85 5	13.6	86 4	12 5	87.5

(a) Students are those respondents who in 1985 were not at school but who were at university or college, apprentices, or in transition or adult education courses The percentages of the group still in education were 56.9 in 1986, 19 0 in 1987 and 16.5 in 1988.

(b) Respondents were not at school or in other non-school education in 1985

P = percentage in poverty

N/P = percentage not in poverty

A useful comparison can be made of the incidence of poverty through time by partitioning the whole cohort into two sets. These are the post-school student population of 1985 and the respondents who were neither at school nor in any other type of education in that year In Table 11 we show, for each survey year, the poor and non-poor shares of these groups of respondents For example 42.7 per cent of the post-school students were in poverty in 1985. But by 1988, when 16 5 per cent of the group were still studying, the poverty rate was 12 3 per cent For the non-students, the percentages in poverty ranged from 16 1 to 12.5. The convergence of poverty rates for these groups in 1988 followed the steady reductions in the numbers studying in the earlier years. The very high poverty rates among students are disturbing, but apparently poverty eases after study finishes. For the students in Table 11, about 11 per cent remained outside the labour force by 1988. Only 5.7 per cent of them were unemployed in 1988 compared with 6.3 per cent of all ALS respondents.

7. Policy Issues and Concluding Remarks

We have identified a number of characteristics which appear to contribute to the probability of poverty among young people. These include living alone, living with dependent children, acquiring educational qualifications and not working. Some respondents may think it worthwhile to endure a spell of poverty if it enhances future earnings prospects. Others may have little choice. circumstances drive them into reliance on state benefits which fail to keep them above the poverty line. The former group has a good idea of when the poverty spell will end, the latter does not. For policy it is essential to recognise that poverty has a time as well as an income dimension. It depends not only on income relative to the poverty line, but

also on how long the income unit remains, or expects to remain below that line.

For poor students low income is likely to be a temporary state. They have entered poverty by choice, or at least wittingly. Their lack of current resources may partly result from the failure of the capital market to recognise their future earnings potential. Given their lack of collateral, there is little probability that lending institutions would finance them during the period of human-capital formation. In Australia the provision for deferral of the payment of the Higher Education Charge, the graduate tax, could be thought of as a loan against future earnings. Policies for the prevention of poverty among post-school students should be designed to reflect the short periods for which income support would be required. In particular, generous benefits for specific short periods would be appropriate. We have found that sole person income units living alone are especially prone to poverty Therefore income support for students who must live away from home ought to account for the high cost of housing. Similarly, students belonging to households with high dependency ratios may require special provision. Crossley (1990, p.7) calls for financial support for those at school noting it is then

> .. that the impact of poverty on a child's future life chances is most significant . rather than at tertiary level in which so few children raised in poverty can or, under current conditions, ever will be able to attain

We suspect that it is particularly women and especially women with children who are most 'at risk' of spells of poverty Recent work by Ermisch and Wright (1990) suggests that, at least among young mothers, the potential real wage is a key determinant of entry to employment In turn, the potential real wage reflects previous work experience and educational qualifications The economic status of men with low incomes in single person income units which are part of larger households, is somewhat ambiguous They may not have to pay the full economic cost of the goods and services they consume, and some may be voluntarily undergoing a period of human capital investment Females caring for children, on the other hand, tend to be part of households with a single earner and a high dependency ratio. Of all groups, the attachment to the labour market of these young women appears to be the most tenuous Additional provision for poor parents should reduce the cost of participation in the labour market For example, subsidised child care facilities, and income support to undertake further education, where appropriate, during the child rearing years might lessen the probability of continuing poverty.

From our research it is clear that the factor most likely to reduce poverty is to be in employment Employment policies should be designed with a view to their effect on the labour market prospects of the poor. Consideration must, of course, be given to the incentive, or labour-supply effects, of such policies, particularly the creation of poverty traps Such policies will tend to reduce the cost of finding work for poor people, or to reduce the cost to employers of retaining workers from this group. To

reduce the costs of finding work the state might retain a private-sector employment agency to find work for the poor, paying a bonus for each successful placement. Employers might be given a short-term subsidy to hire particular classes of the poor. Policy design should take account of the relative merits of provision in kind - travel, child-care and housing vouchers - rather than cash benefits.

Those who are poor for a long period do not appear to comprise a large proportion of the total instances of poverty among young Australians. Rather, there is a preponderance of those who are recorded as being poor in only one survey. There are difficulties in using annual data to measure the length of poverty spells, but these might be expected to lead to an upward bias in the measure of spell length. If our estimates are upward-biased, our conclusion regarding the small numbers of long-term poor relative to the short-term poor will be further reinforced. There do appear to be a reasonably large number of repeat spells of poverty which can be captured even by annual data This implies that those who have already been poor stand a much greater chance of re-entering poverty than other young people. To say something more precise about the numbers and lengths of spells of poverty we would require income data, in addition to the labour force data, for every week of the ALS reference period Since employment is a good, but not comprehensive predictor of poverty, the existing calendar data for weeks of employment could be used to proxy the continuity of the poverty experience.

The most obvious question which arises from this research is who should receive support to enable them to escape poverty? Where resources are scarce, effective policy targeting is essential. Although the evidence is not complete, it appears that poverty among young Australians can be most effectively alleviated by improving the employment prospects of respondents. Clearly, the ALS dataset could be used in future research to identify the barriers reported by poor respondents for their unsatisfactory labour market outcomes. These will include barriers such as affordable child-care facilities, and inadequate work experience. The identification of these factors would form the basis for policy targeting.

A number of issues which have arisen in the course of the research require further investigation. We strongly suspect from the cross-tabulations of the unbalanced data in Appendix 3 that by confining our analysis to respondents who participated in every year, we have biased downwards our estimate of the extent of poverty From the unbalanced data (Table 4A) we can see that those who do not participate in each year are more likely to have very low incomes compared with the group interviewed every year. Response rates are relatively lower for the unemployed, the poorly educated and those living away from their parents (Kryger (1990, p.84)) Refinement of our classification of poverty would be possible if the additional data from the household files were used to study the labour market status of other members of the ALS respondents' households. This would give us more information on household financial

resources which may be available to support single person income units who report little personal income

We have been able to highlight some critical features of the relationship between poverty and studying. Several matters have emerged which warrant further analysis. For example, the detailed linkages between work, study and poverty should be explored. It is unclear how quickly poverty ends once studies are completed. Our analysis has not revealed the typical lag between the completion of study and the end of poverty spells. It has been beyond the scope of this study to explore the relative importance of full-time and part-time work for the alleviation of poverty among the student and non-student populations. Although we have emphasised the importance of employment as the key escape route from poverty, we have not identified the characteristics which lock individuals out of employment and which thus contribute to long-term poverty. Nor have we examined the extent of poverty among full- time workers

Finally, the logit model which we have constructed is not dynamic. Our inferences in respect of the impact of the respondents' past experiences on their current outcomes have only been addressed indirectly. This is an econometric problem rather than a problem of insight or data. A comprehensive approach to the estimation problem posed by our model would require us to take account simultaneously of sample attrition, missing data and dynamic response all in the context of an econometric model. This is clearly an objective of our further work.

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Appendix 1

Definition of an Income Unit

Every respondent in the survey belongs to one of four broad types of income unit. These are:

Married couple:	where the respondent is a partner in a 'married couple' income unit (with or without children);
Sole parent:	where the respondent is a sole parent (i.e. no partner, but with chilren;
Dependent:	where the respondent is dependent upon parents and belongs to an income unit with the parent(s), and dependent sibling(s), if any;
Sole parent:	where the respondent is the only member of the income unit (regardless of whether they live with anyone else).

There are 22 income unit codes, (listed at the end of this Appendix). Rules for coding are as follows:

- if the respondent lives with a spouse/partner, they belong to a 'married couple' (including de facto) income unit and are allocated code 2-6, depending on the presence of children;
- if the respondent does not have a spouse/partner, but has a child/children, they belong to a sole parent income unit and are allocated code 7-10, depending on the number of children,
- if the respondent does not have a spouse or partner, does not have any children, is aged 15-20, is a full-time student, and lives with a parent(s) they are classed as 'dependent'. In this case, they belong to an income unit with the parent(s), and 'dependent' siblings (defined as above, and including those less than 15 years old) They would be given a code 11-22, depending on whether they lived with one or both parents, and on the number of dependent siblings
- if the respondent is not allocated to an income unit in the range 2-22 as outlined above, they are classed as 'sole person' income unit - code 1.

Definition of a Household Structure

The income unit code does not necessarily describe the household structure. For example, a respondent with income unit code 1 (sole person) may live with parents, brothers and sisters. The household structure can be defined by using three variables - IU (income unit), HHSIZE (Household size) and HHTYPE (Household type) listed at the end of this Appendix. For example, assume that a respondent with IU code 1 (sole person) lives with both

parents, two brothers, and a grandmother The household size is 6, and the household type code would be 5. A household consists of the respondent's income unit plus, perhaps, father and/or mother, brother and/or sister, and other relative(s)

Income Unit Types (IU)

Code	Type
1	Sole Person
2	Couple
3	Couple, 1 Child
4	Couple, 2 children
5 & 6	Couple,> 2 children
7	Respondent, 1 child
8	Respondent, 2 children
9 & 10	Respondent, > 2 Children
11	Respondent, parents
12	Respondent, parents, sibling
13 & 14	Respondent, parent, > 1 sibling
15	Respondent, father
16 - 18	Respondent, father, siblings
19	Respondent, mother
20 - 22	Respondent, mother, siblings

Household Type (HHTYPE)

Code	Type
1	Lives alone
2	Lives with Father and/or Mother only
3	Lives with Father and/or Mother, and Brother(s)/Sister(s)
4	Lives with Brother and/or Sister only
5	Lives with Father/Mother, Brother/Sister and other relatives
6	Lives with Father/Mother, Brother/Siste, and non-relatives
7	Lives with other relatives only
8	Lives with non-relatives only
9	Other

Appendix 2
The Logit Model of Poverty

If υ_{it} is defined as

υ_{it} = 1 when i is poor in year t

= 0 otherwise,

then the expected value of υ_{it} is

$$E(\upsilon_{it}) = 1.Pr(\upsilon_{it}=1) + 0.(1-Pr(\upsilon_{it}=1)) = Pr(\upsilon_{it}=1)$$

We assume that this probability may be written as

$$Pr(\upsilon_{it}) = 1 \mid \alpha_i, x_{it}) = F(\alpha_i + \sum_{k=1}^{K}) \beta_k x_{kit}),$$

where α_i denotes time-invariant, unobserved (or unobservable) characteristics which influence individual i's probability of being in poverty such influences include ability and motivation The x_{it} are observations on explanatory variables which vary over time and across individuals These might include educational attainment, labour market experience, household type and income unit Note that the coefficients β_k are homoegenous across individuals and through time that is, we assume for all individuals and time periods that the probability of being poor responds by the same amount to a unit change in any of the explanators, x_k. It is the presence of the individual-specific α_i which produces different response probabilities,

$$F(\alpha_i + \sum_{k=1}^{K} \beta_k x_{kit}),$$

among individuals with the same observed characteristics Such permanent individual differences as sex or ability in an observationally equivalent group of ALS resondents, will imply that the probability of any member of the group being poor in any year can differ from the average response probability with the fixed effect α_i both α_i and β are unknown parameters to be estimated for the model However, there are only a small number of time periods, T, available (four, at the time of writing) for the estimation of the N(>>T) α_i parameters.

Following Chamberlain (1980, pp.228-230 we generate estimators of the structural parameters β using a conditional logit technique. For this procedure F is the logistic functional form

$$F(Z) = \frac{e^x}{1+e^x}$$

In our context Chamberlain noted that the aggregate number of poverty states for individual

$$i, \sum_{t=1}^{T} \upsilon_{it}$$

is a minimum sufficient statistic for the incidental parameters, α_i. It then follows that the conditional probability

$$\Pr((\upsilon_{i1}, .. , \upsilon_{iT}) \mid \sum_{t=1}^{T} \upsilon_{it})$$

does not depend on α_i. This probability is in the conditional logit form (see McFadden, 1974) Estimates for β may be obtained using standard maximum-likelihood programmes.[5] These estimates are consistent under mild regularity conditions (see McFadden, 1984).

For T = 4 there are five conditioning events:

$$\sum_{t=1}^{4} \upsilon_{it} = 0, 1, 2, 3 \text{ or } 4$$

The probabilities conditional on one, two or three aggregate incidences of poverty may be calculated once the β have been estimated For example, we have.

$$\Pr((1,0,0,0) \mid \sum_t \upsilon_{it} = 1) = \exp [\sum_k \beta_k(x_{ki1} - x_{ki4})] / D_i^1$$

$$\Pr((1,1,0,1) \mid \sum_t \upsilon_{it} = 3) = \exp [\sum_k \beta_k(x_{ki1} - x_{ki3})] / D_i^3$$

$$\Pr((1,1,1,0) \mid \sum_t \upsilon_{it} = 3) = \exp [\sum_k \beta_k(x_{ki1l} - x_{ki4})] / D_i^3$$

$$\Pr((1,0,1,1) \mid \sum_t \upsilon_{it} = 3) = \exp [\sum_k \beta_k(x_{ki1} - x_{ki2}] / D_i^3$$

and

$$\Pr((0,1,1,1) \mid \sum_t \upsilon_{it} = 3) = 1/D_i^1 ,$$

where

5 We used version 5 1 of the LIMDEP package (see Greene, 1990).

$$D_i^1 = \exp[\beta'(x_{i1} - x_{i4})] + \exp[\beta'(x_{i2} - x_{i4})] + \exp[\beta'(x_{i3} - x_{i4})] + 1$$

and

$$D_i^3 = \exp[\beta'(x_{i1} - x_{i2})] + \exp[\beta'(x_{i1} - x_{i3})] + \exp[\beta'(x_{i1} - x_{i4})] + 1$$

When two incidents of poverty occur over the four years we have, for example,

$$\Pr((1,0,1,0) \mid \sum_t \upsilon_{it} = 2) = \exp[\sum_k \beta_k(x_{ki1} - x_{ki4}]\ /\ D_i^2$$

$$\Pr((0,1,1,0) \mid \sum_t \upsilon_{it} = 2) = \exp[\sum_k \beta_k(x_{i2} - x_{ki4}]\ /\ D_i^2$$

$$\Pr((0,0,1,1) \mid \sum_t \upsilon_{it} = 2) = /\ D_i^2,$$

and

$$\Pr((1,1,0,0) \mid \sum_t \upsilon_{it} = 2) = \exp[\sum_k \beta_k\{(x_{ki1} - x_{ki3}] + (x_{ki2} - x_{ki4})\}]\ /\ D_i^2$$

It is clear that use of the conditional logit technique for our fixed-effects model restricts the sorts of probability statements that can be made However, at modest computational cost we obtain the structural coefficients, b, which model the impact of the explantory variables, x_{k3} for all individuals i over the entire period of T(=4) years.

In fact

$$\frac{\partial \Pr(\upsilon_{it}=1)}{\partial \beta_k} = x_{kit}\, F(\alpha_i + \beta' x_{it})\,[1 - F(\alpha_i + \beta' x_{it})]$$

which is positive when $x_{it} > 0$, so that the greater is β then the greater the contribution to the probability that individual i in period t is poor as a consequence of attaining the state x_{kit}.. In the case of a variable taking only discrete values the partial derivative above is invalid. Most significant coefficients in our regressions are for dummies taking the values 0 or 1 Suppose x_{kit} changs only for the k^{th} explanatory variable when period t+1 is reached. Further, if $x_{kit} = 0$ and $x_{kit+1} = 1$ then the change $\Delta\Pr(\upsilon_{it} = 1)$ is given by

$$\Delta\Pr(\upsilon_{it} = 1) = (e^{\beta_k} - 1)\, F(\alpha_i + \beta' x_{it})\,[1 - F(\alpha_i + \beta' x_{it})]$$

Hence the probability of poverty increases (does not change or decrease) when β is greater than (less than or equal) to zero.

Appendix 3

Unbalanced Data

These tables match equivalent tables in the text, but are for individuals who did not respond to the ALS in all four years. Here only data for 1985 are presented.

Table 1A: The Distribution of ALS Respondents Across Income Units 1985 (per cent)

Income Unit	1985
Sole persons	64.3
Couples	64.6
Couples with children	8.3
Sole Parents	2 2
Respondents with parents*	10.6
Total	100 0

* Respondent financially dependent on someone else.

Table 2A: The Distribution of Income Units Across Households 1985 (per cent)

	Household Types:		
Income Unit	No Others	Parents and Siblings	Non-Relatives
Sole persons	5.3	52 4	42 3
Couples	88 5	3.7	12.8
Couples with children	79 6	3.2	17.2
Sole parents	32 0	20.0	48.0
Respondents with parents	47.9	n.a	52.1

Table 3A: The Labour Force Status of Respondents in 1985 (per cent)

	Labour Force Status		
Income Unit	N	E	U
Sole persons	10.8	70 5	18.7
Couples	11.6	76.2	12.7
Couples with children	49 5	35.5	15.1
Sole parents	80.0	16.0	4 0
Respondents with parents	55 5	33.6	10.9

N = Not in Labour Force; E = Employed; U = Unemployed; E + U + N = 100 percent

Table 4A: The Distribution of Weekly Unit Income in 1985

Income Range	Percentage of ALS Respondents
Zero	9
1-10 per cent of mean	8
11-25 per cent of mean	8
26-50 per cent of mean	24
51-75 per cent of mean	13
Mean	19
101-125 per cent of mean	10
126-150 per cent of mean	5
151-200 per cent of mean	3
> 200 per cent of mean	1

Table 5A: The Distribution of Poverty Across Income Units: 1985 (per cent)

Income Unit	1985
Sole persons	87.8
Couples	3 3
Couples with children	6.1
Sole parents	2.0
Respondents with parents	0.8

Table 6A: Labour Force Status and Poverty: 1985 (per cent)

Income Unit	Labour Force Status		
	N	E	U
Sole persons	26 9	12.5	60.6
Couples	50.0	12.5	37.5
Couples with children	66.7	0.0	33 3
Sole parents	100.0	0.0	0.0
Respondents with parents	50 0	0.0	50.0

Table 7A: Educational Status[a] and Poverty: 1985
(per cent)

Income Unit	Educational Status				
	1	2	3	4	5
Sole persons	2 3	56 0	21.8	16 2	3 7
Couples	0 0	50 0	25.0	12 5	12 5
Couples with children	0 0	73 3	0 0	26.7	0.0
Sole parents	0 0	100 0	0.0	0.0	0 0
Respondents with parents	100.0	0.0	0 0	0.0	0.0

Health Consequences of Employment and Unemployment*

Brian Graetz

1. Introduction

Research into the health consequences of employment and unemployment has consistently shown that unemployed people report diminished levels of psychological health and well-being in comparison with their employed counterparts. Differences have been reported on a wide range of measures, such as boredom, depression, anger, minor psychiatric disorder, life satisfaction, happiness, helplessness, work ethic, confidence, self-esteem and locus of control (Eisenberg and Lazarsfeld, 1938; Hepworth, 1980; Finlay-Jones and Eckhardt, 1981; McPherson and Hall, 1983; Warr and Jackson, 1984, Warr, 1987; O'Brien and Feather, 1990). These effects may vary by such things as sex, financial circumstances, living arrangements and social support, but seem unrelated to factors such as age, ethnicity, marital status, education, and social class (Gore, 1978; McPherson and Hall, 1983; Finlay-Jones and Eckhardt, 1984; Sanford and Mullen, 1985; Warr, 1987).

Much of the early research in this area relied on cross-sectional findings. As such, it was not possible to determine whether unemployment was a specific cause of diminished well-being, or yet another symptom of prevailing malaise and adversity (McPherson and Hall, 1983, Winefield and Tiggemann, 1985, p 229, Warr, 1987, p 195). Now, however, there is a growing body of longitudinal evidence that, for the most part, confirms that unemployment has adverse consequences for psychological health and well-being. For example, it has been shown that on a variety of measures there are significant differences between school-leavers who find employment and those who become unemployed, but few if any differences while both groups are still at school (Banks and Jackson, 1982, Patton and Noller, 1984). Other studies report differences both before and after leaving school, although in this case the experience of unemployment still contributes to such things as lower levels of self-rated competence, activity, happiness and life satisfaction, and higher levels of anger, helplessness and depressive affect (Winefield and Tiggemann, 1985, Feather and O'Brien, 1986a, 1986b) The evidence also suggests that, at least amongst young people, the adverse

* The data for this analysis are taken from the Australian Longitudinal Survey, conducted by the Department of Employment, Education and Training and distributed by the Social Science Data Archives at the Australian National University, Canberra This project has been funded by the Department of Employment, Education and Training, in association with the Centre for Economic Policy Research, Research School of Social Sciences, at the Australian National University. Neither the depositors, the distributors of the data, nor the funding agency, bear any responsibility for the analyses or interpretations.

consequences of unemployment are confined to mental health or psychological well-being, and are less likely to be reflected in general measures of physical health (McPherson and Hall, 1983; Sanford and Mullen, 1985; Warr, 1987, p 202-7).

Although it is clear that unemployed people are worse off than employed people in general, recent research suggests that the quality of employment is crucial in mediating these effects For example, Winefield et al. (1988) found that satisfied employees were significantly better off in terms of self-esteem, depressive affect and psychiatric morbidity than both dissatisfied employees and the unemployed, and argued that these differences were due to the beneficial effects of satisfactory employment rather than the adverse effects of unsatisfactory work or unemployment. O'Brien and Feather (1990) distinguished between good and poor employment on the basis of skill utilisation, and found that school-leavers derived substantial benefits from good employment, but were adversely affected by poor employment to the extent that there were no substantial differences between them and their counterparts who became unemployed. Moreover, they suggested that leaving a poor job and becoming unemployed may have little impact on well-being if low quality employment had already produced adverse consequences.

One issue still unresolved is whether unemployment and poor employment induce an adverse psychological impact. Winefield and Tiggemann (1985) and Winefield et al. (1988) found that neither unsatisfactory employment nor unemployment produced any significant deterioration in health amongst school-leavers; instead, well-being was enhanced by finding satisfactory employment upon leaving school. Other studies have reported both enhanced well-being for those who find good jobs, and a deterioration for those who take poor jobs or become unemployed (Banks and Jackson, 1982; Patton and Noller, 1984; Feather and O'Brien, 1986b; O'Brien and Feather, 1990). These discrepancies have been attributed to variations in the size and representativeness of samples, to differences between cultures, and to differences in the outcome measures investigated

Despite the obvious advantages of longitudinal studies for making causal attributions about these issues, there are also a number of problems and limitations that vitiate making generalisations about broader populations or long-term trends First, most studies focus on particular groups such as school-leavers, the unemployed, or those most likely to become unemployed. Others are based on a restricted sample size, a limited time span, or a particular metropolitan area or region. These limitations make it difficult to compare findings across studies or to draw reliable conclusions about the adverse consequences of employment and unemployment in general Second, many longitudinal studies suffer high rates of sample attrition, typically close to and sometimes in excess of 50 per cent (Banks and Jackson, 1982, Winefield and Tiggemann, 1985, Winefield et al , 1988). This makes it difficult to disentangle the effects of labour force experiences from the biases of uneven sample losses.

The significance of the present study is that it overcomes many of these difficulties and limitations. It is based on a substantial, representative sample of young people in Australia, aged 16-25 years in 1985. The survey was conducted annually over a 4-year period and, in that time, achieved relatively modest rates of sample attrition. The aim of this analysis is to trace health changes over time for a variety of groups and through a variety of labour market experiences: during sustained employment and unemployment, in the transition from school to employment and unemployment, and as people move between employment and unemployment and between satisfying and unsatisfying jobs. Its aim is to identify the primary sources of health risk in the context of the labour market.

The policy implications of this research are three-fold First, it will help to identify the specific health needs of young people, including those groups whose health is most at risk in the context of the labour market Second, it will help to identify educational and training needs such as career planning and counselling in preparation for the realities of labour market experiences that are not always benign. Third, it will highlight the need within the workplace itself to improve job environments, work conditions, skill utilisation, career prospects or the organisation of tasks in such a way as to reduce the detrimental effects of employment In effect, this represents a shift in focus away from an assumption that all work is positively rewarding, beneficial and inherently attractive, and towards greater recognition of the need to address the undesirable consequences of both employment and unemployment.

2. Data and Method

Data

The analyses reported below are based on data from the ALS Area sample. The sampled universe includes all people aged 16-25 years in Australia except those in sparsely populated areas (approximately 2 per cent of the population; Parkinson, 1989) The initial sample of 8,998 respondents was first interviewed in 1985, and re-interviewed on three subsequent occasions at one year intervals. Some 7,871 respondents remained in the active sample at Wave 2 of the survey, 7,110 at Wave 3 and 6,151 at Wave 4, representing attrition rates of 12.5, 8.5 and 10.7 per cent respectively.

Measures

To assess the health consequences of employment and unemployment, the dependent variable used is the 12-item version of the *General Health Questionnaire* (GHQ). The GHQ was developed to detect minor psychiatric disorder in community settings (Goldberg, 1978, Goldberg and Williams, 1988). It has been validated for use with general Australian samples (Tennant, 1977) and with Australian youth (Winefield et al., 1989). According to Goldberg (1978, p 5), it detects two main forms of disturbance: inability to continue to carry out one's normal 'healthy' functions, and the emergence of new life circumstances that are distressing. The GHQ has been

used as an outcome measure in a number of studies of unemployment and health (e.g. Finlay-Jones and Eckhardt, 1981, 1984; Banks and Jackson, 1982; McPherson and Hall, 1983; Warr and Jackson, 1985; Winefield et al., 1988). The 12-item version is shorter than those usually used for screening purposes, but performs more efficiently than longer versions when used as part of a general survey. It also seems particularly useful for studying employment-related issues (Banks et al., 1980; Winefield et al., 1989).

The GHQ asks respondents whether they recently have experienced an increase or decrease in symptoms such as loss of sleep, inability to concentrate, unhappiness and depression, or loss of confidence. Although four response categories are provided, Goldberg (1978) suggests using a binary scoring method (to denote the presence or absence of symptoms) for detecting clinical cases. Respondents who report more than one symptom on the 12-item version are classified as 'cases' and scored 1; the remainder are scored 0. As a binary variable, mean scores can be interpreted as the proportion of respondents who are potential psychiatric cases.

More recently, it has been suggested that a four-point Likert scoring method is also useful for general surveys and for parametric statistical analyses (Banks et al. 1980; Winefield et al., 1989). With this method, an overall GHQ score is obtained by assigning values of 0-3 to responses and summing across items. The resulting scores have greater variance, less skew and less kurtosis, although there is still some positive skew because few respondents report more than one or two symptoms. To compensate, the square root of the GHQ score is sometimes used for parametric analyses (e.g. Finlay-Jones and Eckhardt, 1984). However, because the present study is based on such a large sample, this transformation makes little difference here, so raw scores are retained to simplify the interpretation of results. Both the Likert and binary scoring methods are reported in this analysis.

One disadvantage of Likert scores is that they have no direct interpretation. However, the average case rate associated with particular Likert scores can be used as a guide to symptom severity. By definition, scores below 4 are associated with a case rate of 0, and scores of 15 or more represent a case rate of 100 per cent In between these extremes, scores of 8, 10 and 12 are associated with average case rates of 8 per cent, 27 per cent and 57 per cent respectively at Wave 1 of the survey. For GHQ scores greater than 4, the average case rate increases exponentially.

In keeping with previous studies (e.g. McPherson and Hall, 1983; Spruit et al , cited in Warr, 1987), some 965 respondents with prior health problems have been omitted from the analysis. Most of these report health problems that limit the amount or type of work they can do, while others report health problems that impede job search activity. In general, these respondents have significantly higher GHQ scores, and have been omitted so that comparisons can be made between people who are otherwise in good health.

The main independent variable in this analysis is *employment status.* Three base categories are used. employed full-time, unemployed and studying. No distinction is made between students looking for work and

students not looking for work; preliminary screening identified no clear health differences between these two groups. However, all students with full-time jobs, and part-time students with jobs, are classified as employed rather than as students, on the grounds that their work experiences are likely to be more salient. In addition, respondents with a part-time job and respondents who spent time outside the workforce (that is, not studying, not employed and not looking for work) are excluded to minimise extraneous influences that might be associated with their distinct experiences and expectations. This means that the analysis is restricted to those who are primarily studying, working full-time or seeking work at each wave.

When changes over time are considered, a number of different categories of employment status can be identified First, there are people who retained the same status at each wave, either as employed (n = 2,647), studying (n = 459) or unemployed (n = 76). Second, there are people whose employment status changed from one wave to the next; these include employed people who became unemployed (n = 323), students who left school and either found work (n = 954) or became unemployed (n = 152), and unemployed people who subsequently found work (n = 521) More than half of the respondents included in this analysis were employed in full-time jobs at each wave of the survey.

Finally, quality of work is included in the analysis as a mediating variable It is assessed by a single job satisfaction item, and scored on a 5-point scale from very dissatisfied to very satisfied. Although quality of employment is probably a function of many more things than job satisfaction alone, a similar measure has been used in other studies (e.g. Winefield et al., 1988), and there is evidence to suggest that it is highly correlated with other aspects of work quality (O'Brien and Feather, 1990).

Method

The analyses reported below focus on the extent to which health or psychological well-being, as measured by the GHQ, is affected by changes in employment status. The results are presented in two sections The first is for cross-sectional findings and the second for longitudinal results. The cross-sectional analysis is conducted using one-way analysis of variance (ANOVA) to test for statistically significant group differences. In addition, multiple classification analysis (MCA) is used to identify other factors that might be associated with GHQ scores. MCA is a variant of ANOVA in which group means on each factor (categorical independent variable) are adjusted for the influence of other independent variables, and a standardised beta (comparable to beta values in regression analysis) is calculated to assess the magnitude of adjusted group differences. Statistical significance for each main effect is assessed by a conventional F test. Interactions between factors were not statistically significant, and have been omitted from the final analyses.

The independent variables used for MCA are sex, age (16-19 years, 20-25 years), birthplace (Australia, United Kingdom and New Zealand, Mediterranean countries, other), marital status (de facto, married, separated/widowed/divorced, never married), whether respondent lives

with either parent, nature of housing occupancy (owner, buyer, renter, boarder, other), financial year income ($0-$4,999, $5,000-$9,999, $10,000-$19,999, $20,000 or more), number of job spells (0, 1, 2 or more) and number of looking-for-work spells (0, 1, 2 or more). In addition, job satisfaction (satisfied, neither, dissatisfied) is included for employed respondents, and duration of unemployment (less than 5 weeks, 5 weeks to less than 6 months, 6 to less than 12 months, 1 year or more) for unemployed respondents Continuous variables such as income and duration of unemployment have been converted to categorical measures to capture possible non-linear associations

The longitudinal analysis is conducted using t-tests to identify statistically significant time and group variations in GHQ scores. Pairwise comparisons are used to assess changes over time, while between-group comparisons are used to test for predisposing differences; for example, to compare school-leavers who find jobs with school-leavers who become unemployed both before (T1) and after (T2) leaving school.

3. Results

Cross-sectional findings

The relationship between employment status and health at each wave of the survey is presented in Table 1. This shows clear variations in health according to employment status. Employed respondents return GHQ scores that are 1-2 points lower than students and the unemployed, and their case rate is 10-20 per cent lower. These differences are also consistent across time. At each wave, employed respondents report significantly lower levels of disorder than respondents who are studying, and students in turn report marginally lower levels of disorder than the unemployed. These differences are both moderate in size (etas range from .10 to .17) and statistically significant.

While employment status is clearly related to psychological well-being, other factors may also influence health outcomes Accordingly, Table 2 shows the impact of demographic attributes, living arrangements, socioeconomic status and labour force experiences among employed, studying and unemployed respondents. The results show that age, birthplace, nature of occupancy, income and number of job spells are unrelated to well-being. The only consistent difference across groups is by sex, with women reporting higher GHQ scores than men (see also Goldberg, 1978; Finlay-Jones and Eckhardt, 1981; Banks and Jackson, 1982) Marital status also has some impact, contingent upon employment, with married respondents reporting lower scores than never married respondents if employed, but higher scores if unemployed Even these effects are still relatively modest in size, indicating that GHQ scores are largely independent of socio-demographic variables. This finding is consistent with others

TABLE 1: Health (means scores) by Employment Status; ALS Area Sample, Waves 1-4, 1985-88[1]

	Health (Mean Scores)	
Employment Status	**GHQ Score**	**Case Rate**
Wave 1 - 1985		
Employed full-time	9 19	.28
Studying	10 14	.38
Unemployed	10.83	.42
Eta	.12*	11*
Wave 2 - 1986		
Employed full-time	8 85	25
Studying	10.45	.39
Unemployed	10.79	.48
Eta	.17*	14*
Wave 3 - 1987		
Employed full-time	8 86	24
Studying	10 08	35
Unemployed	10 52	35
Eta	13*	.10*
Wave 4 - 1988		
Employed full-time	8.80	23
Studying	10.06	.32
Unemployed	11.39	.39
Eta	16*	.10*

1 See text for a description of health variables. Eta measures the strength of association between employment status and health, an asterisk indicates that differences in health are statistically significant at $p < 001$ (one-way analysis of variance).

studies (Goldberg, 1978; Banks et al , 1980; Finlay-Jones and Eckhardt, 1984; Winefield et al., 1989).

However, among employed respondents, those who are dissatisfied with their jobs report substantially higher levels of disorder than those who are satisfied (adjusted mean GHQ scores of 13.09 and 8.96 respectively, and adjusted mean case rates of 59 per cent and 27 per cent respectively). Thus, psychological health is primarily a function of employment status and, for those who are employed, quality of employment (as indicated by job satisfaction). Moreover, women report higher levels of disorder than men; however, separate analyses provided no evidence of any substantial gender differences in the determinants of health outcomes. Accordingly, the longitudinal results presented below report only the effects on health of employment status and quality of employment.

TABLE 2: Net effects of demographic attributes, living arrangements, socioeconomic status and labour force experiences on composite GHQ scores (1) and GHQ case rates (2) for employed, studying and unemployed respondents; Wave 1, 1985[1]

	Employment Status					
	Employed		Studying		Unemployed	
	(1)	(2)	(1)	(2)	(1)	(2)
Demographic attributes						
Sex	14*	.10*	16*	10*	10*	.08*
Age	.01	.00	.06	05	.06	.03
Birthplace	02	04	.01	01	03	.07
Marital status	.06*	08*	02	02	12*	.05
Living arrangements						
Lives with parents	.06	.08*	.04	.09	.06	.09
Nature of occupancy	.05	.04	.07	.07	.05	.04
Socioeconomic status						
Income	.02	.03	.06	.04	.06	.04
Labour force experiences						
Job spells	02	02	02	.01	.07	.06
Looking for work spells	02	02	.08*	06*	.03	.02
Job satisfaction	30*	25*	na	na	na	na
Duration of unemployment	na	na	na	na	.05	.04
R^2	12	09	05	.03	.06	.03

Notes Multiple Classification Analysis showing standardised beta values for main effects. An asterisk denotes statistical significance at $p < 01$, na denotes not applicable.

Longitudinal results

Cross-sectional findings that show higher levels of psychological disorder amongst unemployed people provide no conclusive evidence of whether this is a consequence of becoming unemployed, or a predisposition that may precipitate unemployment. Accordingly, this section examines whether health is affected by changes in employment status; that is, whether employed people who suffer job loss, school-leavers who find jobs or become unemployed, or unemployed people who find jobs, report significant changes in health.

Three separate issues are examined. The first is whether changes in employment status are associated with corresponding changes in health; specifically, whether those who become unemployed experience a deterioration in health, and whether those who become employed experience improved health. For comparison, health changes amongst those

who remained employed, studying or unemployed at each wave are also examined. The second issue is whether predispositions account for changes in health outcomes; for example, whether people who become unemployed suffer prior health problems that increase their chances of becoming unemployed. The third issue is the extent to which the health consequences of employment and unemployment are mediated by quality of work; for example, whether the detrimental consequences of unemployment vary according to whether the job lost was satisfying or unsatisfying.

The first of these issues is examined in Table 3, which shows GHQ scores and case rates for employed, studying and unemployed respondents whose status remained unchanged, and for those whose status changed either by becoming employed or unemployed Those who were employed full-time at each wave report no significant changes in GHQ scores, although their case rate declines marginally from T1 to T3 ($t = 3.98$; $p < .001$) and T1 to T4 ($t = 4.08$, $p < .001$). Students also report a small improvement in health, although differences are not statistically significant ($p > .01$).[1] Unemployed respondents report a small increase in disorder over time, although this is at least in part a function of uneven sample attrition, that is, a disproportionate loss of respondents with higher GHQ scores Thus, respondents whose employment status remained unchanged at each wave report only minor health changes over time These fluctuations might be attributable to the cumulative effects of maintaining a constant status, maturation, uneven sample attrition or re-test effects (e.g. Radovanovic et al., 1988; Ormel et al , 1989). Because they are small in magnitude, they are unlikely to have any confounding influence on results.For respondents whose employment status changed from one wave to the next, much more substantial health changes have been recorded

Among employed people who become unemployed, there is a significant increase in GHQ scores, but no change in the overall psychiatric case rate. Students who ceased study and entered the workforce in full-time jobs report significant improvements in health, while students who became unemployed report some deterioration, although this is reflected only in overall GHQ scores and not in an increased case rate. Unemployed people who subsequently found jobs also report significant improvements in health, both in their overall GHQ score and case rate. Thus, respondents who experienced a change in employment status, becoming either employed or unemployed, report a significant improvement or deterioration in health. Amongst school-leavers, the beneficial effects of employment are much greater than the adverse consequences of unemployment.

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1 Because the degrees of freedom for the t-tests vary from very small to very large numbers, it is not appropriate to apply the same probability level (alpha) to assess statistical significance (see, for example, Tabachnick and Fidell, 1989). Accordingly, for degrees of freedom less than 150, 150-999 and 1,000 or more, the alpha values chosen are .05, .01 and .001 respectively.

TABLE 3: Employment status and health for respondents whose status remained unchanged at each wave (T1-T4), and respondents whose status changed from any one wave to the next (T1-T2); ALS Area sample, Waves 1-4, 1985-88

Employment Status	Health (Mean Scores) GHQ Score	Case Rate
Status Unchanged		
Employed throughout[1]		
T1 (n=2647)	9.03	.27
T2 (n=2647)	8.81	.24
T3 (n=2300)	8.76	.22
T4 (n=1978)	8 81	.22
Studying throughout[1]		
T1 (n=459)	10 10	.37
T2 (n=459)	10 17	.37
T3 (n=365)	9 89	.32
T4 (n=325)	9.71	.31
Unemployed throughout[1]		
T1 (n=76)	10.66	.43
T2 (n=76)	11.29	.45
T3 (n=42)	11.88	.38
T4 (n=33)	11.00	.36
Status Changed		
Employed who became unemployed(n = 323)		
T1 (employed)	9.43	.33
T2 (unemployed)	10 52	.37
Student's t (* = p<.01)	3.39*	1.40
Students who became unemployed (n = 152)		
T1 (studying)	10.11	.39
T2 (unemployed)	11.55	.42
Student's t (* = p< 01)	2.82*	.58
Students who became employed (n = 954)		
T1 (studying)	10.42	.39
T2 (employed)	8 98	.29
Student's t (* = p< 001)	8.11*	5 08*
Unemployed who became employed (n = 521)		
T1 (unemployed)	10.58	.36
T2 (employed)	8 52	22
Student's t (* = p<.01)	7.72*	5.62*

1 N of cases varies due to sample attrition

Although these results are based on an analysis of changes over time, it is still possible that prior circumstances or predisposing factors may account for the differences observed (Winefield and Tiggemann, 1985). For example, people who lose jobs, or students who fail to find full-time employment, may already be suffering higher levels of health impairment, placing them at a competitive disadvantage in the labour market relative to their more successful counterparts. Alternatively, students and unemployed people who manage to find full-time work may be better adjusted to begin with, thereby improving their chances of being successful in job search activity.

To test whether predisposing factors account for subsequent health differences,people with similar origins but different destinations can be compared across time. For example, employed people who lose their jobs and those who remain employed can be compared both at T2, when one group is employed and the other not, and at T1 when both groups are employed If predisposing health differences are important, then the groups should be different at both points in time. If differences emerge only at T2, then this is much more likely to be a function of the intervening changes in employment status.

The results of this analysis are presented in Table 4, where three groups are tested for the influence of predisposing health differences. First, employed people who lose their jobs are compared with those who remain employed; second, students who find jobs are compared with students who do not, and third, unemployed people who find work are compared with those who remain unemployed.

TABLE 4: Pre-disposing health differences for respondents with similar employment status origins (T1) but different destinations (T2); ALS Area sample, Waves 1-4, 1985-88

Employment Status		Health (Mean Scores)			
		GHQ Score		Case Rate	
	(N)	T1	T2	T1	T2
Employed throughout	(2647)	9.03	8 81	.27	.24
Employed who became unemployed	(323)	9 43	10 52	.33	37
Student's t (* = p<.001)		1 47	5 25*	2.34	5.32*
Students who became employed	(954)	10.41	8 98	39	29
Students who became unemployed	(152)	10 11	11.55	.39	.42
Student's t (* = p< 01)		.68	5.10*	.17	3 17*
Unemployed throughout	(76)	10 66	11 29	.43	.45
Unemployed who became employed	(521)	10.58	8.52	.36	.22
Student's t (* = p< 01)		.12	4.98*	1.24	4 28*

The results in Table 4 provide strong evidence for the view that health changes are a function of changes in employment status rather than predisposing factors. For all three sets of comparisons, there are no significant differences in health at T1, but significant differences at T2 Thus, employed people who became unemployed are initially no different from those who remained employed, but report significantly higher levels of impairment after becoming unemployed Likewise, students who found jobs and those who did not are indistinguishable in GHQ scores and case rates while studying (T1), but those who did not find employment record an average GHQ score that is two-and-a-half points higher and a case rate 13 per cent higher than those who found full-time jobs Finally, unemployed people who subsequently found full-time jobs were initially no different from other unemployed people, but on entering the workforce they report a substantial improvement in health These results confirm that changes in employment status, rather than prior health differences, are responsible for variations in health outcomes

Next, we consider whether the health consequences of employment and unemployment are mediated by the quality of work Three aspects of this issue are examined here· first, whether the health of those who were employed at each wave is affected by changes in the quality of their employment, second, whether the adverse consequences of unemployment occur irrespective of the quality of the job that was lost, and, third, whether the benefits of finding work are experienced equally by those who find satisfying and unsatisfying jobs. These issues are examined in Table 5

The results show that amongst employed people whose quality of work deteriorated between surveys, significant changes in health were reported, with GHQ scores increasing by more than two points, and the case rate by 15 per cent. Amongst those whose quality of work improved, the reverse occurred GHQ scores declined by more than two points and the case rate was more than halved

Quality of employment also has a marked mediating influence for employed people who became unemployed. While this group, in total, records only a small deterioration in health, these adverse effects are experienced only among those who were satisfied with the jobs they subsequently lost. Among those who had no feelings either way about the jobs they lost, no significant health changes are reported. In contrast, those who lost an unsatisfying job report minor improvements in health after job loss, although only the change in the average case rate is statistically significant ($p < .05$).

The final two panels in Table 5 refer to students and unemployed people who found work In both cases, the health consequences of finding a job are contingent on the quality of the work obtained Both groups report significant improvements in health if the jobs found were satisfying, while those who were neutral or dissatisfied report no significant health changes. In fact, students who found unsatisfying jobs report a small deterioration in health, although the differences over time are not statistically significant ($p > 05$) Nonetheless, the health of school-leavers who end up with

TABLE 5: Health consequences of employment and unemployment as mediated by quality of employment, for respondents employed at successive waves, and for students and unemployed respondents who found full-time jobs; ALS Area sample, Waves 1-4, 1985-88

		Health (Mean Scores)					
Employment Status/		GHQ Score			Case Rate		
Job Satisfaction		T1	T2	t-test	T1	T2	t-test
Satisfied employed (T1) who became dissatisfied (T2)	(n = 176)	9 16	11.44	5.09*	.32	.47	3 46*
Dissatisfied employed (T1) who became satisfied (T2)	(n = 354)	11 62	8.34	10 48*	49	.22	8.90*
Employed (T1) who became unemployed (T2)							
Dissatisfied	(n = 56)	12 30	11 23	1 46	.59	.41	2 32*
Neither	(n = 45)	11 64	11.98	36	47	.44	27
Satisfied	(n = 210)	8.14	9 99	4.88*	22	34	3.27*
TOTAL	(n = 323)	9 43	10 52	3 39*	33	37	1 40
Students (T1) who became employed (T2)							
Dissatisfied	(n = 76)	11.54	12 45	1.31	50	.63	1 92
Neither	(n = 98)	11 99	11.59	69	.54	.51	.48
Satisfied	(n = 757)	10.15	8.30	9 59*	36	.23	6 36*
TOTAL	(n = 954)	10 42	8 98	8 11*	39	29	5 08*
Unemployed (T1) who became employed (T2)							
Dissatisfied	(n = 49)	11.41	11 69	.32	.41	43	20
Neither	(n = 48)	12.54	11 65	.80	52	.50	23
Satisfied	(n = 390)	10 28	7.73	8 83*	.34	.16	6 55*
TOTAL	(n = 521)	10.58	8.52	7.72*	36	.22	5.62*

unsatisfying jobs is certainly no better than that of school-leavers who failed to find work

In summary, the health consequences of remaining employed, finding a job, or becoming unemployed, are directly contingent upon the quality of the work performed. Those in continued employment may experience substantial changes in health if the quality of their work changes. For those who become unemployed, health may deteriorate or even improve, depending on whether the job lost was satisfying or unsatisfying. For job seekers who are successful in finding work, the health benefits of employment are unlikely to be realised unless the jobs they find are satisfying.

Finally, we consider whether there are predisposing health differences amongst job seekers that account for why some end up in satisfying jobs and others in unsatisfying jobs. This issue is examined in Table 6. The results show that the substantial differences in health between satisfied and dissatisfied workers are not a function of health differences prior to becoming employed. For both students and the unemployed, there are no significant health differences before finding a job, but significant differences emerge after entering the workforce according to the quality of the jobs obtained. For students, there is evidence of some predisposing health difference ($p < .05$), but given the size of the pooled sample and the variation within groups, this differences is quite small, and considerably less than that which occurs after entry to the workforce. Thus, we may be confident that the health consequences of employment are mediated primarily by quality of work as such, and not by prior health differences that may predispose some people to find their jobs satisfying or unsatisfying.

TABLE 6: Pre-disposing health differences for respondents with similar employment status origins (T1) but different destinations (T2), by quality of employment; ALS Area sample, Waves 1-4, 1985-88.

Employment Status		Health (Mean Scores)			
		GHQ Score		Case Rate	
	(N)	T1	T2	T1	T2
Students (T1) who became satisfied employed (T2)	(757)	10 15	8.30	36	.23
Students (T1) who became dissatisfied employed (T2)	(76)	11.54	12.45	.50	.63
Student's t (* = p<.01)		2.29	5 65*	2 42	7.81*
Unemployed (T1) who became satisfied employed (T2)	(390)	10.28	7.73	.34	.16
Unemployed (T1) who became dissatisfied employed (T2)	(49)	11 41	11 69	.41	43
Student's t (* = p<.01)		1.30	4.88*	.97	3 62*

4. Conclusions

This analysis has shown that employment status has an important bearing on the mental health of young people. In general, those who are employed report lower levels of disorder than students and the unemployed, and these differences are largely unaffected by demographic attributes, socioeconomic status or immediate labour market experiences. It also has confirmed that these differences can be attributed to employment status itself, and not to any predisposing health differences that may disadvantage some people in the labour market.

The analysis has also shown that unemployment has a small detrimental effect on the health of school-leavers, contrary to the findings of some other studies (e.g. Winefield and Tiggemann 1985; Winefield et al. 1988). However, significant changes occur only for Likert scores and are not substantial. In part at least, this is because students report relatively high levels of health disorder to begin with (see also Banks and Jackson 1982; Winefield et al. 1989). This might be attributed to the pressures and anxieties of final-year studies and examinations, and to uncertainties associated with impending entry to the labour market.

Most importantly, the health consequences of employment and unemployment are directly contingent upon the quality of work. As a result, the benefits of employment are confined to those, albeit a majority, who manage to find a satisfying job. In contrast, those who do not end up in satisfying jobs -- approximately one out of every 5 workers -- report the highest levels of health disorder. At the same time, the adverse consequences of job loss are confined to those who were satisfied with their former jobs.

These diverse outcomes can be seen more clearly in Figure 1, which traces the health changes that occur as people leave school and move into and out of full-time employment. As the steepness of the gradients shows, the most substantial changes are associated with movement to or from a satisfying job. For all other groups, except unemployed school-leavers, health changes are much less pronounced and not statistically significant. In fact, the differences induced by quality of work are so pronounced as to make this the most important determinant of health outcomes.

In order to gauge the severity of these outcomes, Table 7 presents a Health Risk Index for various categories of employment status. The health risk for each group has been calibrated according to the average GHQ case rate recorded across all four waves of the survey. The index confirms, contrary to popular expectations, that the health risks associated with unemployment are not the most severe. Instead, unsatisfying work is the most potent source of health disorder, with an index score of 50; that is, 50 per cent of dissatisfied workers probably suffer some degree of health impairment. Moreover, this high level of disorder can be attributed primarily to unfavourable work experiences and not to pre-disposing factors. At the other end of the scale, satisfying employment yields the lowest levels of disorder (an average

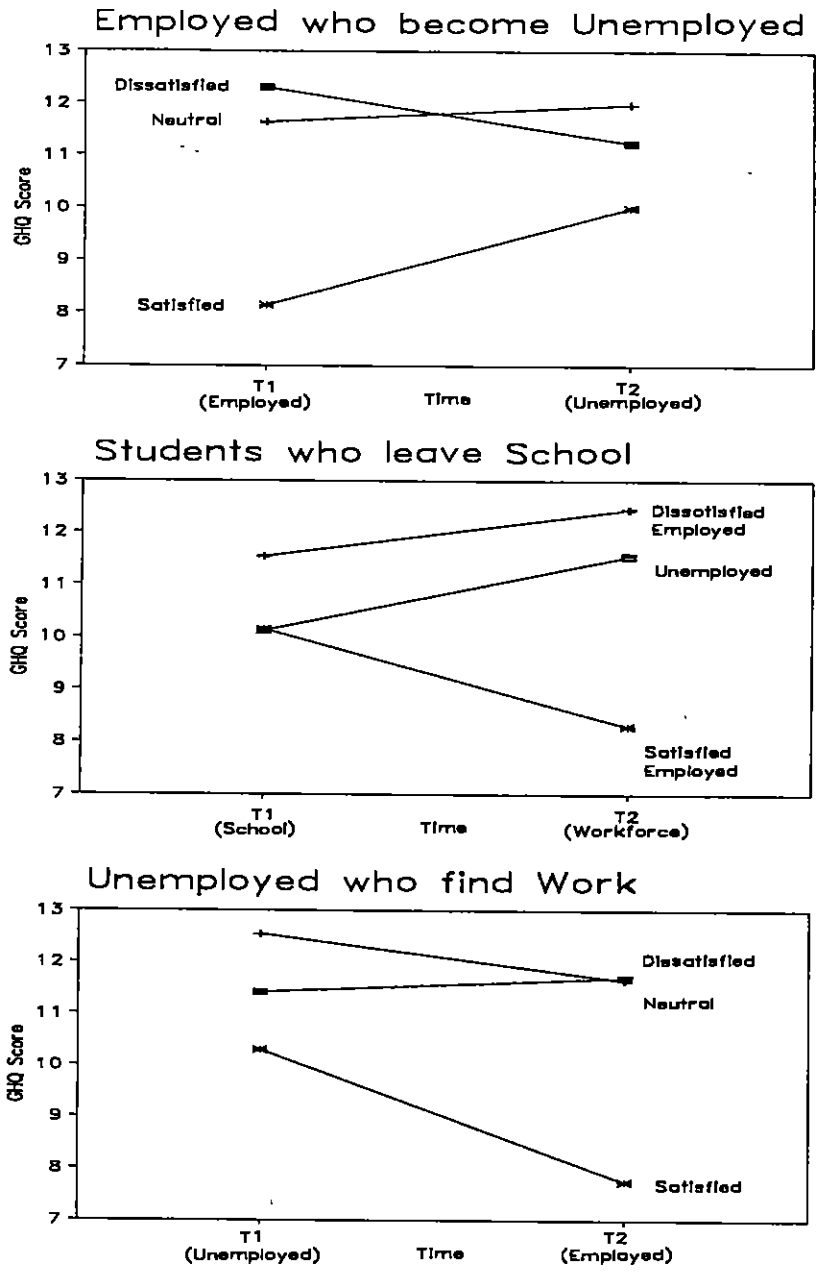

Figure 1: Health Outcomes by Changes in Employment Status

TABLE 7: Health Risk Index for employed respondents by job satisfaction, unemployed respondents by duration of unemployment, and students; ALS Area sample, Waves 1-4, 1985-88.

Employment Status	Health Risk Index[2]
Dissatisfied employed	50
Short-term unemployed[1]	40
Neutral employed	37
Medium-term unemployed[1]	36
Long-term unemployed[1]	36
Students	36
Satisfied employed	20

1 Periods of unemployment are defined as follows short-term, less than 3 months; medium-term, 3 months to less than one year; long-term, one year or longer

2 Index scores are calibrated according to the average GHQ case rate for each group across all four waves of the survey, they can be interpreted as the percentage of each group who probably suffer some degree of health impairment.

case rate of just 20 per cent) In between these two extremes lie employed respondents who are neither satisfied nor dissatisfied with their jobs, unemployed respondents irrespective of duration, and students; differences between these groups are minimal.

These results present a somewhat unexpected picture of the health consequences of employment and unemployment. In particular, they provide no support for the view that unemployment is the worst outcome that young people can experience, or that having a job—any job—is better than no job at all Instead, they indicate that what happens in the workplace is at least as important as success or failure in finding a job and keeping it. This is because the psychological benefits of employment are not delivered across the board, but are confined to those who are satisfied with their work For those who are dissatisfied, any potential benefits are cancelled out.

Accordingly, we may conclude that employment imparts substantial benefits for all those who manage to find a satisfying job Unsatisfying employment conveys no such benefits. As a result, school-leavers who end up in unsatisfying jobs are no better off than their counterparts who fail to find work. Likewise, unemployed people derive no health benefits from finding an unsatisfying job, and so become no better off than their counterparts who remain unemployed. Unemployment itself has adverse health consequences, but only for satisfied workers who lose their jobs and, to a lesser extent, school-leavers who fail to find work. For dissatisfied workers, becoming unemployed may actually have beneficial effects on

health; equally, those who remain in unsatisfying jobs may end up being *worse* off than those with no jobs at all.

One reason why unemployment may not have a more detrimental effect on health is that existing welfare provisions may help to cushion people from some of its more severe consequences or alleviate their effects. No such benefits or services are provided for those in unsatisfying employment. It is also perhaps reasonable to speculate that school-leavers and other job seekers are quite aware that they face a dilemma in choosing between bad jobs and no jobs at all. In this respect, the prospect of finding a satisfying job can be expected to provide a strong incentive for people to seek work; the prospect of ending up in unsatisfactory employment will provide little incentive at all, especially as some of those people can expect to suffer increased psychological impairment from so doing. Indeed, the prospect of ending up in a bad job may act as a disincentive, discouraging people from taking certain jobs or from searching diligently for employment. At the same time, as noted by Winefield et al. (1988), attempts to boost the morale or well-being of unemployed people by providing them with jobs are unlikely to succeed unless those jobs can evoke some measure of satisfaction

Finally, attention might now be given to identifying the circumstances and conditions that make for satisfying employment, identifying jobs that do not provide satisfaction and devising means to improve them, and helping to prepare young people for the realities of the labour market choices that confront them The aim of this should be both to alleviate the adverse health consequences of unemployment, and to eliminate as far as possible the conditions within the workplace itself that may induce ill-health.

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Appendix 1

Australian Longitudinal Survey Research Bibliography 1985-1991

Listed by Substantive Area of Research:

1. Unemployment
2. Youth Labour Market
3. Education and Training
4. Transition
5. Survey/Statistical Methodology

Appendix 2

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