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Discussion Paper No. 95

ESTIMATING THE IMPACTS OF JOB SUBSIDIES ON THE DISTRIBUTION OF UNEMPLOYMENT: RESHUFFLING THE QUEUE?

by

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ABSTRACT

This paper provides estimates of the direct impacts of Australia’s Special Youth Employment Training Program (SYETP) on the eligible population and on young people not eligible for the subsidy. The workers whose wages have been subsidised are mainly teenagers who had been unemployed for at least four months. The specific issues addressed are:

- Has the subsidy resulted in less long-term unemployment of young people than otherwise would have been incurred?
- If so, have the long-term unemployment reductions been achieved at the expense of increases in short-term youth unemployment?
- What has been the net impact on youth unemployment rates?

These issues are central to the assessment of any targeted employment subsidy program. In the United States, which has an employment subsidy for young people from low-income families, critics have argued that it is difficult to induce employers to participate in narrowly targeted subsidy programs and that most of the subsidised jobs would have existed without the subsidy. Thus, the theoretical macroeconomic and distributional benefits of such subsidies are not achieved. This debate has been hampered by the absence of convincing estimates of the actual impacts of specific targeted employment subsidies. The relatively high proportion of the youth labour force whose employment has been subsidised under SYETP, along with the availability of monthly participation data over a six-year period in which there was considerable variation in subsidy participation rates, provide a good
opportunity to estimate this subsidy's direct impacts.

The Australian subsidy experience demonstrates, at a minimum, that it is possible to induce employers to hire members of a disadvantaged group with a subsidy. The preliminary estimates reported here, based on time series analysis of the impacts of the variation in subsidy participation rates, rates on long-term and short-term teenage unemployment rates, suggest:

-- Higher subsidy participation is associated with less long-term unemployment for young people.

-- Some of this is at the expense of increased short-term youth unemployment, so that the net impact on youth unemployment is slightly less than the program's impact on long-term unemployment.

These results are consistent with the findings of surveys of participating employers which suggest that SYETP has been effective in increasing employment opportunities for the target group. Whether the benefits exceed the costs (the current subsidy rate is $75 per week for Standard SYETP) cannot be determined from this analysis. The issue raised is whether targeted employment subsidies might be used to a greater extent for other disadvantaged groups. Given the strong tradition of comparative wage justice in Australia, an approach that provides differential costs to employers while maintaining the existing wage structure has much to commend it.


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1. INTRODUCTION

The widespread use of employment subsidies to expand employment opportunities for members of high-unemployment groups has raised a number of important issues concerning their effects on the eligible groups and on the remainder of the population. In the design, implementation, and assessment of targeted employment subsidies, two key questions are: To what extent does a subsidy result in higher employment and lower unemployment levels for the target group? To what extent are these gains at the expense of lower employment and higher unemployment for others? Considerable effort has gone into attempts to design and implement subsidies in ways that maximise net impact, minimise windfall to participating employers, and minimise inter-group substitution.

1. The issues addressed here, as well as many others, have been well-conversed in Haveman (1982), Haveman and Palmer (1982), Palmer (1978), and Solow (1980).

2. For example, amendments to the American Targeted Jobs Tax Credit (TJTC) were enacted in 1981 to restrict retroactive certification of eligible workers and to exclude non-disadvantaged cooperative education students. In each case because it was believed that employers would have hired the subsidised workers in the absence of the subsidy.
Supporters of targeted subsidies argue that in principle they can be an effective means of improving labour market opportunities for disadvantaged groups. They lower the relative cost of employing members of the eligible population, thereby inducing firms to provide them with work experience. This may be desirable on equity or on human capital investment grounds even if some or all of the jobs would otherwise have been held by non-disadvantaged workers. Moreover, under certain conditions, induced changes in the distribution of employment and unemployment in favour of high-unemployment groups can enable a lower aggregate unemployment rate to be achieved for a given rate of inflation or provide more employment per dollar of government expenditure than could be achieved through general fiscal stimulation.

Opponents argue that, at least in the way that targeted subsidies actually operate, these benefits are not achieved. For example, O’Neill (1982) contends that the experience with the American Targeted Jobs Tax Credit demonstrates that narrow socioeconomic targeting criteria make it very difficult to implement an effective program. A number of other studies of this subsidy have also emphasised the

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2. Solow (1989, p.140), for example, points out that, at least in principle, private sector employment subsidies might help members of a disadvantaged group to gain a foothold in the regular job market.

3. The potential impact of targeted subsidies on the NAIRU has been modelled by Baily and Tobin (1977).


Minister for Employment and Industrial Relations (1983), Department of Employment and Industrial Relations Programs, 1983-84 (Canberra: Commonwealth Government Printer).


difficulty of inducing firms to participate. It has been argued that targeting, per se, signals potential employers that there is something wrong with the subsidy-eligible job-seeker. As a consequence, many employers simply will not participate and those who do will often be the ones who have jobs that they would have filled with subsidy-eligible persons anyway. That is, participation will be low and windfall to employers will be high. Moreover, where the subsidy does influence firms to substitute subsidised workers for others, the losers may be persons who are also disadvantaged, though not meeting all of the eligibility guidelines.

This debate has been hampered by the absence of convincing estimates of the actual impacts of specific subsidy programs. In the U.S., where much of the discussion has taken place, the one point that is not in doubt is that the Targeted Jobs Tax Credit and its predecessor targeted programs have not been used very much. Studies suggest that low utilisation is due to lack of employer knowledge and enthusiasm, lack of marketing by the responsible government agencies, and possibly lack of

5. The U.S. Department of Labor sponsored a major field study of the 1980-81 experience in implementing TJTC, under the direction of Randall Ripley of Ohio State University [Ripley, et al (1982).] Among its findings were that government agency staff tended not to market the subsidy very aggressively and that the majority of certifications were issued retroactively. Hamermesh (1978) contends that the income criterion used to determine eligibility stigmatised them, thereby discouraging some eligible persons from participating and discouraging employers from hiring them. Bishop (1982, p.206) argues that low participation was a result of lack of awareness of the subsidy by most employers, a stigma effect, and inability of employers to determine who is eligible.
interest on the part of the eligible population as well. Its small size, relative to the size of the total number of eligible persons, and complicated eligibility criteria preclude direct estimation of the program's impact on eligible and ineligible groups. Attempts to infer from employer surveys the extent to which subsidised employment results in net gains to the eligible population and losses to the ineligible population are discussed below.

Since 1976, Australia has also had a targeted employment subsidy program. The Special Youth Employment Training Program (SYETP) provides subsidies to employers to induce them to hire long-term unemployed youth, mainly teenagers. Between 1978 and 1983, the average number of teenagers whose employment was being subsidised through SYETP was 13,500, which equals about 1.7 percent of the teenage labour force in Australia and 9.3 percent of average teenage unemployment. The subsidy participation levels have fluctuated widely, peaking in August

6. It is difficult to estimate the actual participation rate in TJTC because the size of the eligible population is not known. The main eligible groups are economically disadvantaged persons between the ages of 18 and 24; others eligible under current legislation include economically disadvantaged Vietnam-era veterans, ex-convicts, and cooperative education students and recipients of certain income assistance programs. In a recent document prepared by the U.S. General Accounting Office (1983), it was reported that about 250,000 certifications were issued in fiscal year 1982, of which 96,000 were for economically disadvantaged young people; they estimate that this accounted for 3.7 percent of all new hires of eligible youth in that period and 5.3 percent of full-year equivalent new hires. This is consistent with other studies that have found that only a minority of employers are even claiming credit for the eligible workers that they have hired.


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1979) at 34,000 teenagers; this equalled 4.5 percent of the teenage labour force, 26.7 percent of teenage unemployment, and 51.5 percent of all teenagers unemployed for at least 13 weeks in that period.

The purpose of this paper is to estimate the direct impact of Australia's targeted employment subsidy program on the eligible population and on young people not eligible for the subsidy. The specific questions which we attempt to answer are: Has the subsidy resulted in less long-term unemployment of young people than would otherwise have been incurred? If so, have the long-term unemployment reductions been achieved at the expense of increases in short-term youth unemployment? What has been the net impact on youth unemployment rates? Up until now, the only estimates of these impacts have been based on surveys of participating employers. These suggest that about a third of the people hired through SYETP have been net additions to employment, with the majority of the other positions going to subsidised workers at the expense of 'more experienced' workers.

The methods used here are quite different from those used to obtain the employer survey-based estimates. Our approach involves time series analysis of group-specific unemployment rates in which the number of

7. By way of comparison, the 36,000 disadvantaged youths hired in fiscal year 1982 in the American program equalled about 0.5 percent of the age 18-24 labour force and less than 4 percent of youth unemployment.

subsidised workers in the group is one of the explanatory variables. The size of, and fluctuations in, subsidy participation rates in Australia appear to make this a feasible approach.

Our results are consistent with a priori theory and with the qualitative findings of the employer surveys. Higher subsidy participation is associated with lower rates of long-term unemployment for young people. Some of this is at the expense of increased short-term unemployment, so that the net impact on youth unemployment rates is less than the program’s impact on long-term unemployment. Nonetheless, our estimates indicate that the subsidy is not simply reshuffling the youth unemployment queue.

The plan of the paper is as follows: Part II identifies the major research issues involved in estimating net impact and substitution effects, summarises the approaches used in previous studies, and introduces our approach. Part III briefly discusses the characteristics of SYETP and the Australian labour market most relevant to our analysis. In the main section, Part IV, the regression equations are specified and the estimates are reported and interpreted. Concluding comments are made in Part V.

targeted employment subsidies can work in Australia. Given the strong tradition here of comparative wage justice, an approach that provides differential costs to employers while maintaining the existing wage structure has much to commend it.
mind had been that it was merely causing employers to delay hiring short-term unemployed teenagers until they satisfied the eligibility criterion. That suspicion is now lessened.

The apparent success of targeted employment subsidies in increasing employment opportunities for long-term unemployed people raises the issue of whether this approach would be suitable for other disadvantaged groups in Australia. In principle, targeted subsidies provide one means of introducing greater flexibility into Australia's wage system, by lowering the effective cost of employing eligible workers at the award wage. Small numbers of Aboriginals and disabled persons have participated in subsidy schemes similar to SYETP and, in 1983, an adult wage subsidy scheme was introduced to induce employers to hire long-term unemployed adults. The effectiveness of these schemes is not known. Targeted employment subsidies can be expensive -- the subsidy under standard SYETP is currently $75 per week, which is about half of the average teenage wage -- although there may be offsets to the government from reduced transfer payments and higher tax revenues. The policy questions are whether the benefits exceed the costs and whether there are more cost-effective methods of achieving the objectives. The results of this study at least suggest that

II. METHODS OF ESTIMATING A SUBSIDY’S IMPACTS

Targeted employment subsidies can increase the employment of the eligible population by lowering the cost of their employment, as viewed by potential employers. Assuming the demand for that group's labour has the normal properties, one result of a subsidy must be to increase the group's employment and/or to increase its earnings (by increasing the number of hours worked or the hourly compensation). Unless the group's employment gains are matched by labour force participation increases of the same magnitude, group unemployment will fall. There are many different ways of designing and implementing a targeted subsidy, but they all share these characteristics.

Assessment of the cost-effectiveness of a subsidy needs to encompass, among other things, the long-term consequences of the subsidised work experience on the participants' earnings and on the earnings of people who were displaced by the participants; the subsidy's effects on the economy's total employment, output, productivity, and inflation during the subsidy period and beyond; and the level of public expenditures involved in achieving these impacts, net of offsetting savings (e.g., in transfer payment), and the value of alternative uses of these funds.

The critical initial step in such an assessment is the estimation of the magnitudes of the employment responses induced by the subsidy. If, for example, there are no changes in the employment of the target group generated by the subsidy, then questions about the long-term effects on

41. In 1983-84, it is estimated that 4,700 Aboriginals, 2,850 disabled persons, and 900 "special needs clients" (e.g., ex-prisoners and refugees) will participate in special training programs, including wage subsidies; another 2,850 are expected to participate in the Adult Wage Subsidy Scheme (Minister for Employment and Industrial Relations [1983], p.29).
their employability and about inter-group substitution need not be asked. Similarly, the case for using targeted subsidies as a means of lowering the nonaccelerating inflation rate of unemployment (NAIRU) or of cheating the Phillips curve rests on their ability to change the structure of the labour market.

There is reason to believe that the existence of a subsidy can have a wide range of effects on the labour market and on the workings of the entire economy. Ideally, one would like to know what the economy would look like with and without a particular subsidy. This is the classic program evaluation issue. One way of addressing it is by introducing a characterisation of the program into a general model of the economy or, more narrowly, of the labour market and solving for the subsidy's effects by analysis or simulation. A critical set of parameters needed to use this approach is the elasticity of demand for the eligible population and the labour-labour substitution elasticities between the eligible population and other groups. There is an extensive literature on labour demand elasticities in the U.S. [Many of these studies were reviewed by Hamermesh (1976) and by Hamermesh and Grant (1979)]. These are directly relevant to the estimation of the potential impacts of a subsidy or other cost reduction in which the eligibility criteria correspond to the categories of labour that can be delineated in a production function. For example, they have been used in the U.S. to event is refuted by our analysis. Until now, the only estimates of SYETP's direct impacts were based on employer surveys. The estimates reported in this paper are based on entirely different data and methods. Since each approach has its own set of limitations, it is useful to have both. Both sources suggest that the subsidy is, indeed, reducing unemployment among the eligible population and that that reduction is not totally at the expense of other young people. If anything, the results reported here suggest that the program may be more successful than is indicated by the employer surveys. However, given the sensitivity of the estimates to our specifications and the likelihood that improvements in the estimation techniques would generate different results, I certainly would not stake much on the point estimates themselves.

The empirical analysis was limited in a number of dimensions. An important one to bear in mind is that, since the aggregate unemployment rate was one of the explanatory variables, no estimates can be derived about the impact of the subsidy on that rate. The "reshuffling" that was being estimated was strictly within the youth labour force itself. Although the reason for this restriction was methodological, it does have some virtue for policy analysis. First, it seems quite reasonable that the group closest to the eligible population in the eyes of prospective employers consists largely of other young people who happened to be ineligible. Second, it may be of some interest to know whether teenagers as a group benefit from a subsidy aimed at one part of this group. Certainly a lingering suspicion about the subsidy in my
V. CONCLUSION

The issues raised by O'Neill, Haveman, and others concerning the net impacts of targeted employment subsidies and the incidence of the gains and losses are central to their assessment. If an employment subsidy does not increase the employment of members of the eligible population, it has failed. If it does so at the expense of others, then it is important to identify the losers in order to judge whether the gains to the target group are worth the cost.

The Australian experience demonstrates, at a minimum, that it is possible to induce employers to hire members of a disadvantaged group via a targeted employment subsidy. Unlike the American experience with the Targeted Jobs Tax Credit, large numbers of employers have opted to participate. The eligibility criteria are different, but it is not obvious whether labelling someone as eligible because they have been unable to find a job for four months is any less damaging than an eligibility criterion based on family income. There are reasons, especially on equity grounds, why one might well prefer a family income criterion.

The hypothesis that Australian employers are merely claiming the subsidy for the employment of persons whom they would have hired in any

40. The option of including income as an eligibility criterion in SYETP or other Australian employment and training programs is discussed in Smith (1983b).

simulate the impacts on youth employment of changes in minimum wage legislation. In order to use them for estimating the impacts of employment subsidies, a number of additional simplifying assumptions regarding eligibility criteria and other terms need to be made. Several authors [e.g., Baily and Tobin (1977) and Johnson and Blakemore (1979)] have estimated the potential impact of employment subsidies, including public sector job creation programs, on aggregate inflation-unemployment relationships. However, in each case, no attempt was made to model the characteristics of an actual subsidy. The literature on labour-labour substitution in Australia is much smaller and there has been no attempt to model Australian employment subsidies in this manner.

If one focuses on the immediate employment and unemployment effects of a subsidy, the research issues can be considered within the following framework. Consider a labour market in which there are two categories of labour: the employment of the first, denoted by the subscript e, provides a subsidy to employers and the employment of the second, denoted by the subscript n, does not provide a subsidy. Let E

9. Much of this literature is reviewed in Brown, Gilroy, and Kohen (1981).

represent a group's employment level, $S$ represent the level of subsidised employment, and $X$ represent the set of other variables that influence the employment of each group. Then

$$E_e = \beta_{1e}S + \beta_{2e}X$$

and

$$E_n = \beta_{1n}S + \beta_{2n}X,$$

where, for ease of exposition, the relationships are assumed to be linear and the disturbance terms (not shown) assumed to be random with zero means and constant variances.

The key questions are the values of the parameters $\beta_{1e}$ and $\beta_{1n}$. The former depicts the proportion of subsidised jobs that result in net additions to the eligible population. If the program has been designed and implemented in such a way that all subsidised employment translates into employment gains for the eligible group, then $\beta_{1e}$ would equal unity. If the program is either a complete windfall to participating employers or the gains to the eligible population from employment by those firms are offset by employment losses in other firms, then $\beta_{1e}$ would equal zero. In general, one would expect the impact to be between these extremes. Likewise, if the subsidy generates employment gains that are not at the expense of lost employment for the ineligible population, then $\beta_{1n}$ would be zero. If there is substitution, then $\beta_{1n}$ employer survey would overstate the impact (unless the nonparticipating firm had filled the vacancy with a similar youth). It may be that our method misses this too because such offsetting impacts might not occur in the same month. However, experimentation with lagged subsidy terms in the equations did not change the impact estimates.
estimate for teenagers of one-half. If "more experienced" in effect means people who had not been unemployed as long, then our point estimate that two-thirds of the subsidised employment is associated with lower medium- and long-term unemployment is comparable.

The second survey covered employers who had participated in the subsidy program during late-1981. Responses of private employers-only indicated that only 19 percent of the subsidised placements represented net employment gains. However, in this period there were also State government employers participating, with almost 30 percent of them reporting that the subsidised workers were net additions. Including the latter group, the total employment impact estimate is raised to almost 30 percent, similar to the previous survey finding. Information is not available on substitution patterns.

We expected the net impacts of the subsidy estimated in this paper to be smaller than those estimated from the employer surveys. Instead the estimated net impact is larger, although the difference is not significant. The survey-based estimates were expected to be larger because they do not capture any offsetting impacts on the eligible population or on young people in general. For example, if a long-term unemployed teenager were hired by a participating firm as a result of the subsidy, but otherwise would have been hired by another firm, the

would be negative; with complete substitution, its absolute value would equal β. In the latter case, the subsidy would have resulted in queue reshuffling, with no gains in aggregate employment. If we assume away labour force participation responses to the subsidy, then Equations (1) and (2) can be used to depict its impacts on the unemployment levels of the two groups, with opposite signs expected.

In the absence of the ability to estimate β and β from a model that would take into account all of the indirect implications of the existence of a subsidy on a labour market, any technique will, at best, yield estimates of partial impacts. Nonetheless, these can be quite useful as a means of judging whether the immediate direct consequences of a subsidy are at least increasing employment and reducing unemployment levels of the eligible population and of indicating whether these gains are largely the result of intergroup substitution.

The most frequently used method of estimating β and β is by asking employers of subsidised workers what they would have done in the absence of the subsidy. For example, O'Neill (1982) reports that a

11. Haveman (1982) summarizes the empirical studies of the effectiveness of subsidies in various OECD member countries, grouped according to whether they were mainly based on interviews, statistical analyses, or other methods. He tentatively concludes: "The net jobs created by marginal, targeted employment subsidy programmes are likely to range from 20-50 per cent of the gross employment effect, at least in the first few years of programme operation." (p. 46) For criticism of some of these studies, see Schwanze (1980).
mail survey of a sample of firms that participated in the Targeted Jobs Tax Credit program found that, among the 720 usable responses, about 26 percent of respondents claimed that their use of the subsidy would increase their total employment level and 41 percent said that they substituted some eligible workers for similar nontarget workers. If these estimates are additive and if each respondent hired the same number of subsidised workers, then these responses would translate into an estimate of .67 for $b$ and -.41 for $\beta$. A recent OECD report [OECD (1982), Part 3] provides estimates of a number of employment subsidy programs, largely based on employer surveys.

There are a number of possible problems with the survey approach. Perhaps the most serious is that there may be an upward bias on $b$ and a downward bias on the absolute value of $\beta$, resulting from respondents answering in ways that they believe make them look best; this can be especially serious if one of the conditions of accepting the subsidy were that the subsidised employment be for a job that otherwise would not have existed. Another potential source of bias in the same direction is that the estimates from surveys of participating employers take no account of the indirect impacts on other firms. If, for example, the eligible worker would have otherwise been employed

interesting to compare these estimates with our own. Each has its own limitations. An important advantage of considering both sets of estimates is that they are based on entirely different methodologies and datasets; that is, they are independent.

The results of two employer surveys are available. The first was conducted in late-1979 and covered about 20 percent of employers who had hired SYETP subsidised workers in April 1979. This was during a period in which participation was quite low and operating guidelines were in force intended to minimise windfall. Employers were asked how the vacancy filled by the subsidised worker arose and whether, in the absence of the subsidy, they would have filled the position with someone who was more experienced, older, or not have offered it to anyone.

Thirty-three percent responded that they would not have offered the position in the absence of the subsidy; 6 percent that they would have offered it to someone similar; 52 percent to someone more experienced; and 10 percent to someone older. These responses are open to various interpretations and are not directly comparable to the categories used in our analysis. The best estimate of the net impact on youth unemployment from these responses is that one-third of the subsidised jobs were associated with lower unemployment, compared with our point

12. These estimates are provided as illustrations only. The information provided by O'Neill is not sufficient to make actual estimates.

38. Department of Employment and Youth Affairs (1980b), pp.26-29. One of the survey questions was: "If a SYETP trainee were not available, would you have filled the position with a worker who was - More experienced? Older? Would you have not offered the position?"
the program: during 1978–83, the average participation level was only 3,900, which was 0.4 percent of the young adult labour force.

**Comparison with Employer Surveys**

Our estimates indicate that SYETP has been reducing the long-term unemployment among young people and that very little of this reduction has been achieved at the expense of increased short-term youth unemployment. The point estimates in our main specification suggest that a one point increase in the percentage of teenagers is associated with a half-point reduction in the long-term (26 weeks and over) teenage unemployment rate; a small estimated reduction in the medium-term rate is offset by a comparable increase in the short-term rate, so that the net impact on teenage unemployment equals the impact on teenage long-term unemployment. For the reasons stated above, the confidence bands that one should put around these estimates are wider than the ones indicated by the statistical significance tests.

The only other estimates of the immediate impacts of the subsidy available are from surveys of participating employers. It is elsewhere, the actual impact on the eligible population would be smaller. Other problems that might exist are the inability of respondents to predict what they would have done in the absence of the subsidy and/or inadequate specification of the counterfactual on the questionnaire; it is not clear whether the resulting errors would bias the estimates.

Another approach that has been used to estimate the employment impacts of various employment subsidies involves regression analyses in which the specific subsidy program is included in an equation. The technique used in this paper, presented in Part IV, is of this sort. However, the studies to date have all focused on the net impacts of subsidies, whereas the present research attempts to estimate the incidence of gains and losses as well.

Studies of the American New Jobs Tax Credit (a nontargeted subsidy) by Bishop and Haveman (1979) and Perloff and Naccher (1979), for example, each provide estimates of its net employment impacts. The former regressed monthly employment and hours series in the construction and retailing industries on input prices, other variables, and an estimate of the proportion of firms that knew about the subsidy; large employment impacts for these industries were estimated. The Perloff-Naccher study, also using the knowledge-of-subsidy variable, found that firms which knew about the subsidy had larger increases in employment than other firms; a multinomial logit analysis indicated that firms that had not been growing or were growing slowly were more likely to use the subsidy to increase their employment. Neither study

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37. The main estimates, comparable to the ones for teenagers reported in Table 1, indicated similar program impacts, but generally not statistically significant: the point estimates of the program participation parameter in the young adult unemployment rate equation and in the long-term unemployment equations were, respectively, -.25 and -.29. Using the alternative cyclical variable, comparable to the teenage results reported in Table 2, the program parameter estimates were mostly significant, but unreasonably large: -.46 and -.90, respectively. Given this degree of sensitivity, one cannot have any confidence in the estimates.

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of the New Jobs Tax Credit attempted to estimate the impacts of the 
subsidy on the level or distribution of unemployment.

Iterative estimation in which the observation period was extended one 
month at a time demonstrated, for example, that the program parameter 
estimate in the teenage unemployment rate equation settled down to 
between .5 and .6 within 28 months and was little influenced by the 
introduction of subsequent observations. By contrast, iterative 
estimation begun in 1979 did not produce stable program impact 
estimates. It should be emphasised that in every estimation period 
tried the qualitative findings were confirmed, although the estimates 
were not always statistically significant; higher subsidy participation 
is always estimated to generate lower teenage long-term unemployment. 
Since the specific point estimates are sensitive to the choice of 
estimation period, one should be wary of using them to forecast the 
impacts of future changes in program participation.

Attempts to estimate the impact of the subsidy on the unemployment 
rate and duration distribution of persons in the 20-24 age group 
yielded results that were more sensitive to specification changes and 
were less significant than were found for teenagers. This is probably 
due to the very small number of young adults who have participated in 

13. Kopits (1978) simulates the employment impacts of a French subsidy 
from output and wage elasticities he estimated for eight major 
industries prior to the introduction of the subsidy.

36. I am grateful to Adrian Pagan for his advice and for the use of his 
computer programs.
unemployment, with less displacement, than in either the period of
initial program buildup or the more recent period of expansion. The
results are reported in Table 3. The cyclical indicator used was the
aggregate unemployment rate; thus, these estimates should be compared
with those in Table 1.

Once again, the overall explanatory power of the equations is quite
high, largely associated with the seasonality. For this shorter period
(44 observations), serial correlation was much less of a problem. The
coefficients on the aggregate unemployment rate are, with one exception,
highly significant. Somewhat higher cyclical sensitivity is estimated,
with a smaller share of it associated with variation in long-term
unemployment.

The major finding is that, as hypothesised, the absolute value of the
point estimate on the subsidy term is larger in the teenage
unemployment rate equation (0.9 vs. 0.5), although it is only
marginally significant. This pattern is repeated for most of the
duration categories, with only the coefficient in the long-term
unemployment rate equation being significant.

Further investigation of the robustness of our estimates revealed
that the estimated responsiveness of teenage unemployment and its
duration components is mainly determined by the responses to the sharp
fluctuations in program participation that occurred during the first
two years of the full estimation period. Recall that the variations
that occurred there were much larger than any that have occurred since.

III. AUSTRALIA'S TARGETED SUBSIDY

The Special Youth Employment Training Program (SYETP) was introduced
by the Australian Government in late-1976 as a means of helping
unemployed school-leavers find employment. Throughout most of its
life, it has operated as a hiring subsidy to induce employers (mostly
private firms) to take on young people who had recently experienced
substantial unemployment. It's history and terms have been fully
described elsewhere [Hey, (1983)]. This discussion will focus on the
characteristics of the program and of the labor market environment in
which it has operated that are most pertinent to our analysis.

Most participants have been in "Standard SYETP". Since early in this
program's history, eligibility has been limited to persons between the
ages of 15 and 24 who have been unemployed and away from full-time
education for at least four of the last 12 months. Eligible youths are
referred to employers by the Commonwealth Employment Service, which is
responsible for administering the program. An employer who fulfills
the conditions imposed by the Employment Service receives a flat-rate
subsidy for each week's wages paid, up to a maximum of 17 weeks per

14. Among the other conditions are that the employer agree to pay award
wages and that an individual training plan be developed for the new
employee. Since "training" can include normal orientation and the
"plan" can be quite simple, this condition is not considered to be a
costly one.
Australia. There is also a 'Commonwealth SYETP', which reimburses government agencies for 100 percent of the participants' wages during the 17 week subsidy period and an 'Extended SYETP', begun in 1981, providing a larger subsidy for up to 34 weeks to employers who hire young people who have been unemployed at least eight months.

Although employers are permitted to hire people through age 24, in practice most subsidised workers have been teenagers, with the majority of them being under age 18. This appears to be due to the subsidy being a flat rate, rather than a percentage of wages paid, and to the practice in Australia of determining starting salaries for a specific job according to age.

As indicated in Part I, the number of people whose employment has been subsidised through SYETP has varied considerably. Monthly data on subsidised employment levels are available from 1978 through 1983.

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15. Extended SYETP provides $100 per week for the first 17 weeks and $75 per week for the next 17 weeks.

16. A brief description of wage-setting institutions in Australia is provided below. The incentives to use the subsidy for low-wage, high-turnover jobs, disproportionately held by young teenagers, are discussed by Hoy (1988) and Smith (1983a).

17. I am grateful to the Department of Employment and Industrial Relations for providing me with these unpublished data for this study.

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Table 3

Estimates of the Impact of the Subsidy on Teenage Unemployment

Jan. 1979 - Aug. 1982

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unemployment Rate</th>
<th>Long-term Rate (26 + wks)</th>
<th>Medium-term Rate (13-26 wks)</th>
<th>Short-term Rate (&lt; 15 wks)</th>
<th>Unemployment Rate (26-39 wks)</th>
<th>Unemployment Rate (39 + wks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidy Participation Rate (t-Statistic)</td>
<td>-0.90 (-1.81)*</td>
<td>-0.77 (-2.23)*</td>
<td>-0.14 (-0.62)</td>
<td>0.03 (0.07)</td>
<td>0.09 (0.43)</td>
<td>-0.85 (-2.78)**</td>
</tr>
<tr>
<td>Aggregate Unemployment Rate (UR) (t-Statistic)</td>
<td>2.57 (7.31)**</td>
<td>1.12 (4.02)**</td>
<td>0.64 (3.41)**</td>
<td>0.84 (2.70)**</td>
<td>1.02 (6.10)**</td>
<td>0.10 (0.40)**</td>
</tr>
<tr>
<td>Δ UR (t-Statistic)</td>
<td>0.37 (0.58)</td>
<td>-1.33 (-2.72)**</td>
<td>0.14 (0.44)</td>
<td>1.51 (2.78)**</td>
<td>-1.24 (-4.22)**</td>
<td>-0.09 (-0.21)</td>
</tr>
<tr>
<td>Δ UR (t-1) (t-Statistic)</td>
<td>-0.49 (-0.82)</td>
<td>-1.18 (-2.56)**</td>
<td>0.50 (1.61)</td>
<td>0.15 (0.30)</td>
<td>-0.69 (-2.49)**</td>
<td>-0.49 (-1.19)</td>
</tr>
<tr>
<td>Δ UR (t-2) (t-Statistic)</td>
<td>-0.65 (-1.54)</td>
<td>-0.65 (1.10)</td>
<td>0.51 (0.55)</td>
<td>0.26 (0.94)</td>
<td>-0.24 (-0.94)</td>
<td>-0.41 (-1.09)</td>
</tr>
<tr>
<td>Trend (t-Statistic)</td>
<td>-0.05 (-4.56)**</td>
<td>-0.02 (-3.32)**</td>
<td>-0.02 (-5.71)**</td>
<td>0.01 (0.91)</td>
<td>-0.01 (-1.61)</td>
<td>-0.01 (-2.62)**</td>
</tr>
<tr>
<td>Summary Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (seasonal)</td>
<td>2.18</td>
<td>28.68**</td>
<td>17.09**</td>
<td>18.09**</td>
<td>47.02**</td>
<td>7.59**</td>
</tr>
<tr>
<td>R²</td>
<td>0.96</td>
<td>0.94</td>
<td>0.97</td>
<td>0.99</td>
<td>0.97</td>
<td>0.85</td>
</tr>
<tr>
<td>D.W.</td>
<td>1.29</td>
<td>1.19</td>
<td>1.99</td>
<td>1.46</td>
<td>1.70</td>
<td>1.39</td>
</tr>
</tbody>
</table>
slightly worse. The significance of the cyclical variable itself remains very high, though generally smaller.

The important differences are in the estimates of the impact of the subsidy participation rate. In this specification, the estimated impacts are uniformly larger: the net reduction in the teenage unemployment rate associated with a one point higher subsidy participation rate is 0.8, rather than 0.5, and is not significantly different from unity. Likewise, the estimated reductions in long-term and medium-term unemployment are larger and the increase in short-term unemployment small (and insignificant).

There are (at least) two implications that can be drawn from the differences between the impact estimates in Tables 1 and 2, and from the effects of adjusting for serial correlation. One is that the general result that the program reduces long-term unemployment of teenagers without significantly increasing short-term unemployment for teenagers is not shaken. The other, less sanguine, implication is that our point estimates are rather sensitive to seemingly minor changes in the estimating equations.

The preceding results are based on regressions run for the entire period for which observations are available. The next issue addressed is whether the estimated relationships are stable. A preliminary test of the stability of our estimates was to rerun our equations for the period between January 1979 and August 1982. The hypothesis is that during this period there would have been larger impacts on teenage

During the earlier start-up phase, participation appears to have been quite small. These, together with national unemployment data from the Australian Bureau of Statistics, described below, are the major data sets for our regression analysis in Part IV. Figure 1 illustrates the fluctuations in subsidy participation. The solid line depicts the level of subsidised teenage employment as a percentage of the teenage labour force. The broken line (right-hand scale) shows the teenage unemployment rate during this period for comparison.

Several observations about the variations in subsidised employment can be made. First, participation has a strong seasonal variation, but no simple relation to teenage unemployment. The Pearson correlation between the teenage subsidy participation rate and the teenage unemployment rate was insignificant. A preliminary regression of the participation rate on the teenage unemployment rate, seasonal dummies, and a linear trend estimated a small positive coefficient on the unemployment term; the most important terms were the seasonals, with program participation being lowest in the summer months and peaking in July and August. These estimates would be consistent with the program eligibility criteria for school-leavers: the school year ends in December, so that they would not be eligible any earlier than April of

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18. The total number of SYETP-subsidised workers gradually increased throughout 1977, remaining below 15,000 until toward the end of the year (Hoy, [1985], Figure 1).

19. Even with monthly dummies, only 40 percent of the variation in the subsidy rate was accounted for.
of the $B$ parameters no long sum to $1$, making them more difficult to interpret. With these estimates, the overall impact of a percentage point increase in the subsidy participation rate would reduce teenage unemployment by .24, with almost half the gains to the long-term and medium-term unemployment categories being offset by an increase in short-term unemployment. Further analysis of the underlying causes of the serial correlation is required.

Estimates of similar equations, with the aggregate unemployment rate replaced by the unemployment rate of adults in the full time labour force, are reported in Table 2. There is no strong reason for preferring one indicator of labour market tightness over the other. The aggregate rate includes the teenage unemployed themselves, which should produce an upward bias to the estimate on the unemployment term itself, but need not affect the estimate of the subsidy's impact. The adult rate has the advantage of not including the dependent variable within it, but may not be as good an indicator of the variations in the relevant labour market. In any event, the overall goodness of fit was about the same in this set of estimates as it was in the set reported in Table 1. The coefficients of determination tend to be slightly smaller in this specification and serial correlation tends to be

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35. The program parameter estimates in the long-term, medium-term, and short-term unemployment equations are, respectively, -.27, -.14, and .17, each with t-statistics not significantly different from zero. However, adjusted for heteroscedasticity, the t-statistics are all significant at the .05 level: 1.39, 2.52, and 1.62, respectively.
percentage with between 13 and 26 weeks of unemployment. The point estimate for the impact on the short-term unemployed, .16, was not quite significant, using the conventional t-statistic. Adjusted for heteroscedasticity, each program parameter estimate was significant. Together, these estimates indicate that the subsidy is generating a significant reduction in teenage unemployment, with only about a quarter of the direct gains being offset by higher short-term unemployment. As one would expect, the subsidy’s benefits are even more concentrated on the long-term unemployed than is the case with aggregate demand stimulation.

The major estimation problem revealed in Table 1 is the substantial extent of serial correlation, as indicated by the low Durbin-Watson statistics. Although this should not bias the parameter estimates themselves, high serial correlation would result in overstatement of the t-statistics. To explore this problem further, a first-order serial adjustment was specified and the equations reestimated. The estimate of the subsidy program parameter in the first equation was not affected; a one percentage point high subsidy participation rate was still associated with a .49 point reduction in the teenage unemployment rate, still significant at the .99 level. However, the new estimates

34. The parameter estimates in the first two rows of Table 1 indicate that it would take a sustained reduction in aggregate unemployment of about a quarter of a percentage point (.52/2.13) to achieve the same impact on the teenage unemployment rate as would be achieved from a one point higher subsidy participation rate. About 60 percent of the gain from an aggregate reduction would accrue to the long-term unemployed, compared with 100 percent of the gain achieved from the subsidy.

the following year; program commencements peak in April and May, with high entry levels in June and July as well.

The second observation is that, apart from the seasonal variation, subsidised employment rates have fluctuated considerably, without any obvious pattern. The largest variation was the build-up that peaked in 1979, followed by a sharp contraction in 1979. This is thought to have been due to important policy changes that were announced in late-1979. Up until then, the maximum subsidised employment period had been six months and the subsidy was $67 per week; effective for commencements after August 1979, the subsidy period was reduced to four months and the subsidy amount to $45. The former change in itself would reduce the average level of subsidised employment that would correspond to a given inflow by about one-third. The combination, along with changes made in the administration of the program, probably made the program considerably less attractive to employers. Other changes that are likely to have influenced participation include the introduction of Extended SYETP in February 1981 and a liberalisation of administrative

20. In addition to the changes in terms discussed here, Ministerial statements were used to emphasise that SYETP was not supposed to be used to subsidise employment that would have otherwise occurred and new guidelines were issued to the Commonwealth Employment Service (Moy (1983)).
procedures, including the introduction of self-canvassing by 
subsidy-eligible job-seekers, in September 1982. In addition, 
throughout the program’s existence there have been a number of changes 
in policy direction that may have influenced the degree to which 
Commonwealth Employment Service staff marketed the subsidy to employers 
and, possibly, the willingness of employers to participate.

The state of the Australian labour market during this period is 
suggested by the variations in the teenage unemployment rate shown in 
Figure 1. Apart from differences in seasonality, the teenage 
unemployment rate and the aggregate unemployment rate have moved 
together quite closely during this period, as will be seen in our 
regression estimates reported in Part IV.

Finally, it should be noted that the system for determining wage 
rates in Australia is such that the implicit assumption that wages are 
determined exogenously is a reasonable one. Most wage rates are set by 
State and Federal arbitration bodies. Strictly speaking, the "award 
rates" are minima, although in practice most wages paid are at these 

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21. Up until then, referrals of subsidy-eligible job-seekers were made 
to employers by the Employment Service. Now, these job-seekers can also 
obtain a card from the Employment Service indicating their eligibility 
without being referred.

22. This is discussed in Hoy (1983).

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than zero. In other words, these estimates all suggest that a 
significant fraction of the jobs held by teenagers that are subsidised 
under the SYETP are associated with a reduction in teenage unemployment 
in the same period. The point estimate in the first equation indicates 
that five out of ten subsidised jobs either were held by teenagers who 
would otherwise have been unemployed or indirectly generated jobs for 
otherwise-unemployed teenagers. This assumes that there was no impact 
on the size of the teenage labour force. The validity of this 
assumption was confirmed by regressions in which the dependent variable 
was, alternatively, the teenage employment to population ratio and the 
labour force participation rate; the former indicated that the 
employment impact was about equal to the estimated unemployment impact 
(with the opposite sign); the latter indicated that there was no 
significant labour force impact.

Examination of the program impact estimates for the duration 
categories reveals that the estimated effects are confined to the 
long-term and medium-term unemployed, as should be the case given the 
eligibility criteria. A one percentage point higher subsidised 
employment level is associated with a .54 point lower percentage of 
teenagers with at least 26 weeks of unemployment and a .13 point lower 

33. Specifically, the coefficient on the subsidy term (the percentage 
of the teenage population whose employment was subsidised) was .37 in 
the employment equation, significant at the .99 level; in the labour 
force participation rate equation it was .07 and insignificant. The 
program’s lack of direct impact on labour force participation may be 
due to the requirement that the person must have been out of school and 
unemployed for at least four months.
flows into unemployment. Thus, these estimates suggest that aggregate stimulation of the labour market is one way of helping teenagers who would otherwise face long-term unemployment.

The parameter estimates on the unemployment change variables are also significant in the teenage unemployment rate equation, indicating that the short-term labour market adjustments of teenagers to variations in aggregate demand may be different from those of adults. For a given aggregate unemployment rate, teenage unemployment is higher if aggregate unemployment is falling. Likewise, long-term unemployment among teenagers is much higher if aggregate unemployment is declining.

The parameters of greatest interest in this study are those associated with the subsidy program variable. Recall that this variable is measured by the percentage of the teenage labour force whose employment was subsidised through the program each period. The estimated coefficient in the first equation indicates that a one percentage point higher subsidised employment level is associated with a 0.5 percentage point lower teenage unemployment rate. This is significantly different from zero and significantly different from unity. Alternative specifications of this equation provided different estimates of the coefficient, including some that were not significantly different from unity; but all were significantly greater.

Within these awards, it is common to specify a youth differential. Indeed, separate rates for teenagers by single year of age are often specified. Under these conditions, employers are likely to consider the availability of a subsidy as a temporary reduction in the cost of employing a young person at the award wage. Likewise, given the rigidities in the wage-setting mechanisms and the high youth unemployment rates prevailing in recent years, it seems reasonable to assume that there is an excess supply of youth labour available at the award wage. In this sense, the award wages play a role in the youth labour market in Australia akin to minimum wages in the U.S. In both cases, they may result in lower employment and higher unemployment. As in the literature on the American minimum wage, estimates of the importance of award wages as a cause of labour market problems are very difficult to make.

32. The higher cyclical amplitude of average unemployment duration, relative to the amplitude of unemployment inflows, was also found for the aggregate Australian labour force (Chapman and Gruen (1984)).

23. The Australian institutions are described and analysed by Mitchell (forthcoming). The specification of age-specific wages in the awards is discussed in Bureau of Labour Market Research (1983).

24. This literature, as it related to the relatively high unemployment of young people, was recently surveyed by Paterson and MacKay (1984).
IV. ESTIMATES OF THE SUBSIDY'S IMPACTS

In this part, we present estimates of the impacts of Australia's targeted employment subsidy on youth unemployment. We begin by specifying the equations and describing the data used for their estimation. Next, the regression estimates, including the sensitivity of our main results to alternative specifications and estimation periods, are reported. Finally, our estimates of the subsidy's impacts are compared with those derived from surveys of participating employers.

Specifications and Data

The eligibility criteria for SYETP restrict participation to persons under the age of 25 who have been unemployed at least 17 weeks during the preceding 12 months; the actual participation patterns are that most subsidised workers have been teenagers unemployed for at least that long immediately prior to obtaining subsidised jobs. Therefore, if the program is causing employers, in the aggregate, to employ more young people who would otherwise have continued an already-long spell of unemployment, this should be reflected in a reduction in the number

25. A survey of the characteristics of persons entering SYETP-subsidised employment in April 1979 found that 60 percent had no previous full-time work experience; these would have been mostly school-leavers who would have been required to have been jobless for four months prior to entry. About 12 percent had been unemployed less than three months immediately prior to placement; 15 percent for three to six months; and the rest (13 percent) had been unemployed at least six months [Dept. of Employment and Youth Affairs (1980b), p.13].

The results presented in Table 1 in general indicate that our simple specification accounts for variations in the teenage unemployment rate and its duration components reasonably well. Significance at the .05 or .09 levels is denoted by a single or double asterisk, respectively. The coefficients of determination are all extremely high (greater than 0.9), with much of this due to the considerable seasonality in the dependent variables. A small, but highly significant, negative trend is estimated for the teenage unemployment rate and for the duration categories between 13 and 39 weeks; given the other variables in the equation, the teenage unemployment rate is estimated to be declining by about 0.5 percentage points per year.

As expected, the most significant and important determinant of the variations in teenage unemployment rate and its duration components is the tightness of the overall labour market. A one percentage point higher aggregate unemployment rate is associated with a 2.1 point higher teenage rate. Once the new equilibrium is reached (i.e., suppressing the unemployment change variables), 62 percent (1.32/2.13) of the higher teenage rate is reflected in increased unemployment of at least 26 weeks duration, even though the long-term unemployed only account for 31 percent of total teenage unemployment during the estimation period. Only 13 percent of the increased unemployment is short-term unemployment (although this group accounts for nearly half of total teenage unemployment). This is another way of saying that cyclical variations in teenage unemployment are reflected in larger variations in the duration of average spell of unemployment than in the
Table 2

Alternative Estimates of the Impact of the Subsidy on Teenage Unemployment

April 1978 - Dec. 1983

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unemployment Rate (26 + wks)</th>
<th>Long-term Rate (13-26 wks)</th>
<th>Medium-term Rate (&lt; 13 wks)</th>
<th>Short-term Rate (26-39 wks)</th>
<th>Unemployment Rate (39 + wks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidy Participation Rate (t-Statistic)</td>
<td>-0.80 (-6.03)**</td>
<td>-0.68 (-7.84)**</td>
<td>-0.22 (-3.35)**</td>
<td>0.11 (0.94)</td>
<td>-0.31 (-5.82)**</td>
</tr>
<tr>
<td>Adult Unemployment Rate (UR) (t-Statistic)</td>
<td>2.17 (25.31)**</td>
<td>1.34 (21.50)**</td>
<td>0.59 (12.77)**</td>
<td>0.26 (3.15)**</td>
<td>0.48 (12.86)**</td>
</tr>
<tr>
<td>Δ UR (t-Statistic)</td>
<td>-1.11 (-2.85)**</td>
<td>-1.65 (-6.08)**</td>
<td>0.18 (0.90)</td>
<td>0.48 (1.32)</td>
<td>-0.51 (-3.08)**</td>
</tr>
<tr>
<td>Δ UR (t-1) (t-Statistic)</td>
<td>-1.01 (-2.56)**</td>
<td>-1.59 (-6.07)**</td>
<td>0.22 (1.15)</td>
<td>0.36 (1.04)</td>
<td>-0.32 (-2.05)**</td>
</tr>
<tr>
<td>Δ UR (t-2) (t-Statistic)</td>
<td>-1.03 (-2.59)**</td>
<td>0.005 (0.02)</td>
<td>0.72 (1.85)*</td>
<td>-0.12 (-0.69)</td>
<td>-0.91 (-3.05)**</td>
</tr>
<tr>
<td>Trend (t-Statistic)</td>
<td>-0.05 (-7.15)**</td>
<td>-0.02 (-5.09)**</td>
<td>-0.03 (-7.32)**</td>
<td>-0.002 (-0.38)</td>
<td>-0.01 (-4.64)**</td>
</tr>
<tr>
<td>Summary Statistics</td>
<td>25.96** 31.17** 44.37** 67.05** 56.26** 13.55**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (seasonals)</td>
<td>25.96**</td>
<td>31.17**</td>
<td>44.37**</td>
<td>67.05**</td>
<td>56.26**</td>
</tr>
<tr>
<td>R²</td>
<td>0.97</td>
<td>0.96</td>
<td>0.94</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>D.W.</td>
<td>0.99</td>
<td>0.94</td>
<td>1.24</td>
<td>1.15</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Of teenagers (and, to a lesser extent, young adults) unemployed for at least 17 weeks, given that the average duration of teenage unemployment during much of the period that the program has operated was above that, it was possible for employers to hire from the eligible pool without actually changing their employment patterns; if this were the case, then there would be no reduction generated by the subsidy.

Assuming that the program did induce employers to hire more long-term unemployed young people, the next question is who would be the most likely to have been displaced as a result. A reasonable hypothesis is that the people for whom long-term unemployed young people are most closely substitutable are other young people. If intra-age substitution occurs, this would be reflected in a program impact for the age group as a whole that is less than for the long-term unemployed in that age group and in an increase in short-term unemployment. That is, the queue of unemployed young people would have been reshuffled.

During the short (six-year) period for which monthly data are available on subsidy participation rates and labour force status, the major influence on youth unemployment appears to have been the state of the overall labour market, rather than any changes that would affect the relative supply of, or demand for, youth labour. Since our primary concern here is to control for non-subsidy influences on the level and duration of youth unemployment that might, by their absence, bias our subsidy impact estimates, we have opted not to attempt to specify a behavioral model.
Other influences on the level and duration composition of teenage and young adult unemployment in Australia include a wide range of factors that are likely to affect the decisions of young people to enter, remain in, or leave the labour force and particular jobs and the decisions of employers to hire, retain, or dismiss them. Past research in Australia suggests the importance of changes in the availability and amount of unemployment benefits, the availability of part-time jobs, and the wage structure in accounting for variation in the unemployment rates of young people relative to adults. In Australia, unemployment benefits are available to school-leavers without regard to previous employment experience. A substantial increase in the weekly benefit amounts in 1973 may have increased the size of the teenage labour force and thereby contributed to a rise in the ratio of teenage to adult unemployment rates. A sharp compression in the age differentials in arbitration awards between 1972 and 1974 is also thought to have led to

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27. Gregory and Duncan (1980), for example, suggest that the increased weekly benefits, combined with a 100 percent implicit tax on earnings above $3 per week, would have discouraged out-of-school youth from taking part-time jobs; as a consequence, more students entered the labour force to take these jobs.

---

**Table 1**

Estimates of the Impact of the Subsidy on Teenage Unemployment

April 1978 - Dec. 1983

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unemployment Rate (26+ wks)</th>
<th>Long-term Rate (15-26 wks)</th>
<th>Medium-term Rate (&lt;15 wks)</th>
<th>Short-term Rate (26-39 wks)</th>
<th>Unemployment Rate (39+ wks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidy Participation Rate (t-Statistic)</td>
<td>-0.52 (-5.16)**</td>
<td>-0.54 (-6.98)**</td>
<td>-0.13 (-2.27)**</td>
<td>0.16 (1.65)</td>
<td>-0.25 (-4.34)** -0.30 (-5.69)**</td>
</tr>
<tr>
<td>Aggregate Unemployment Rate (UR) (t-Statistic)</td>
<td>2.13 (29.47)**</td>
<td>1.32 (23.33)**</td>
<td>0.56 (13.51)**</td>
<td>0.29 (3.91)**</td>
<td>0.47 (13.13)** 0.84 (14.26)**</td>
</tr>
<tr>
<td>Δ UR (t-Statistic)</td>
<td>-0.55 (-1.12)</td>
<td>-1.63 (-6.65)**</td>
<td>0.10 (4.11)**</td>
<td>1.26 (-2.10)**</td>
<td>-0.33 (-2.02)** -1.31 (-5.06)**</td>
</tr>
<tr>
<td>Δ UR (t-1) (t-Statistic)</td>
<td>-0.62 (-1.95)**</td>
<td>-1.57 (-6.36)**</td>
<td>0.41 (2.25)**</td>
<td>0.53 (1.71)**</td>
<td>-0.32 (-2.02)** -1.26 (-4.84)**</td>
</tr>
<tr>
<td>Δ UR (t-2) (t-Statistic)</td>
<td>-0.80 (-5.10)**</td>
<td>-0.80 (1.61)</td>
<td>0.50 (0.79)</td>
<td>0.25 (0.70)</td>
<td>-0.11 (0.70) -0.68 (-2.52)**</td>
</tr>
<tr>
<td>Trend (t-Statistic)</td>
<td>-0.04 (-6.71)**</td>
<td>-0.01 (-3.49)**</td>
<td>-0.02 (-7.05)**</td>
<td>-0.001 (-0.25)</td>
<td>-0.01 (-3.73)** -0.01 (-1.05)**</td>
</tr>
</tbody>
</table>

**Summary Statistics**

- F (seasonals) 11.42**
- \( R^2 \) 0.98
- D.W. 0.95

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28.
disaggregated. Nonseasonally adjusted data were used, given that the
subsidy variable is not adjusted.

Estimates

Estimates of equation (3) for teenagers are reported in Table 1. Experimentation with alternative specifications indicated that some of our results were sensitive to the choice of labour market tightness indicator. Specifically, in equations in which the aggregate unemployment rate is replaced by the unemployment rate of adults in the full-time labour force, the estimated impacts of the subsidy itself tend to be larger. The results of this alternative specification are reported in Table 2.

Our main results are based on estimation for the entire period for which program and labour force data are available, February 1976 through December 1989. Given the lag structure, most of the regressions were run from April 1978. The stability of the relationships over this six-year period is discussed later.

higher teenage unemployment. These changes occurred prior to our estimation period.

For each age-duration group, the following equation was estimated with OLS:

\[ \text{UR}_{id} = \kappa_{id} + \beta_{1id} \text{SR}_1 + \beta_{2id} \text{UR} + \beta_{3id} \Delta \text{UR} + \beta_{4id} \Delta \text{UR}_{t-1} + \beta_{5id} \Delta \text{UR}_{t-2} + \beta_{6id} T + \text{seasonals} + \epsilon_{id} \]

where \( \text{UR} \) is the total unemployment rate of the \( i \)th age group (15-19 and 20-24) and the subscript \( d \) indicates a duration category (less than 13 weeks, 13-26 weeks, 26 weeks and over, 26 to 39 weeks, and 39 weeks and over). The total unemployment rate and each of the duration categories are expressed as percentages of the group’s labour force. \( \text{SR} \) is the percentage of the \( i \)th group’s labour force whose employment \( i \) is subsidised; UR is the unemployment rate of all labour force participants; and \( T \) is a linear time trend that takes the value of one in February 1978 and increases by one each month. The unemployment rate change terms are included to reflect differences in adjustment.

The main problem encountered in using the population survey data for the present study is small sample size. The mean levels of teenage and young adult unemployment during the estimation period were 145,000 and 102,000 respectively; the numbers unemployed at least 26 weeks were 45,000 and 37,000. The standard errors of estimate for survey estimates of this magnitude are equal to between 5 and 6 percent of the estimates; for example, the standard error of an estimate of 50,000 is 2,900; for an estimate of 100,000 it is 3,900; and for an estimate of 150,000 it is about 4,500 (ABS (1983), Technical Note). These only reflect sampling errors. Issues raised by Summers (1981) concerning non-sampling errors in the Current Population Survey may be applicable to the Australian survey as well.

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20. There is no single satisfactory measure of relative award rates. One illustrative statistic derived from a sample of 13 awards is that the ratio of award wage rates for persons age 17 relative to adults increased from .441 in January 1972 to .501 in July 1974 (Bureau of Labour Market Research (1983), p.53).
paths between the aggregate unemployment rate and the teenage rate and its duration components. The trend term is included to capture any omitted secular influences, such as a gradual decline in the real value of unemployment benefits. In addition, a set of eleven seasonal dummies were included to control for differences in seasonal patterns. The error term, \( \varepsilon \), is assumed to be random with zero mean and constant variance.

The parameter of most interest, \( \beta \), is hypothesised to be between zero and minus one for duration categories of 26 weeks and over; indeterminate for the 13-26 week category; between zero and one for the under-13 week category; and its value for the age group as a whole, which is the sum of the separate duration groups, should be between zero and minus one. The coefficient on the aggregate unemployment rate, \( \beta \), is expected to be positive for all groups. The signs on the unemployment change coefficients and on the trend are indeterminate. Seasonality is expected to be important in the teenage equations, with short-duration unemployment peaking in the summer and longer-term unemployment being higher in subsequent months.

Two sources of data were used. The first is the Australian Department of Employment and Industrial Relations' administrative data on the number and characteristics of persons whose wages were being subsidised through SYETP each month. Records made available include the level of subsidised employment disaggregated by age, sex, and type of program (Standard, Extended, or Commonwealth). These records are part of the computerised data files maintained by the Commonwealth Employment Service, the agency responsible for certifying eligibility and paying the subsidy.

The second source is the published tabulations of the population survey conducted by the Australian Bureau of Statistics. This is a survey of approximately 33,000 households conducted each month since February 1979. The sample covers about two-thirds of one percent of the Australian population and is based on their Census of Population and Housing. The only significant change in the series during our estimation period is the introduction of a new sample in October 1982 following the 1981 Census. Each month detailed tabulations are published on the labour force status of all persons age 15 and over, disaggregated by age, sex, and other characteristics. The labour force questions are almost identical to those used in the American Current Population Survey. For unemployed teenagers (15-19) and young adults (20-24), and other age groups, duration distributions are provided; these indicate duration of incomplete current spell at the end of the survey week. Unfortunately, the 13-26 week category could not be

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29. Program data sources are described in Hoy and Paterson (1982).
30. Described in Australian Bureau of Labour Statistics (monthly), "Explanatory Notes." Prior to October 1982, the sample size was about 30,000.