Targeted Wage Subsidies and Long-term Unemployment

Theory and Policy Evaluation

James Richardson

London School of Economics

PhD Thesis

1999

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Abstract

Prolonged experience of high and long-term unemployment has led many governments to a renewed interest in active labour market policies. In particular, targeted wage subsidies have been seen as a means of both directly getting long-term unemployed people into work, and improving their future prospects of finding and keeping jobs.

We examine three issues. Firstly, we look at the macroeconomic theory of targeted wage subsidies, and, to a lesser extent, job search assistance, within efficiency wage, union bargaining and search theoretic frameworks. Subsidies directly increase labour demand, but we also find that their effectiveness is enhanced by general equilibrium effects from targeting: wage pressure is reduced; and the average quality of the unemployed pool rises as long-term unemployed workers are removed from it, increasing the incentives for other firms to open vacancies.

Secondly we address the optimal degree of policy targeting, using an extension of the Mortensen-Pissarides job creation and destruction model. We argue that there are real gains to targeting the long-term unemployed, but also diminishing returns. Hence, as the level of policy expenditure rises, the extent of targeting should fall. Simulating the model for the UK, we find that policy could have a significant impact on equilibrium unemployment, with more modest welfare gains.

Finally, we look at longer-term employability effects by evaluating the Australian Special Youth Employment Training Program (SYETP). Controlling for selection bias using a bivariate probit, we find that participation increased the chances of having a job by 26% between 8 and 13 months after subsidy expiry, and 20% a year later. Much of this gain arose from retention of initially subsidised jobs, but even excluding this, participants were significantly more likely to be employed in subsequent years than if they had not gone on the programme.

Contents

Acknowledgements

I have been helped by many people with comments and encouragement in writing this thesis. Firstly, I must thank my supervisors, Richard Jackman and Richard Layard, for encouraging me to do a PhD in the first place, and then for all their assistance throughout the process. Their insight has helped me to find fruitful paths, and close off dead-ends.

Many others have been generous with their suggestions. I would like to thank Ravi Balakrishnan, Nigel Campbell, Paul Gregg, Mark Gritz, Maia Güell-Rottlan, Timo Henckel, Steve Machin, Alan Manning, Steve Millard, Rohini Pande, Chris Pissarides, Danny Quah, Jonathan Wadsworth, Hugh Wills and participants in a number of seminars where earlier versions of this work were presented.

I am particularly grateful to Katharina Gassner, Alex Heath, Louise Keely, Henry Overman and Geoffrey Shuetrim who have been ever generous with their time, their thoughts and their friendship.

Chapter 5 was initially conceived as joint work with Genevieve Knight, but a clash of timetables meant that instead it became a more limited piece, solely of my own work. I am grateful to Genevieve for her assistance in obtaining the data, and for a number of useful discussions. I hope that she is able to carry this work forward in the future. Lorraine Dearden's Stata do files made processing the data a considerably easier task that it would otherwise have been.

At the beginning of this thesis, I was fortunate to visit Sweden, the spiritual home of active labour market policy, and have valuable discussions with a wide range of individuals. I would like to thank Per-Anders Edin, Mr P. O. Edin, Anders Forslund, Anders Harkman, Jan Herin, Bertil Holmlund, Fredrik Jansson, Sven Jansson, Björn Jonzon, Henry Olsson, Håkan Regnér, Lena Schröder and Juhana Vartiainen for making the time to meet me, and Gudrun Cavalli of the Swedish National Labour Market Board for organising my programme.

The Australian Longitudinal Survey was made available through the Social Science Data Archive, Australian National University, and I am grateful to them for their assistance. The SSDA bear no responsibility for my analysis and interpretation.

As well as providing intellectual stimulation, the Centre for Economic Performance has been an oasis of order and efficiency. I would like to thank all the staff of the CEP, and particularly Anita Bardhan-Roy, Emily Broughton, Sarah Grainger, Adam Lubanski, Lucy Matthew, Marion O'Brien, Kate Perry and Nigel Rogers for all their help, and for making my time at CEP such an enjoyable one.

I am grateful to the Economic and Social Research Council for financial assistance. Finally, I would like to thank Anne Richardson and Becky Stanley for their support, patience and encouragement. I am, of course, responsible for all remaining errors.

Introduction

In 1934, the economist Irving Fisher wrote to Franklin D Roosevelt urging the President to 'stimulate reemployment in private industry' rather than through 'slow, clumsy, inefficient and costly' public works, which needed a 'double shift from relief to public works and from public works to normal jobs' (cited in Allen, 1977). Roosevelt, although apparently interested, was not convinced. In the 1980s and 1990s, persistent high and long-term unemployment, together with a perceived failure of direct job creation and training schemes, has led a number of governments back to Fisher's conclusions. Wage subsidies, in particular subsidies targeted at the long-term unemployed, have become an increasingly popular policy choice for governments striving to cut the unemployment queues.

This thesis is an attempt to evaluate the likely success of such policies, from both a theoretical and empirical perspective. Our findings are broadly favourable for advocates of targeted wage subsidies. Taking a macroeconomic approach, we argue that policy can reduce equilibrium unemployment, and that many of the concerns that have dominated evaluations of past programmes are based on a partial equilibrium view that is misplaced. We show that there are positive externalities to persuading firms to hire the long-term unemployed, and hence that targeting subsidies can increase their effectiveness.

However, we also show that there are diminishing returns to targeting. Whilst these never nullify the gains, they do imply that an excessive concern with the long-term unemployed, to the complete exclusion of policy for the short-term unemployed, is not generally optimal.

Finally, we evaluate a particular targeted wage subsidy, Australia's Special Youth Employment Training Program (SYETP) to assess whether there are long-term gains to participation. We find that subsidies offer more than simply a temporary respite from unemployment. Instead there are lasting gains. Participants' chances of having a job in subsequent years are substantially increased.

We start with a survey of the existing literature on active labour market policies (ALMP), particularly focusing on those policies which directly increase the probability of transitions from unemployment to employment, hence avoiding the need for the 'double shift' which concerned Fisher. We argue that there are three broad strands to the theoretical literature, and that each can be seen to underlie one of three principal empirical approaches.

The oldest approach, dating back to Pigou (1993) and Kaldor (1936), emphasises the direct effect of subsidies on firms' labour demand. Correspondingly, empirical studies of wage subsidies have attempted to separate out net job creation (additionality) from those subsidised jobs that would anyway have been offered (deadweight) or which would otherwise have gone to someone else (substitution and displacement). Theorists in this tradition have generally argued the case for subsidies, but the empirical evidence has been much weaker, with less than 30% additionality in most studies.

A second approach is based on the outflow rates of different groups of unemployed workers. If programmes reduce the outflow rates of participants for their duration, but increase them subsequently, then there will be a trade-off. Shorter programmes, and those with larger gains and smaller losses, will be more effective. Empirically, studies of job search assistance have concentrated on outflow rates. Most of these studies have suggested that participants secure modest gains from programmes that generally incur modest costs.

The third approach looks at wage-setting. Baily and Tobin's (1977) seminal paper argued that the Phillips' Curve could be 'cheated' by shifting labour demand towards workers who exerted little inflationary pressure. More recently, however, this approach has been used to argue that active labour market policy may be counterproductive because the very gains to unemployed workers, observed in partial equilibrium, will reduce the disutility of unemployment that offsets wage pressures in general equilibrium. Empirically, there have been a number of attempts to assess the impact of ALMP on wage-setting, and more generally on unemployment, at a macroeconomic level. Most of these have proved somewhat inconclusive, due to considerable difficulties with both data and identification of programme effects.

We believe that all three approaches contain genuine insights, but that papers in each strand have too often ignored the arguments of the others. We attempt to draw on all three traditions in building theoretical models of targeted wage subsidies, and to a lesser extent, job search assistance.

In Chapter 2, we develop a general theoretical framework for looking at 'transition-based' active labour market policies, those which seek directly to affect the probability of transiting from unemployment to employment. We incorporate both wage pressure and outflows in general equilibrium, but ignore, for the moment, labour demand. We find that if policy increases the outflow rate of the long-term unemployed, relative to the short-term unemployed, then wage pressure will fall with either Shapiro-Stiglitz (1984) efficiency wages or union bargaining. The gains made by the long-term unemployed are discounted more heavily by wage-setters than the losses to short-term unemployed workers who now face greater competition for jobs. With fixed labour demand, unemployment then also falls.

We then extend the model, introduced heterogeneity among the unemployed. We find that, if workers with naturally low outflow probabilities can be identified, then policy targeted on them can be effective even if the short-term unemployed are eligible. Because workers with low outflow probabilities will make up a disproportionate part of the long-term unemployed, targeting them implicitly targets the long-term unemployed, and the same discounting effect arises.

In Chapter 3 we develop explicit models of targeted wage subsidies and job search assistance, using a search theoretic framework. This allows us to introduce labour demand effects into the model. Modelling job search intensity as an endogenous choice highlights the importance of interactions between job search assistance and 'actively seeking work' requirements in the unemployment benefit system. If policy simply cuts the cost of search, without imposing binding limits on the amount of search undertaken, it may have perverse effects. The short-term unemployed will reduce the amount of search they undertake, anticipating lower future costs, whilst the long-term unemployed will take part of the reduced cost as extra consumption. In addition, wage pressure will rise in the same way as if unemployment benefits had been increased.

However, where the benefit system imposes binding constraints on search intensity, these negative effects can be avoided, and job search assistance can reduce unemployment. Increasing a binding constraint on the long-term unemployed is similar to cutting unemployment benefits, lowering wage pressure. At the same time, the long-term unemployed search harder, as do the short-term unemployed, who now anticipate a lower utility of remaining unemployed.

We go on to model wage subsidies, under the assumption that falling outflow rates with unemployment duration arise from genuine state dependence: long-term unemployed workers are less desirable than the short-term unemployed, either because of skill attrition or employer discrimination. One firm's hiring decision is then an externality for other firms. Hiring a short-term unemployed worker reduces the average quality of the remaining unemployed pool faced by other firms with vacancies. A subsidy targeted at the hiring of long-term unemployed workers can overcome this externality, increasing the average quality of the pool of unemployed workers faced by other firms, which will respond by opening more vacancies. In addition, there is a direct effect of the subsidy on labour demand, and the wage pressure effect identified in Chapter 2. We find that subsidies unambiguously reduce unemployment.

Our emphasis on policies targeted on the long-term unemployed follows the general trend in policy in the 1980s and 1990s. Most active labour market policy, outside of the US, has been focused primarily or exclusively on long-term unemployed workers. However, whilst we argue in Chapters 2 and 3 that there are gains to targeting the long-term unemployed, it does not automatically follow that the short-term unemployed should be excluded completely. We extend our framework in Chapter 4 to consider the optimum targeting of subsidies between long- and short-term unemployed workers.

Firms respond to the level of subsidy per hire. Government, however, is concerned with the total cost, which increases with both the subsidy per hire and the number of hires. Hence, at a given level of total expenditure, the greater the outflow rate of the target group, the less the level of subsidy per hire. We show that this leads to diminishing returns to targeting, and that it is not necessarily optimal to target policy exclusively onto the long-term unemployed.

In addition, Chapter 4 extends our model to include endogenous job destruction, using the Mortensen-Pissarides (1994) framework. Deadweight, substitution and displacement all arise endogenously in our model, as do wage pressure effects and externalities from targeting. By simulating the model for the UK economy, we are able to estimate the net effect of these various components that have dominated the debate about targeted wage subsidies. We find that, for reasonable structural parameters, a properly targeted wage subsidy policy could lead to significant reductions in equilibrium unemployment and modest gains in welfare, but at the cost of some increased taxation.

We would have liked to have tested our theory directly, using macroeconomic evidence of the effects of policy on aggregate unemployment. However, there remain formidable difficulties to such studies. Aggregate data on the policy stance is often poor, and may conceal more than it reveals. Changes in the rules or operation of a programme may have more impact than variations in measures of expenditure or numbers of programme placements. Beyond this, even a clean measure of the policy stance would suffer from endogeneity. Policy is likely to respond to changes in unemployment at least as much as unemployment to changes in policy. A lack of suitable instruments has dogged previous attempts to estimate the macroeconomic effects of active labour market policies. This led us to the view that we could not produce a convincing macroeconomic estimate of the effect of wage subsidies with the data available.

Instead, therefore, we preferred to look at another issue that has had considerable prominence in the policy debate: the longer-term employability effects of wage subsidies. Using data from the list sample of the Australian Longitudinal Survey, we assess the effect of participation in the Special Youth Employment Training Program. This allows us to confirm a critical assumption of our models, that, once hired, subsidised workers are not systematically laid off when the subsidy expires, but instead have a tenure distribution similar to regular employees. Indeed, the principal effect of subsidies on tenure appears to be to extend otherwise very short duration jobs.

Programme participants appear to have been drawn from those otherwise less likely to gain employment. We use a bivariate probit analysis to control for selection bias, and estimate the effect of going on the SYETP, between June 1984 and October

1985, on the subsequent probability of being employed in the following two years. We find that programme participation has a large, positive and significant effect on employment prospects in both years. Even if we exclude retained, but initially subsidised, jobs, there is a positive effect from participation. SYETP participants who lose their initially subsidised jobs are more likely to get another job than if they hadn't gone on the programme.

The New Deal

A central aim of the UK government's recently introduced New Deal and other welfare-to-work policies is to promote employability: 'so that people keep in touch with the labour market when they lose their jobs, continue to remain part of the effective supply of labour and avoid long-term benefit dependency' (HM Treasury, 1997, p. 34). Both job search assistance and wage subsidies play a major part in the New Deal.

Our findings suggest that these elements at least of the New Deal will reduce unemployment in the short-term, and help participants avoid long-term benefit dependency, by increasing their long-term employability. By increasing the average quality of the pool of unemployed workers, wage subsidies increase the capacity of a given number of unemployed workers to fill vacancies: the effective supply of labour. Job search assistance works similarly, by increasing the efficiency of the matching process. Empirically, our findings suggest that a period of subsidised employment confers a substantially increased probability of subsequent employment, not only beyond the subsidy period, but for at least two years thereafter, and even for those young people who subsequently re-enter unemployment.

The New Deal for 18-24s consists of a period of intensive job search assistance, the Gateway, which is mandatory for all 18-24 year olds unemployed for more than 6 months. For those who do not exit during the Gateway, there are then four options: a subsidised job, full-time education and training, a placement in the voluntary sector, or on an environmental taskforce. Participation is again mandatory. Of the four options, the wage subsidy is expected to be the largest, and provides a subsidy of £60 per week for 26 weeks, combined with a £750 training grant. Participating firms are required to provide the equivalent of one day per week training for 26 weeks, so that the subsidy includes an element of in-work (but potentially off-the-job) training, as well as a wage subsidy.

We do not model the complex interactions between different programmes, and between programmes and benefit receipt, involved in the New Deal for 18-24s, and indeed this thesis was near completion before the design of the programme was finalised. However, our findings are supportive of two main elements of the programme: job search assistance with a mandatory job search requirement in the Gateway, and a targeted wage subsidy.

We suspect that this combination will be more effective than either policy individually, although it is not something we explicitly model. An initial period of mandatory job search will compensate for any tendency for job search intensity to dip prior to eligibility for the subsidy, in anticipation of greater returns to subsequent search. It should also serve to cut deadweight on the much more expensive wage subsidy element, since although job search assistance programmes generally have modest results, it seems reasonable to suppose that many of those helped would otherwise constitute deadweight on the subsidy.

The New Deal for 25+ is closer to our models, comprising a £75 per week subsidy paid for 26 weeks, for which unemployed workers aged 25+ and unemployed for at least 2 years, are eligible. Our findings imply that this should unambiguously reduce unemployment. The New Deal for lone parents, the New Deal for disabled people and the New Deal for partners of unemployed people all place considerable emphasis on job search assistance, although in each case it will be voluntary. Our findings for job search assistance in the absence of a search mandate are ambiguous. However, these programmes are targeted at the economically inactive, who are not currently searching at all, and hence cannot reduce their search in response to lower search costs.

Again, this is beyond the scope of our models, but initial estimates from the New Deal for lone parents (Hales, Shaw and Roth, 1998) found that it reduced the numbers of lone parents in pilot areas claiming Income Support by between 1 and 2 percentage points in its first 9 months of operation. The interaction of employment programmes and transitions into employment from economic inactivity, rather than unemployment, would clearly merit further research.

Causes of unemployment

A great deal of research has been carried out over the past two decades to try to explain the causes of the rise in, particularly European, unemployment. It would be fair to conclude that no consensus has arisen from this effort, nor does it seem likely that a single cause can be isolated for the rise. We do not propose to discuss the merits or demerits of particular theories and explanations in themselves: to do so with any justice would take us far beyond the scope of this thesis. Surveys can be found in Layard *et al* (1991) and Bean (1994).

But it is fair to ask how the theories we put forward, and our findings about how unemployment might be reduced, interact with the various leading views on the causes of unemployment. A starting point is that we examine only effects arising from within the labour market itself. Furthermore, we look only at equilibrium unemployment. It is certainly arguable that the initial rise in European unemployment in the 1970s and early 1980s owed more to cyclical factors, and broad macroeconomic policy, than to increased distortions in the labour market. But the scope for more expansionary macroeconomic policies to reverse the rise seems distinctly limited (Bean, 1997).

Instead, we would need considerable persistence in unemployment to explain why the macroeconomic policies of the early 1980s and early 1990s led to high unemployment throughout most of those decades in many European countries. A number of such persistence mechanisms have been proposed, most rooted within the labour market. The main exception is persistence through the capital stock, where it is argued that a shock to aggregate demand or employment leads to capital decumulation. When the shock is reversed, the employment can only recover gradually, because of the need to rebuild the capital stock. We make no attempt to model the capital stock, but there is little evidence that firms have been constrained by capital shortages in recent years (Bean, 1997).

Three other main explanations for persistence can be found in the literature: insider effects (Blanchard and Summers, 1986; Lindbeck and Snower, 1988); hiring and firing costs (see for example Bentolila and Bertola, 1990; Bertola, 1990); and outsider effects (Layard and Nickell, 1987; Pissarides, 1992; Blanchard and Diamond, 1994). Insider theories argue that wages are set solely by the current set of workers, so that,

following a shock, the reduced number of workers prefer to bid up wages rather than allow employment to expand back to its previous level. Although we do not directly develop an insider model, we do look at models of union bargaining in Chapter 2, where the union is concerned about unemployment only in as far as it is a risk which the insiders face. We show there that, by increasing the competition for jobs which the short-term unemployed face, a policy targeted at the long-term unemployed increases the disutility of unemployment from the perspective of insiders. In addition, wages subsidies would reduce the cost to the firm of breaking insider power by replacing the entire workforce (provided the subsidy rules allowed this), or more gradually, by hiring additional workers in the knowledge that they would become insiders in due course, and seek to protect their positions, increasing both employment and the long-run profitability of the firm.

We do not model firing costs, but we do include hiring costs in our models in Chapters 3 and 4. By reducing these hiring costs, wage subsidies increase outflows from unemployment, but they will also increase inflows where they are endogenous. This is explored in Chapter 4. It is difficult to say much about the impact of firing costs, without developing a specific model, since the existing literature shows mainly that the effects of firing costs are ambiguous (Bertola, 1990). It is likely that this ambiguity will extend into models of active labour market policy that include firing costs: for example, Millard and Mortensen (1997) and Mortensen (1996) find opposite effects of untargeted subsidies in models with firing costs modelled in different ways (see Chapter 4).

Our models share a number of features with outsider models, such as Blanchard and Diamond (1994) or Pissarides (1992). We develop models in Chapters 2, 3 and 4 in which there is genuine state dependence, in equilibrium, leading firms to prefer the short-term unemployed to the long-term unemployed. Targeted subsidies can offset the additional costs faced by firms hiring the long-term unemployed and hence mitigate outsider effects. Our approach is clearly consistent with the outsider approach, but this is not to say that outsider effects must be a significant cause of the rise in unemployment for policy findings to be relevant. The increase in long-term unemployment that has been a much documented feature of the rise in unemployment (see especially Layard *et al*, 1991) appears to be primarily a function of declining outflow rates at all durations, rather than being a specifically long-term unemployment related phenomenon (Machin and Manning, 1998).

Changes more closely related to individuals' behaviour may also have been behind the rises in unemployment of the 1980s and 1990s. Increased generosity of unemployment benefit systems, or changes in the tax wedge, might lead unemployed people to search less hard for work, since the returns to finding work, relative to remaining on benefits, will fall (Atkinson and Micklewright, 1991). Job search assistance is clearly an appropriate policy response here, provided it can be implemented in a way which does not at the same time effectively make the benefit system more generous still. These issues are explored in Chapter 3.

Changes in the benefit system might also impact on unemployment through people's incentives to accept job offers. In particular, we would expect more generous benefits, and high implicit marginal tax rates arising from benefit tapers, to undermine work incentives and raise workers' reservations wages. Our models have little to say about this problem: because of our assumptions about wage setting, workers will always be better off in work than on benefits, and will always accept jobs if offered.

In line with the empirical evidence (Atkinson and Meager, 1994; Woodbury and Spiegelman, 1987), we assume that subsidies are captured by the firm which receives them, rather than being bargained over as part of the wage. Hence if unemployment arises from too high reservation wages or poor work incentives it is unlikely that job search assistance or wage subsidies would be an effective policy response. Instead, either reducing the generosity of out-of-work benefits, or increasing that of in-work benefits, would be the appropriate policy response. It is notable in this context that the UK government has introduced not just the New Deal, but reforms to the tax and benefits system to increase work incentives at the same time.

Increases in mismatch are another possible cause of increased unemployment which we do not explicitly consider. Here, we must distinguish mismatch arising from geographical factors and a lack of labour mobility, from skills mismatch. If, for some reason, concentrations of unemployed workers and vacancies are geographically separated, then it is unlikely that policies of job search assistance or wage subsidies will be an effective response. Firms face a problem not that the pool of available workers is not sufficiently desirable to fill their vacancies, but rather that they are not sufficiently mobile. Subsidies might help firms overcome barriers to mobility by offering workers mobility grants to meet fixed costs of mobility, but they are unlikely

to be effective where more deep-seated barriers to mobility, such as the structure of social housing, are relevant.

However, skills mismatch is implicit in our models. Firms prefer short-term unemployed workers to readily available long-term unemployed workers because the latter need more training. In general, attaching subsidies to workers with poor or redundant skills will increase firms' incentives to hire them, and bear the costs of training them, rather than seek to find workers who already have the required skills. However, this assumes that the subsidy, plus the saving in search costs of hiring more available workers, is sufficient to bridge the gap between the skills available and those required. Provided there are no mass points in the distributions of skills available in the population and demanded by firms, this will always be the case on the margin. But in the presence of mass points – for example discrete qualification requirements – subsidies will only be effective if they are sufficiently large to cover this gap.

Finally, a number of theories have been put forward related to increases in wage pressure, including the tax wedge, changes in the terms of trade, increased union power or benefit generosity, and real wage rigidity. Whilst active labour market policy does not directly tackle these potential causes of higher wage pressure, we show that targeted wage subsidies will reduce wage pressure, and hence would offset such effects.

No policy is effective under all circumstances, and active labour market policies are no exception. Their effectiveness will depend on the underlying causes of the unemployment they seek to reduce. Our models inevitably abstract from some of the causes of unemployment that have been suggested, whilst incorporating others. But we are convinced that they capture sufficient features of the labour market to offer insight: in particular, that the labour market is extremely dynamic; that even at long durations unemployed workers have a finite and non-trivial probability of exiting into employment, but that that probability falls with duration; that, for the UK at least, there is evidence of genuine negative state dependence; that firms will respond to the cost of finding suitable workers in deciding whether to offer vacancies; and that workers who search harder for jobs are more likely to find them.

If wage subsidies were a panacea for mass unemployment, we would surely know by now. However, we believe that too often wage subsidy programmes have been undermined by analysis that is both short-term and partial equilibrium. This thesis argues that we should expect subsidies to have greater effects on aggregate unemployment than those suggested by looking at the experience of participating firms alone. Furthermore, we have shown that, at least for participants in one such programme, subsidies had a lasting effect, extending years beyond the expiry of the subsidy. Viewed from a long-term, macroeconomic, perspective, targeted wage subsidies for the long-term unemployed seem a policy which governments are wise to try once again.

1. Active Labour Market Policy: A Survey

We argue that there are three broad strands to the theoretical literature, and that each can be seen to underlie one of three principal empirical approaches. The first emphasises the direct effect of subsidies on firms' labour demand, and empirically attempts to separate out additionality from deadweight, substitution and displacement. The empirical evidence has generally been weaker than the theoretical claims. A second approach looks at outflow rates of the unemployed and those on programmes. Empirically, studies of job search assistance have concentrated on outflow rates, generally finding that participants secure modest gains from programmes that incur modest costs. The third approach looks at wage pressure in a macroeconomic framework. Shifting labour demand towards workers who exert little inflationary pressure can lead to reductions in unemployment, but active labour market policy will be counterproductive if it reduces the disutility of unemployment that offsets wage pressure. Empirically, there have been a number of attempts to assess the impact of ALMP on wage-setting, and more generally at a macroeconomic level. Overall, macroeconomic findings are inconclusive. We believe that all three approaches contain genuine insights, but that papers in each strand have too often ignored the arguments of the others.

1.1 Introduction

The persistence of mass unemployment in many OECD countries in the 1980s and 1990s has led to renewed interest in active labour market policies (ALMPs). This paper is an assessment of what is known about whether such policies are effective. Government labour market policy can be broken down into the passive provision of benefits, to support the incomes of the unemployed whilst they seek a new job, and active policies designed through one means or another to reduce, rather than simply ameliorate, unemployment. We will not consider in-work benefits, although they too have attracted increasing interest recently (eg Scholz, 1996; Eissa and Liebman, 1996; Bingley and Walker, 1997). Following the OECD (1993), we can break down active labour market policies into five categories: job search assistance; subsidies to regular employment; training; direct job creation; and support for those becoming self-employed.

Support for those becoming self-employed is only relevant to a small sub-section of the unemployed (US Department of Labor, 1995), and we shall not consider it further. Furthermore, we will not consider policies, such as early retirement, which aim to reduce the supply of labour. Whilst there may be a rôle for them in times of disequilibrium, there seems little reason to suppose, on either theoretical or empirical grounds, that such policies can reduce equilibrium unemployment (Layard *et al*, 1991).

Of the four remaining types of active labour market policy, two are broadly 'scheme-based' and two 'transition-based'. Training and direct job creation place the unemployed into government schemes, creating a separate labour market state. Alternatively, training might be thought of as removing participants from the labour force altogether, in the same way as those in full-time education. In addition, with scheme-based policies, we may need to distinguish carefully between 'open' unemployment, which excludes those on schemes, and the total of those unemployed and in schemes. If schemes serve merely to 'park' the unemployed, then an increase in scheme participation may serve only to disguise unemployment, reducing open unemployment but not increasing employment. Conversely, subsidies for regular employment and job search assistance do not constitute a separate state within the labour force, but rather act to increase the probability of transition into employment.

In many countries it has been scheme-based policies that have dominated ALMP provision. Sweden in particular, whose commitment to active labour market policy has far exceeded that of other countries, has depended principally on job creation ('relief work') and training programmes. However, a perceived failure of such policies has led to renewed interest in alternatives, and we will primarily consider policies designed directly to facilitate the transition from unemployment into work: job search assistance and wage subsidies. Inevitably, the literature does not neatly follow the OECD's typology, so we will consider some of the existing broader literature on active labour market policy. But it is not our intention to provide a comprehensive survey of the considerable literature on training programmes or direct job creation.

Whilst these policies have become increasingly popular, particularly as solutions to the problems of long-term unemployment, they are not new. The Weimar Republic implemented a wage subsidy for six months in 1932, the 'Papen plan', (Kopits, 1978), whilst Irving Fisher sought, albeit unsuccessfully, to persuade Roosevelt to include

them in the New Deal (Allen, 1977). As Haveman and Saks (1985, p. 20) argue: 'It is certainly possible that some social scientist or bureaucrat will invent a new program to relieve labor market distress quickly and cheaply. But the odds are that the building blocks for effective employment and training systems are already available'.

Yet, despite 60 years of experience, these policies remain highly controversial. In particular, whilst there is a growing consensus in favour of job search assistance (Fay, 1996; US Department of Labor, 1995), there is continued disagreement about wage subsidies. And whilst there are a large number of microeconomic studies of individual programmes, we are still developing the theoretical basis needed for interpreting these results in a macroeconomic framework. Moreover, attempts at directly estimating the macroeconomic effects of policy have, with a few exceptions, proved inconclusive.

We argue below that most of the existing theoretical literature either fails to address the critics of active labour market policy, ignoring their most vital objections, or assumes that policy is scheme-based, ignoring policies that directly promote the transition into regular employment. Furthermore, much of the empirical literature suffers shortcomings arising from the limitations of the theory underpinning it. There is a substantial body of evidence on the microeconomic effects of active labour market policy, although most studies of wage subsidies look only at the short-term effects. But if what we want is to know the impact of policy on equilibrium unemployment, then we need to move beyond a microeconomic framework.

The rest of this paper is set out as follows. Section 2 below examines the existing theory of active labour market policies. We argue that there are three principal approaches within this literature, focusing on labour demand, outflows and wage-setting respectively. A fourth approach, using search theory, is beginning to bring these different elements together. Corresponding to each of the three main approaches, there is a body of empirical evidence. Section 3 looks at the microeconomic studies, which can in turn be split into two broad types. Employer-based studies fit the labour demand model, whilst employee-based approaches relate to outflow models. Section 4 looks at the more limited macroeconomic evidence, which incorporates the insights of the wage-setting models. Finally, Section 5 concludes.

1.2 Theory

Three main strands to the theoretical literature can be identified. The first, and longest-standing, emphasises the labour demand effects of policy, in particular of subsidies. A second approach, running at least as far back as the beginnings of the Swedish model, focuses on outflow effects. Finally, more recent literature especially has examined the possible interactions of wage-setting and active labour market policy. We believe that this third approach can be applied to all active labour market policies, but the existing literature has primarily focused on scheme-based policies. Each of these strands has genuine insights, and some of the most recent literature has attempted to meld all three approaches. In particular, we look briefly at some recent papers in the Diamond-Mortensen-Pissarides search theoretic tradition. However, we believe that this process is only partially complete, especially concerning the analysis of transition-based active labour market policy.

Labour demand

Theoretical analysis of wage subsidies goes back to Pigou (1933) and Kaldor (1936), prompted by the German experiment of 1932. Both Pigou and Kaldor assume that the subsidy will operate by increasing labour demand at given wages, Kaldor assuming a very high wage elasticity of labour demand, not less than three. The underlying assumption is that labour costs exceed the (market-clearing) marginal product of labour, for unspecified reasons, leading to unemployment. This labour demand approach is neatly summed up by Bishop and Haveman (1977, p. 125): 'The economic rationale for [wage subsidies] is straightforward: By reducing the price of labor at the margin, employment will be encouraged, unemployment reduced, price pressure will be reduced in competitive markets ... and, in the case of marginal stock subsidies, entry will be encouraged.'

The 1970s saw the return of mass unemployment and with it renewed interest in wage subsidies. The labour demand approach inherent in Kaldor and Pigou was extended, most notably by Layard and Nickell (1980). Their argument is essentially about boosting demand in the product market, especially for tradable goods. Where firms are price-takers, a small drop in the marginal cost of domestic producers will lead to large increases in output, increasing employment and improving the balance of payments position. Whitley and Wilson (1983) question whether these output

effects would in fact be as large as Layard and Nickell claimed, using estimates from a large-scale macroeconomic forecasting model. However, in 1979, the UK Temporary Employment Subsidy, a redundancy prevention measure, had to be withdrawn after objections from the EEC over its success in internationally competitive markets (Gregg, 1990). Half of all the subsidy paid went to firms in the highly internationally competitive textiles, leather, clothing and footwear industries. This at least suggests that the effects of the policy may have been greater than Whitley and Wilson were prepared to concede, but at the same time that policies which operate primarily through 'beggar your neighbour' effects may be unsustainable under the rules of the single European market or the World Trade Organisation.

Persistent unemployment in the 1980s and 1990s led to a shift of emphasis towards programmes targeted at the long-term unemployed. However, the intellectual tradition of Kaldor is still reflected in a number of essentially demand-side analyses of wage subsidies. Snower (1994) proposes that the unemployed should be able to use part of their unemployment benefit entitlement as a voucher for firms that hire them. Because the expected future duration of unemployment is an increasing function of actual elapsed duration, the size of the voucher would increase with the duration of unemployment. Snower also suggests that higher value vouchers would be available to firms which use them for training, although this is not integral to his assumptions.

Snower's model sets up a labour demand schedule, in which demand shifts out linearly with the size of the voucher, at given wages. Firms have revenue function, $R = aL - \frac{1}{2}cL^2$. They hire entrants, who initially receive a wage equal to the benefit level, b, and thereafter receive wage w^* if they remain with the firm. Turnover is exogenous, with per period probability σ. All hires are eligible for a subsidy, v. Hence, labour demand is determined by:

$$(1.1) \quad b + \frac{(1-\sigma)w^*}{\sigma} = v + \frac{a - cL}{\sigma}$$

The expected present discounted value of the stream of future wages equals the subsidy plus the expected present discounted value of the stream of marginal revenue products. The incumbent wage, w^*, exceeds the market clearing level only because of an exogenous firing cost, f, so that:

(1.2) $w^* = a - cL + \sigma f$

Whilst it is clear that this is intended to proxy for general distortions in the labour market, this approach crucially excludes any influence of the wage subsidy itself on the wage setting process. The model is closed by imposing a balanced budget requirement, so that the cost of subsidies equals the savings in unemployment benefit, which Snower claims to be the novelty of his 'benefit transfer programme'.

Expressing the value of the voucher as a function of the benefit level provides a way of closing off the upper value of the voucher, when combined with the balanced budget requirement. However, any alternative financing rule that closed off the upper value of the voucher would leave the fundamentals of his proposal intact, regardless of whether the value was expressed in terms of benefit levels, or in absolute terms (as we prefer in our models). Snower derives a reduction in unemployment purely from the labour demand curve shifting out in response to the subsidy. Equations (1.1) and (1.2) give:

(1.3) $cL = v + k$ where: $k = a - b - (1-\sigma)f$, a constant.

Hence, any level of employment is achievable, provided we can finance the subsidy without imposing the costs onto firms. This is only possible because wages here are independent of unemployment, and hence of the effect of policy on unemployment. Snower reinforces this separation by stating that 'the long-term unemployment rate has little effect on wage inflation' (1994, p. 66).

Orszag and Snower (1996) extend this analysis to allow for subsidised workers to displace existing employees and for the fiscal implications of some subsidies being claimed by workers who would anyway have left unemployment (deadweight). Unsurprisingly, both displacement and deadweight limit the increment to employment that can be achieved for any given budgetary allocation to the scheme. However, the basic results remain because of the assumption that wages are independent of unemployment generally, or at least of the effects of policy on unemployment, an assumption also shared by recent work by Artis and Sinclair (1996) and Adnett and Dawson (1996). All these papers argue that wage subsidies

would unambiguously reduce unemployment, essentially by shifting out the labour demand curve at given wages. Fiscal costs can be covered, explicitly or implicitly, by savings from unemployment benefits and foregone taxation.

However, the assumption that wages are independent of the effects of policy is a strong one, and has come in for considerable criticism (eg Calmfors, 1993). Often, this assumption is based on empirical findings that the long-term unemployed do not appear to weigh down on inflation in estimates of wage equations (Nickell, 1987). However, as Nickell points out, there is a very high correlation between the proportion of the unemployed who are long-term, and the change in unemployment. Hence, we cannot easily distinguish effects arising from the long-term unemployed from effects arising from changes in unemployment.

Snower's (1994) model has attracted attention as much for its simulated findings as its theoretical model. A fiscally neutral wage subsidy for the long-term unemployed is predicted to reduce unemployment by around 20% in the UK, 30-35% in the Netherlands and a staggering 80-90% in Germany. Snower estimates these results by assuming that the subsidy, net of deadweight and displacement, has an effect equivalent to half the effect of a corresponding permanent wage reduction. He then multiplies this through by estimates of the short-run labour demand elasticity from Layard *et al* (1991).

Even allowing for the theoretical simplicity of Snower's model, this approach has two substantial disadvantages. Firstly, the parameters used seem excessively generous to his proposal. A combined deadweight, substitution and displacement of 50% is considerably less than is typically found in empirical estimates (see Section 3 below). Snower's 'subsidy effectiveness co-efficient', the effect of a subsidy relative to a permanent wage reduction, also seems high: Drèze (1997), for example, proposes 0.15 instead of 0.5.

Secondly, these parameters are essentially arbitrarily chosen. In simulating the impact of targeted wage subsidies on the UK economy in Chapter 4, we develop a model in which deadweight, substitution and displacement are endogenous. We are then able to select parameter values on the basis of empirical evidence, rather than arbitrary choice. In contrast to Snower, we find that subsidies never pay for themselves –

taxes always increase – whilst the effects on unemployment are more modest than Snower implies. Jongen (1998) re-estimates the likely effects of Snower's proposal for the Dutch labour market, using an aggregate general equilibrium model, and parameter values from micro-survey data. He also finds more modest unemployment effects, about a tenth of those predicted by Snower, and that expenditure on subsidies exceeds savings on benefits.

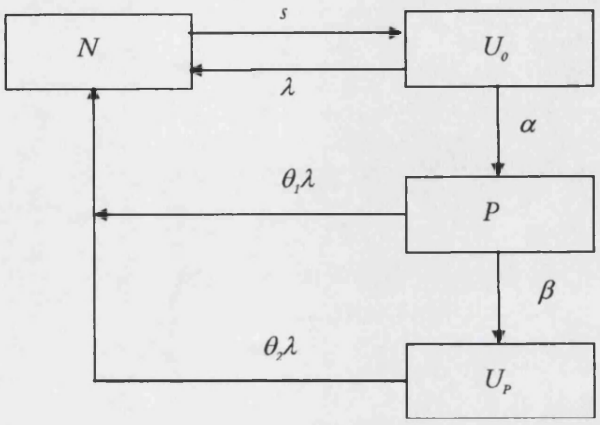
Outflows

It has long been recognised that the existence of frictions in the job-finding market can lead to unemployment. The search theoretic approach pioneered by Diamond, Mortensen and Pissarides builds a general equilibrium model of the labour market around the notion of a matching function. We look at some recent papers in this tradition at the end of this section. However, a simpler approach, looking at the outflow rates of different groups of unemployed workers in partial equilibrium has been more popular in the ALMP literature. In particular, such an approach underlies much of the empirical work on job search assistance.

Whilst frictions have often been assumed to be minor in the context of relatively *laissez-faire* labour markets, enhancing search was a central justification for Swedish active labour market policy (Robinson, 1995). It was recognised that a 'solidaristic' wage policy, aimed at reducing differentials in pay, would dampen the incentives for labour mobility. Active labour market policy was intended to tackle this problem, by promoting the efficient functioning of the labour matching process. A well resourced public employment service, with the legal right to be notified of virtually all vacancies, would minimise the frictions in matching unemployed workers to jobs. At the same time training programmes and mobility grants would enhance worker mobility from low productivity industries – which would be particularly squeezed by the demands of solidaristic pay – towards high productivity industries. Thus active labour market policy was intended both to reduce mismatch and to substitute for the economic incentives for mobility otherwise provided by pay differentials.

Whilst the importance of frictions in the labour market underlay the widespread introduction of public employment services, the central rôle accorded to search in Sweden was not widely copied until the onset of large-scale long-term unemployment in the 1980s. Jackman *et al* (1989) chart the outward shift of the Beveridge curve in the UK.

Figure 1.1: Aarnio's framework



Similar outward shifts in the Beveridge curves have been found for many other countries (Jackman *et al*, 1990), although significantly not for Sweden. Failing to find any evidence of increased mismatch, Jackman *et al* (1989) conclude that the increase in unemployment at given vacancy levels must have arisen from reduced search effectiveness among the unemployed. This in turn might have arisen because of higher benefits, more lax enforcement of job search requirements, or the growth in long-term unemployment.

Aarnio (1993) uses a flow equilibrium model in which search efficiency varies between different groups of unemployed workers to model the effects of active labour market policy. Policy here is scheme-based, with the government determining the flow out of unemployment onto schemes. Workers can exit schemes directly into employment, or, if they fail to get a job before the scheme ends, they enter 'post-programme unemployment'. No-one goes on a scheme more than once in any unemployment spell, but the exit probabilities – and hence implicitly the search intensity – vary between initial unemployment, post-programme unemployment and programme participation. Figure 1.1 shows the flow equilibrium.

N, U_0, P and U_P are employment, initial unemployment, programme participation and post-programme unemployment; λ measures the state of the aggregate labour market, whilst θ_1 and θ_2 are the search effectiveness of programme participants and post-programme unemployed, relative to the initial unemployed. The government determines α, the inflow into programmes, and the maximum duration of programmes, D, which determines β, the outflow from programmes. The inflow

into unemployment, s, is exogenous. We assume an equilibrium in which the numbers in each state are constant, and hence the inflows must equal the outflows from each state:

(1.4) $sN = \lambda[U_0 + \theta_1 P + \theta_2 U_P]$

(1.5) $sN = (\lambda + \alpha)U_0$

(1.6) $\alpha U_0 = (\beta + \theta_1 \lambda)P$

Normalising the total labour force to unity, and solving the flow conditions gives:

(1.7) $$U = \frac{s\mu(\alpha)}{\alpha[\theta_2\lambda(\theta_1 - 1) + \beta(\theta_2 - 1)] + (s + \lambda)\mu(\alpha)}$$

where: $U = U_0 + P + U_P$ and $\mu(\alpha) = (\beta + \lambda\theta_1)\theta_2 + (\beta + \lambda\theta_2)\alpha/\lambda$

Aarnio concentrates on the case where search intensity falls during the programme, but increases once the worker has completed the programme, ie $\theta_1 < 1 < \theta_2$. Hence there is a trade-off and programmes will be more efficient the shorter their duration, the greater the gain in post-programme outflow rates, and the less the loss in within-programme outflow rates. By differentiating (1.7), we can show that total unemployment – including programme participants – will fall when programmes are expanded (ie α is increased), provided: $\beta > \lambda\theta_2(1 - \theta_1)/(\theta_2 - 1)$. β is related to the maximum duration of programmes, D, according to:

(1.8) $$D = \frac{-1}{\lambda\theta_1}\log\left(\frac{\beta}{\beta + \lambda\theta_1}\right)$$

Hence, an increase in placements of the unemployed onto programmes will reduce overall unemployment, provided the duration of programmes satisfies:

(1.9) $$D < D^* = \frac{-1}{\lambda\theta_1}\log\left(\frac{\theta_2[1 - \theta_1]}{\theta_2 - \theta_1}\right) \text{ where: } \frac{\partial D^*}{\partial \theta_1} > 0, \frac{\partial D^*}{\partial \theta_2} > 0$$

Hence, the higher are either of the outflow rates, θ_1 and θ_2, the longer programmes can be. Aarnio's model is the closest in spirit to many of the microeconomic empirical studies which measure the impact of the programme on outflow rates for participants relative to non-participants.

Piggott and Chapman (1995) adopt a similar transition flows model to simulate the Australian Job Compact, which guaranteed a programme place to all long-term unemployed workers (18 months plus). They incorporate substitution, by allowing that outflows from short-term unemployment (the non-target group) fall by some proportion of the rise in outflows from the target group. They then use estimates from empirical studies of the increase in effectiveness of the target group and the substitution effect to simulate the effects of the Job Compact, finding that the net budgetary cost is highly sensitive to the parameters used. In particular, estimates vary widely according to the effectiveness assumed for the programme. Since, as we discuss below, selection biases make this extremely difficult to measure accurately, this suggests a wide margin of error is likely in cost-benefit analyses of these policies.

However, this transition flows approach is only a partial equilibrium. Whilst the relative outflow rates are a function of the programme design, the overall outflow rate also depends on the general state of the labour market, which is left exogenous. In general equilibrium, outflows will clearly be affected by wage-setting. As with the labour demand literature, these models, and the empirical tradition they reflect, are subject to the criticism that the positive effects they find may be offset if ALMP pushes up wage pressure.

Wage-setting

The idea that wage subsidies could operate through the wage-setting, rather than the demand side of the labour market, originates with Baily and Tobin (1977). They argue that targeted wage subsidies can 'cheat the Phillips curve', and hence reduce equilibrium unemployment: 'The basic strategy is simple: Shift labor demand to types of workers who are – because of high unemployment, weak bargaining power, rigid wages, or other characteristics – on relatively flat Phillips curves' (Baily and Tobin, 1977, p. 512). Aggregate wage pressure is thus made a function of policy, and by inducing employers to hire workers whose unemployment does little or nothing to weigh down on wage inflation, we can reduce the NAIRU.

Layard (1996) takes a similar view. The long-term unemployed are unattractive to employers, and thus do not weigh down on inflation. Hence, if the government has an explicit inflation target, it can nonetheless reduce long-term unemployment without having to tighten fiscal or monetary policy: 'if each unemployed person becomes more attractive to an employer, then the total number of unemployed people required falls' (Layard, 1996, pp. 9-10). Hence, Layard contends, we should not worry that targeted wage subsidies for the long-term unemployed will simply substitute short-term unemployment for long-term unemployment. The fact that the displaced short-term unemployed worker is still attractive to employers itself generates another job. Wages are a function purely of the number of short-term unemployed, and hence any increase in short-term unemployment will reduce wage pressure, allowing employment to expand to mop up the increase.

However, these models depend on somewhat *ad hoc* wage equations. Two recent models have incorporated advances in the theory of wage-setting, making use in particular of union bargaining, efficiency wages and search theory.

Holmlund and Lindén (1993) adopt a general equilibrium framework to examine Swedish relief work schemes. The model is search theoretic, but the key results derive from the wage-setting behaviour. There are three labour market states: employment, unemployment and relief jobs. Wages are set by Nash bargaining and are subject to continuous renegotiation. Hence the wage will be increasing in the worker's outside option, which is always assumed to be unemployment. The government can determine flows into relief jobs, both from the stock of unemployed, and from each period's new inflow.

Search intensity is assumed to be lower, in general, in relief jobs than unemployment, but unlike Aarnio (1993), there is no post-programme state so that worker's search intensity cannot rise in the long-run once they have left the programme. In addition, relief work is assumed to be voluntary, so that its utility must be at least as great as the utility of unemployment. In the absence of wage-effects, increases in the flows into relief jobs must reduce open unemployment, but there will be substantial crowding out of regular employment if the search intensity of relief workers is much below that of the unemployed.

However, the wage effects complicate this picture. If the government increases the flows from the unemployed stock into relief work, then that increases the expected value of unemployment, given that relief work is preferred to unemployment. This in turn improves the outside option for the worker, and hence bids up the wage. Thus the effects on (open) unemployment will be ambiguous: larger flows into relief work will tend to reduce unemployment, although at the cost of crowding out regular employment, but higher wages will tend to increase it.

If, instead, the government increases the flows from the unemployment inflow into relief jobs, the wage effects will go the other way. In order to be able to take advantage of this increased flow, the worker must be employed. Hence, the value of employment rises relative to unemployment. This, in turn, lowers the wage, since the worker is prepared to work for less in exchange for their improved prospects should they be separated in future. In this case unemployment will unambiguously fall.

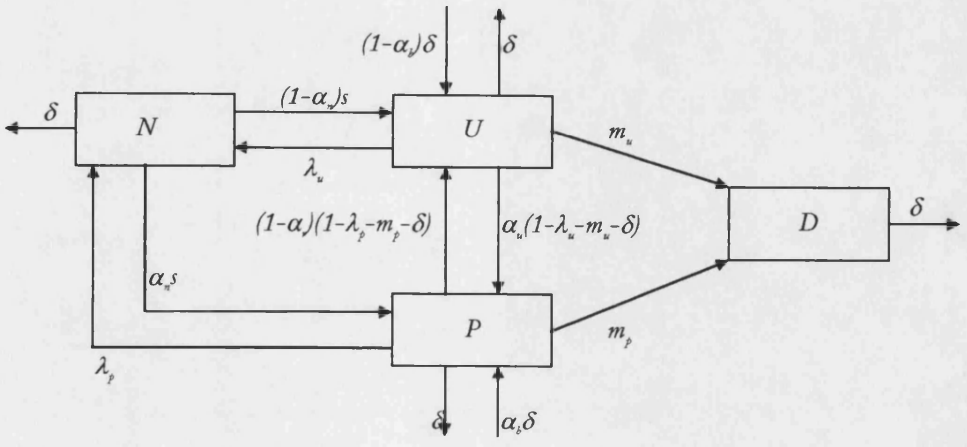
Holmlund and Lindén's model is interesting both because it is a general equilibrium exposition, and because its policy implications directly contradict the suggestions of Layard and Snower that policy should be targeted on the long-term unemployed. However, their results depend critically on the assumption that it is unemployment which is the worker's outside option. If the possibility of being placed directly into a relief job was also taken into account, then an increase in transitions from the unemployment inflow into relief work would increase the worker's outside option in the same way as an increase in the flow from the unemployment stock into relief work. But to exclude the possibility of relief work from the worker's outside option implies that the government can identify, and exclude, 'quitters'. This is a strong assumption, since 'quits' may not be explicit. But if this is possible for the unemployment inflow it must also be possible for the subsequent stock, and hence 'quitters' could be permanently excluded from eligibility for relief work. In this case relief work would not come into the worker's outside option at all, and the wage would be independent of the flows into relief work.

Thus Holmlund and Lindén seem unduly generous in their treatment of programmes targeted on the inflow into unemployment. However, they also appear unduly harsh on active labour market programmes in general, since they do not allow that participation in the programme might make the worker more employable afterwards.

Calmfors and Lang (1995) produce the most elaborate model of active labour market policy yet, addressing these shortcomings. As we can see from Figure 1.2, their transitions framework is considerably more complex than Aarnio's, or indeed Holmlund and Lindén's. They use a union bargaining framework, in which the worker's outside option includes all the possible transitions. In addition they add a further labour market state, in which workers, whilst unemployed, engage in no search. They 'drop out' of the effective labour force, and can exit only through 'death'. This introduces negative duration dependence into the model, since the longer a worker is unemployed, the greater their probability of entering this drop out state. Furthermore, by reducing the risk of drop out, active labour market programmes can serve to reduce negative duration dependence. Figure 1.2 shows the flow equilibrium.

N, U, P and *D* are employment, unemployment, programme participation, and the 'drop out' state respectively. All workers die with probability δ, and are replaced by an equal inflow of δ. New entrants are either unemployed or placed into programmes. The government determines the programme inflows from new entrants, employment (separations), unemployment and existing programme participants, $\alpha_b, \alpha_n, \alpha_u$ and α_r respectively. Employees are exogenously separated with probability s, whilst the unemployed and programme participants have exogenous probability of dropping out, m_u, and m_p respectively. Finally, the endogenous probabilities of re-employment are given by λ_u for the unemployed, and λ_p for programme participants.

Figure 1.2: Calmfors and Lang's framework



At the aggregate level, the labour demand curve is assumed to be fixed, whilst wages are determined by monopoly unions, which maximise the rent from unionisation:

$$(1.10)\ U^j = \frac{N^j}{1+r}\left[v(w^j) - \bar{v}\right]$$

Where: U^j is the utility of union j, N^j employment at firm j, $v(w^j)$ the utility of wages at firm j, and $\bar{v}$ the utility of the outside option, an average of the utilities of the various non-employment states, weighted according to the transition probabilities. The general form of $\bar{v}$ is somewhat complex, covering more than a page of algebra (Calmfors and Lang, 1993). However it is clear that any increase in $\bar{v}$ will bid up wages, and hence reduce employment. Any increase in the size of active labour market policy will, in general, have three offsetting effects:

i) If relief work is preferred to unemployment, then $\bar{v}$ will tend to rise;

ii) By reducing negative duration dependence, policy will increase the competition among the unemployed for jobs, lowering the probability of entering employment, the most desirable transition, and hence reducing $\bar{v}$.

iii) Finally, by reducing the risk of dropping out, the least desirable transition, $\bar{v}$ will be increased.

The balance of these effects will vary with the nature of the policy proposed. For example, only (ii) will apply to policies targeted at new entrants to the labour force, since existing employees will not be eligible for them. Thus policies targeted on new entrants will always reduce unemployment.

Furthermore, policies targeted on the long-term unemployed are more likely to reduce unemployment than those for which all the unemployed are eligible. Increased competition, (ii), imposes an immediate cost on the unemployed, but the gains from (i) and (iii) are now only available after at least one period of unemployment. Hence the increased utility they bring will be discounted relative to the utility costs of (ii), making it more likely that $\bar{v}$ will fall. Thus Calmfors and Lang contradict Holmlund and Lindén's prescription that policy should be targeted on the inflow into unemployment, rather than the existing stock.

The 'iron law' of active labour market policy

Whilst Calmfors and Lang's results are ambiguous in most cases, the possible adverse wage effect that they identify will be a feature of any wage-setting model in which upwards wage pressure is offset by the utility cost incurred by unemployment. Nash bargaining (used in most search models) has this feature, as does the Shapiro-Stiglitz shirking model (see Calmfors and Lang, 1993, for a model with Shapiro-Stiglitz wage setting). If the labour demand schedule is fixed, then ALMP can only reduce unemployment by reducing the expected utility of unemployment (including schemes). Calmfors and Lang describe this as the 'iron law of active labour market policy'.

If labour demand is also increased by policy, then this will mitigate Calmfors and Lang's iron law, but it does not justify ignoring it. The failure of many models of active labour market policy in the labour demand and outflow-based traditions to consider this criticism renders their positive results questionable.

Snower (1997) claims that the wage-pressure argument is unlikely to apply in practice because, at least for those likely to be in receipt of subsidies, wages are determined primarily by benefit levels or minimum wage provisions. This is essentially a dual labour market approach in which efficiency wages or union bargaining apply only in the primary sector, whilst the long-term unemployed are restricted to the secondary sector. However, he does not provide a model to back up this argument.

Moreover, Snower must implicitly assume that existing primary sector workers do not face an anticipated risk of becoming long-term unemployed. Otherwise, provided exiting long-term unemployment, even into the secondary sector, is at all desirable, regardless of the means of wage-setting in the secondary sector, increased outflows from long-term unemployment will increase the expected utility of unemployment for those currently in the primary sector, bidding up primary sector wages. Furthermore, if benefits or minimum wages are determined by fixed replacement ratios to primary sector wages then this will drive wages up in the secondary sector as well. Alternatively, we might assume that the utility of secondary sector employment is no higher than that of long-term unemployment. However, the subsidy must increase the probability of exiting long-term unemployment into the primary sector. Although small, this can never be zero without the exit rate of former primary sector workers equalling one, which would tend to bid primary sector wages up

indefinitely. Hence wages in the secondary sector will have to rise to compensate workers for loss of access to subsidy-entitlement. Either way, even in a dual labour market, wage-pressure effects cannot be ignored.

However, it has also been argued that the wage-pressure effect generates a mechanism by which policy might be more, rather than less, effective. Jackman (1994) claims that because Swedish active labour market policies are compulsory, they can be used as a form of workfare. By making the receipt of benefits contingent on performing time consuming tasks, the utility of unemployment can be reduced without undermining their income insurance rôle. Active labour market policies can thus reduce wage pressure and also act as a self-selection mechanism to remove the idle and fraudulent. Hence ALMP can be effective at the macroeconomic level, even if the programmes themselves have no positive effects for their participants.

Diamond-Mortensen-Pissarides search models

Papers in the Diamond-Mortensen-Pissarides search tradition have concentrated more on the policy implications of unemployment benefits, rather than active labour market policy (see Atkinson and Micklewright, 1991, for a critical evaluation of the literature on unemployment benefits). However, whilst they do not explicitly model active labour market policy, some papers in the general equilibrium search literature contain useful insights. More recently, the Mortensen-Pissarides (1994) model of job creation and job destruction has provided a basis for two attempts to simulate the impact of active labour market policies. Both the earlier approach, as in for example Pissarides (1990), and the Mortensen-Pissarides model incorporate both labour demand and wage setting endogenously.

Pissarides (1984) introduces endogenous search intensity by both unemployed workers and firms with vacancies. There are positive externalities to matching, since each side saves the other side their costs of search when a match is made. The existence of these positive externalities means that search intensities will always be below the social optimum. Furthermore, no feasible wage exists that would ensure optimum search intensities. Because of the saving on vacancy costs, the social benefits from job matching exceed the marginal product of labour. But in order to induce the worker to search efficiently, they must receive the full value of their marginal product, leading firms to make losses. Hence search intensity will always be inefficiently low

in the market equilibrium, which might justify government intervention to subsidise search or establish public employment agencies.

The interaction of long-term unemployment and reduced matching efficiency is investigated in Pissarides (1992). If unemployment duration leads to a loss of skills, then the unemployed may become less attractive to firms, leading to a thin market. This in turn will reduce the incentive for firms to open vacancies, so that fewer jobs come into the market in the next period, the unemployed continue to lose their skills, and the thin market can continue. If this thin market externality is sufficiently large, there can be multiple equilibria. This framework could offer a justification for training or other measures to make the unemployed more desirable to employers.

Davidson and Woodbury (1995) calibrate a search model using results from the Illinois Reemployment Bonus experiment (see Woodbury and Spiegelman, 1987) to estimate the effects of a subsidy paid to employees, specifically to displaced workers. They find that the net effects would be small, but both labour demand and wages are fixed in their model. Mortensen (1996) and Millard and Mortensen (1997) look at various labour market policies using the Mortensen-Pissarides (1994) model of endogenous job creation and job destruction. Mortensen (1996) looks mainly at active policies, whilst Millard and Mortensen (1997) look mainly at passive policies, but do also model a hiring subsidy. As is typical with these models, analytical results are ambiguous and both papers use simulated results.

Mortensen looks at three types of subsidy, using simulations for the UK economy: a recruitment subsidy offsetting the costs of vacancies; a hiring subsidy offsetting the costs of initial training; and a cut in payroll taxes. He finds that all three would reduce unemployment, and increase aggregate consumption. Measuring the effectiveness of policy by the increase in aggregate consumption for a given increase in government expenditure, a recruitment subsidy would be most effective, followed by an initial training subsidy, with a payroll tax cut the least effective.

Millard and Mortensen's results are less clear-cut. They find that a small hiring/initial training subsidy would increase equilibrium unemployment in a model with redundancy payments, but reduce unemployment in a model with zero redundancy payments.

Implications for the empirical evidence

Attempts to divide a diverse literature into simple categories always involve a degree of arbitrariness, and certainly a number of the papers considered above overlap more than one category. However, beliefs about the correct theoretical framework for analysing active labour market policy have a critical effect on the interpretation of the empirical data, and this division of the theoretical literature is matched by a division within the empirical studies. Hence, the weight which we give to any particular piece of empirical evidence must also reflect the weight we give to each of the theoretical approaches outlined.

Most of the labour demand literature implies an unambiguously positive effect for policy, and in particular for wage subsidies. Provided the labour demand curve is shifted out, unemployment will fall. Empirically this is consistent with studies that examine the response of employers to wage subsidies and try to identify the net increase in labour demand at firm level.

Within the outflow-based literature, it is generally the case that an increase in the search effectiveness of unemployed workers will reduce unemployment, but this may be offset by any fall in search during programme participation. Although search effectiveness is difficult to measure directly, we can obtain transition rates into employment for those who go through the programme relative to those who do not. Provided any gains to the participants are not at the expense of non-participants, this will give us a measure of the programme's impact. If this is sufficiently large, relative to any drop in transition probability during the programme, then we would expect aggregate unemployment to fall. This is the approach underlying studies of programme impacts on their participants.

However, if we take into account the rôle of wage-setting, then neither of the above methods is sufficient. Wage pressure effects will only be observable at the macroeconomic level, and studies of firms or workers will not detect them. Apparently successful policies at the microeconomic level may be offset by induced increases in wage pressure. Conversely, even apparently useless schemes may lower aggregate unemployment if they reduce wage pressure among workers keen to avoid ending up on them. Similarly, general equilibrium search models can only be tested with macroeconomic data.

1.3 Microeconomic Evidence

In Section 4 below we consider the existing macroeconomic evidence. Although we believe that a macroeconomic framework is needed to assess the overall effect of active labour market policy, the technical and data difficulties inherent in such a task should not be underestimated. Moreover, the evaluation literature is predominantly microeconomic and a number of critical questions can only be answered by looking at the microeconomic data. We begin, therefore with the considerable body of microeconomic studies.

We shall concentrate almost exclusively on studies of transition-based policies. There have been a number of broader reviews of the microeconomic literature recently (OECD, 1993; US Department of Labor, 1995; Fay, 1996), and especially of training programmes (Heckman, 1993; Lalonde, 1995) and we refer the reader to these for more information on scheme-based policies. Very generally their findings are that:

i) Large-scale, broadly-based training programmes have a poor record in enhancing the employment or wages of participants, although it may be that effects only show up with a substantial lag and longer-term evaluations are required.

ii) Small-scale, well-targeted training programmes can, however, have positive effects, at least for adults.

iii) Direct job creation, in either the public or non-profit sectors, seems to have few, if any, positive effects for participants.

The apparent failure of many of these scheme-based policies has led to a shift of emphasis in a number of countries towards transition-based approaches.

The microeconomic literature can be divided into two broad types. The first, concerned particularly with wage subsidies, seeks to assess labour demand effects, by separating out net job creation from substitution and deadweight at firm-level. This is consistent with the labour demand strand of the theoretical literature, in which the aggregate effect is simply the sum of the net increase in labour demand at participating firms. The second, consistent with the outflow-based strand of the theory, looks at the impact of programmes on their participants, in terms of their future employment and earnings potential.

Deadweight, substitution and displacement

Studies based on employer surveys have generally focused on estimates of the deadweight, substitution and additionality generated by wage subsidies. Displacement is often discussed, but rarely effectively measured. Slightly varying uses of these terms appear within the literature. We shall define them as follows:

- *Deadweight* is where the job would have gone to the same person, or another member of the targeted group, even in the absence of the policy. Hence the policy has had no effect on the firm's hiring decision and is a pure windfall gain to the firm and a deadweight loss to the government.

- *Substitution* is where the job would otherwise have gone to a different person, not a member of the target group. Hence the policy has changed the firm's hiring decision, but not, at least in partial equilibrium, increased the firm's labour demand.

- *Displacement* is where the firm uses a subsidy to gain market share from competitors. The subsidised firm hires additional workers which it would not have hired without the subsidy. However, the firm's competitors hire correspondingly fewer workers (or lay off existing workers), so that, taking the firms together, the effect is the same as for substitution.

- *Additionality* is the net increase in jobs created at partial equilibrium level, so that additionality equals the total number of subsidised jobs, less deadweight, substitution and displacement.

Table 1.1 gives some estimates of these effects from various studies. Some details of the programmes evaluated are also included. These results are not all exactly comparable, since definitions varied somewhat between evaluations. Results are further complicated by the treatment of vacancies which would have been created anyway, but were brought forward in response to the subsidy, or that would have been created but for fewer hours. Where it is reasonably clear that these vacancies would anyway have been created they have been allocated either to deadweight or to substitution as appropriate, since in (partial) equilibrium with a permanent programme these effects would not lead to a net increase in the number of employees.

Table 1.1: Deadweight, substitution and additionality

Study	*Programme*	*Country*	*Target Group*	*Subsidy level*	*Results*
Ash Consulting (1992) cited in NERA (1995)	Training and Employment Grant Scheme (TEGS) II	UK	Principally young or long-term unemployed (ltu) in high unemployment areas.	50% of gross wages for those under 25; 60% for over 25s, for up to 26 weeks. Employers had to provide at least 200 hours training.	Add: 27% Subs: 23% Dead: 47%
Atkinson and Meager (1994)	Workstart I pilots	UK	Very-long term unemployed (vltu), over 2 years duration (over 4 years in one area).	£60 pw for 6 months, followed by £30 pw for 6 months.	Add: 18-29% Subs: 28-35% Dead: 43-48% Dis: low
Bishop and Montgomery (1993)	Targeted Jobs Tax Credit	US	Welfare (AFDC) recipients, various economically disadvantaged groups.	50% of first-year wages up to $6,000, and 25% of second-year wages up to $6,000.	Add: 13-30% Subs: <19% Dead: 70%+
Breen and Halpin (1989)	Employment Incentive Scheme	Ireland	Predominantly short-term unemployed, 13 weeks plus (15% long-term, over 1 year).	IR£30 (IR£60 for ltu) pw for 24 weeks, contingent on employee remaining at the firm (approx. 30-50% of gross wages).	Add: 9% Subs:21% Dead: 70% Dis: low
Bushell (1986)	Young Workers Scheme	UK	Young workers (under 18) paid less than £50 pw.	£15 pw for up to 1 year.	Add: 27% Subs: 10% Dead: 63%
Byrne and Buchanan (1994)	Jobstart	Austr-alia	Unemployed over 6 months, but predominantly long-term unemployed, over 1 year.	AU$200 pw for 16 weeks, with lower rates for 16-17 year olds and shorter-term unemployed, rising to AU$230 pw for 20 weeks for adult vltu, over 2 years (approx. 50% of gross wages).	Add: 11.5% Subs: 14.5% Dead: 74%
Deakin (1996)	Youth Employment Subsidy	UK	16-20 year olds, 6 months+ unemployed.	£10pw for 26 weeks.	Add: 12.5% Subs: 12.5% Dead: 75%
Department of Employment (1978)	Small Firms Employment Subsidy	UK	Any additional employees hired by small manufacturing firms in Special Development Areas.	£20pw for 26 weeks.	Add: 25-40% Dead: 60-75%
de Koning (1993) cited in NERA (1995)	Vermeend-Moor Act	Nether-lands	Very long term unemployed, over 3 years.	Lump sum payment of Dfl4000 plus exemption from social security taxes (approx 17% of gross wages) for up to 4 years.	Add: 15-30% Subs: 30-45% Dead: 40%

In some cases only additionality and deadweight were measured. In these cases, substitution is imputed as the residual on the assumption that displacement, which is not systematically measured in any of these studies, is zero.

Although the various policies studied vary considerably in terms of their target group, level of subsidy and administrative characteristics, some general observations can be made. Where any attempt has been made to evaluate displacement, it has generally been considered to be low. Deadweight is generally high, whilst additionality is rarely above 30%. These findings are broadly consistent with those reported in Casey and Bruche (1985) and Schwanse (1982) from earlier evaluations of wage subsidies implemented in the 1970s in the US and Europe.

Deadweight

Although it is of least interest economically, deadweight always comes first. There is always some hiring of even the most disadvantaged group. Provided administrative costs are not too high, firms will always have an incentive to claim subsidies for actions that they would have taken anyway, even if there are insufficient incentives for firms to change their hiring behaviour. Furthermore, whilst it may be possible to design and target programmes so as to reduce deadweight, it is probably impossible to eliminate it by imposing administrative checks, since the counterfactual is unobserved.

Deadweight is high everywhere, but particularly so in policies for which relatively short-term unemployed people are eligible. Those policies targeted exclusively on the long, or very-long, term unemployed had significantly lower deadweight, around 40-50%, rather than the 70% plus typical of programmes for which shorter-term unemployed people were eligible. This is unsurprising, since, in most countries, the long-term unemployed suffer from negative duration dependence, so that their chances of obtaining a job may be sharply diminished. The corollary of this must be less hiring by firms of the long-term unemployed, and hence fewer firms able to make windfall gains if these hires become eligible for subsidy.

There may also be an effect from the size of the subsidy. Larger subsidies are likely to be required to induce firms to change their behaviour rather than merely to incur the administrative burden of claiming subsidies for their existing behaviour. Hence the proportion of deadweight should decrease as the size of the subsidy increases

(although the absolute cost of deadweight may rise). Some evidence of this is provided by Atkinson and Meager (1994). They asked whether employers would have made use of Workstart subsidies if they had been reduced to £1,500 or £750 instead of the actual level of £2,340 (spread across one year). Jobs identified as deadweight were three times more likely to survive than those identified as additionality with a £1,500 subsidy, and ten times more likely at £750. At £1,500, additionality would fall from 18% to 8%, whilst at £750 it would fall to 3%.

Substitution

If deadweight 'comes first', then it may be most useful to consider substitution and additionality relative to the non-deadweight component. In general, substitution comprised approximately one-half to two-thirds of the non-deadweight effect. The two exceptions are the Young Workers Scheme (Bushell, 1986) and the Small Firms Employment Subsidy (Department of Employment, 1978). However, both of these were targeted by the choice of eligible firms rather than eligible workers, reducing the scope for substitution.

All hires by firms eligible for the Small Firms Employment Subsidy attracted the subsidy, regardless of who was hired, provided that they were in addition to the baseline level of employment at the firm. Hence substitution was zero by definition. There was no untargeted group of workers who could be substituted against. In the Young Workers Scheme, eligibility was restricted to workers under 18 and hence there could have been substitution of older workers. However, the low pay requirements of the scheme may have ensured that many of the jobs offered were unattractive to older workers anyway, reducing the scope for substitution.

It seems likely therefore that under any policy which is targeted at the long-term unemployed, there will be a substantial element of substitution (at firm level). At the partial equilibrium level this is generally seen as wasteful, since it apparently leads merely to a churning of the unemployment pool. In some cases, this churning was seen as an explicit policy objective, on equity grounds. For example, Atkinson and Meager (1994, p. 3) state of the Workstart pilots that 'it is only a secondary aim of the programme to encourage employers to create such [additional] vacancies'. However, in general equilibrium, this churning effect may affect aggregate unemployment. In line with the last two effects identified in Calmfors and Lang (1995) above, substitution may increase the competition faced by the short-term

unemployed, but reduce the utility cost of becoming long-term unemployed. If the former outweighs the latter, wage pressure, and hence aggregate unemployment, will fall, even if all the non-deadweight effect is substitution.

Displacement

Displacement is measured poorly, if at all, within these studies. It is intrinsically problematic, since it affects firms that do not make use of the subsidy and which, therefore, are not interviewed in the evaluations. Atkinson and Meager (1994) and Breen and Halpin (1989) both make an attempt to assess displacement by asking participating firms what competitive advantage they have gained from the subsidy. Atkinson and Meager found that around one-third of private sector participants in Workstart claimed to have increased business volume as a result of the subsidy, but that only one-fifth of these thought that Workstart had made them much more competitive. This group constituted just under 6% of all those who had filled Workstart vacancies, leading Atkinson and Meager to conclude that displacement might have a relatively high incidence, but a low intensity.

Breen and Halpin adopted a similar approach, asking whether firms in receipt of Employment Incentive Scheme (EIS) subsidies had been able to use them to lower prices or gain a competitive advantage on their Irish competitors. They found that only 4% of hirings involved possible displacement.

A number of attempts have been made to assess displacement more directly, but only for job creation schemes. Forslund and Kreuger (1994) attempt to assess the displacement effect of Swedish relief work programmes on employment in the construction and health and welfare industries, the major areas of relief work. They regress total industry employment (excluding relief work jobs) by county and year against the number of relief workers, the wage and measures of aggregate demand. They find substantial displacement, up to 69%, in the construction industry, but unstable results for health and welfare. These findings mirror an earlier study, using just time series data, by Gramlich and Ysander (1981).

However, it seems likely that what is being measured here is *fiscal* displacement. Johnson and Tomola (1977) find nearly 100% fiscal displacement, in the long-run, for grants to US state and local governments for Public Service Employment. If

construction projects have long lead times then local authority demand for construction labour is likely to be relatively inelastic. The arrival of central government grants for relief work will therefore lead to high levels of displacement of local government funds away from construction work into other areas of expenditure or lower local taxation. If expanded provision is easier to manage in health and welfare, we would expect a lower degree of fiscal displacement. But these results are unlikely to tell us much about the behaviour of private companies in receipt of subsidies.

Furthermore, the same general equilibrium arguments apply as for substitution. Even if workers are displaced out of one industry, they will increase the competition for jobs faced by other unemployed workers, and hence potentially reduce wage pressure.

Subsidy take-up

For a wage subsidy scheme to succeed requires not only that a sufficient proportion of hires represent additional employment, but also that the absolute numbers of participants is large enough to make a significant impact on aggregate unemployment. Unlike government schemes, transition-based policies require the involvement of private companies. They cannot simply be expanded by administrative action.

Take-up rates vary considerably between different programmes. In general, we would expect take-up to be higher the greater the level of subsidy. Atkinson and Meager (1994) find an approximately linear relationship between firms' expected likelihood of using wage subsidies and varying proposed alternative levels of subsidy, among employers in receipt of Workstart subsidies.

Other factors, though, also appear to be relevant. The wage subsidy element of the German Federal Employment Programme for Regions with Special Employment Problems was considerably under-subscribed even though subsidies of up to 90% of wages were available (Schmid and Peters, 1982). In contrast, the US New Jobs Tax Credit (NJTC), which paid only 50% of wages at most, was claimed for 3.6 million hires out of a potential universe of approximately 3.8 million eligible hires (O'Neill, 1982).

In part, this simply reflects a trade-off between targeting, and hence deadweight, and take-up. NJTC was available for any hires in excess of 102% of baseline

employment, whilst the German subsidy was only available for the unskilled or long-term unemployed. It is easy to increase take-up by having more deadweight. However, the failure of the German scheme also appears to reflect the interaction of high German firing costs with the greater risks involved in hiring the long-term unemployed (Schmid and Peters, 1982). A similar concern about the difficulties of dismissing subsidised workers if they proved unsuitable was expressed by Australian employers in an examination of falling take-up rates of Jobstart under the *Working Nation* programme (DEETYA, 1996a). Take-up is likely to reflect not only the level of the subsidy and the degree of disadvantage of the target group, but also the extent to which firms are required to enter into long-term commitments and the degree of risk aversion of those who actually make the hiring decisions.

Take-up also varies systematically with firm characteristics. Atkinson and Meager (1994), Breen and Halpin (1989) and Byrne and Buchanan (1994) all consider the types of firms that make use of wage subsidies. Although the subsidies operated in different countries, with different target groups and levels of subsidy, and were examined at different stages of the business cycle, their findings are remarkably similar. Subsidies are overwhelmingly taken up by small firms and predominantly by firms in the retail, wholesale, hotel and catering industries (Standard Industrial Classification 1980, class 6).

Firms with fewer than 10 employees accounted for 65% of Workstart employers, 62% of Jobstart employers and 76% of EIS employers. Moreover, most of the remaining hires were by slightly larger, but still small, firms. Only 17% of Workstart employers and just 8.8% of EIS employers had over 25 staff, 14% of Jobstart employers had 30 or more. In contrast, across the UK economy as a whole, only 28.2% of employment is in firms of 10 or fewer employees, with 56.3% in firms of 50 or more employees (DTI, 1994).

Clearly small, and especially very small, firms are disproportionately likely to make use of subsidies, although this may not be so true in the United States (Katz, 1996) where small firms seem to be more averse to engaging with the government bureaucracy. Furthermore, Byrne and Buchanan (1994) found that the level of deadweight increased monotonically with firm size. The subsidy made no difference to the hiring decision for only 57% of firms with fewer than 5 employees, compared with 86% for those with more than 30 employees.

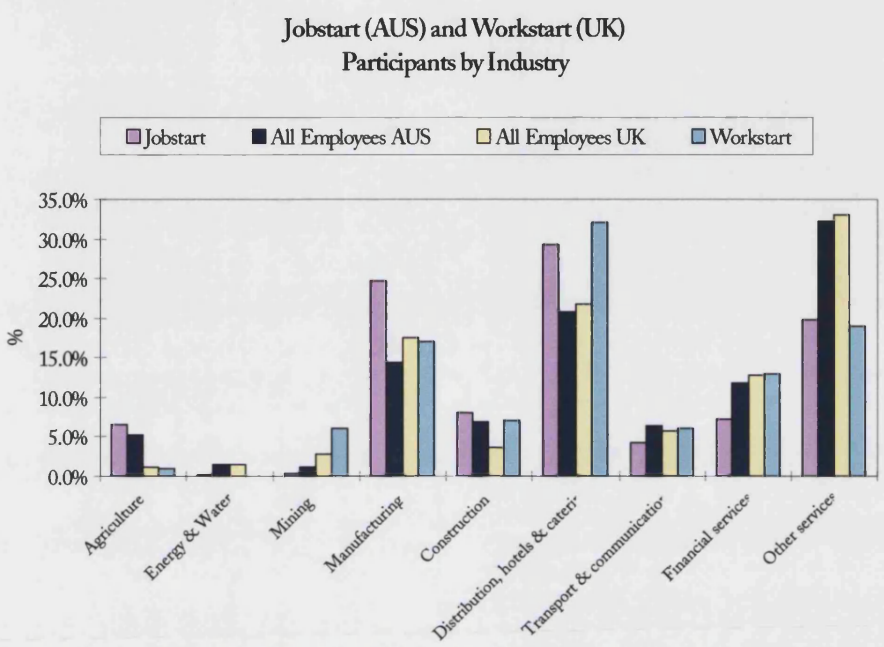
This size effect may reflect the incentives faced by individual managers responsible for hiring. In small firms both the impact of hiring a potentially less productive worker and the benefit of receiving a subsidy will be considered at the same level. However, in large firms, the gains from subsidies may be received centrally and hence may not be properly considered by managers at lower levels who make the hiring decisions and bear the costs of taking on less productive employees. Arwady (1988) found that Borg-Warner Protective Services, a large company that decided centrally to maximise its use of wage subsidies, had to include subsidy payments against managers' income targets before they would hire subsidised workers.

The distribution across industries is less notable but still fairly consistent between the three studies. Figure 1.3 shows the industry distributions for Jobstart and Workstart, compared with the distributions of all employees in employment in Australia and the UK. Data for the EIS shows a similar picture. In particular the retail, wholesale, hotel and catering industries always come out as the largest users of subsidies, and subsidised workers are disproportionately likely to be hired into these industries compared with their share of overall employment in the three countries. This probably reflects low pay in these industries, which makes a fixed level of subsidy worth relatively more. In Australia, manufacturing firms are also disproportionately likely to make use of Jobstart, although this is not found in the UK nor Ireland. The low take-up of subsidies in 'other services' probably reflects restrictions on their use in the public sector.

Implications

Overall, it is clear that, whilst deadweight is often large, wage subsidies do induce changes in firms' hiring behaviour. Even if fiscal constraints are binding, it may be that the savings from reduced benefits and increased taxation sufficiently outweigh the costs of subsidies that the level of deadweight is sustainable. However, if the programme is targeted on the long-term unemployed, then a substantial proportion of the non-deadweight effect appears to be substitution. The implications of this depend on our theoretical framework. Within a labour demand setup, it is only additionality that matters and the results of many of these studies are disappointing for advocates of wage subsidies. However, if wage pressure effects are also taken into account, then substitution may have macroeconomic effects. In particular if the increased competition for jobs faced by the short-term unemployed outweighs the

Figure 1.3: Industry distribution of participants



Source: Atkinson and Meager (1994), Byrne and Buchanan (1994), Department of Employment Gazette November 1994, Labour Statistics Australia, 1993.

gain in utility to the long-term unemployed, then wage pressure will fall, reducing aggregate unemployment. In the limiting case, as in Layard (1996), where wage pressure is solely a function of the level of short-term unemployment, substitution and additionality will be equivalent in general equilibrium.

Impact studies

Whilst studies of deadweight, displacement and substitution focus on employer behaviour, impact studies look at the employee. For wage subsidies, we can obtain some information about the employee's subsequent status from the employer surveys considered above, for as long as the worker remains with the original job. Beyond this, and also if we want information on job search assistance programmes, we need data on individual unemployed workers.

This inevitably raises methodological problems. In surveys of employer behaviour, we assume that the employer can make a reasonable estimate of their own likely counterfactual behaviour. However, employees are very unlikely to be able to assess their counterfactual chances of obtaining and keeping a job in the absence of a programme, and hence we must use the behaviour of other unemployed workers to measure the counterfactual. This can lead to severe problems of selection bias. If

programmes are voluntary, then it may be that the most motivated of the unemployed opt to go on them, biasing any comparison against non-participants towards a favourable programme effect. Where selection for programmes is made administratively, there may be a tendency to 'cream skim' in order to boost the apparent success of the programme, or alternatively to target programmes on those most in need, so that biases may go either way. OECD (1991), Heckman (1992), Jensen and Madsen (1993), Burtless (1995) and Heckman and Smith (1995, 1996) all discuss the difficulties inherent in evaluation of the impact effects of active labour market policies.

Selection bias can be tackled by the use of random assignment into treatment and control groups. Since any differences in observed or unobserved characteristics of the two groups will be purely random and uncorrelated with programme participation, the difference in the mean outcomes of the two groups will be an unbiased estimator of the programme effect. A large number of randomised experiments have been carried out in the social sciences over the last 25 years (Burtless, 1995), predominantly in the US (see Björklund and Regnér, 1996, for a comparison of US and European experiences of random assignment). These are particularly useful in evaluating job search assistance policies, where we are also able to draw on experiments from the UK and Sweden. There are fewer random experiments for wage subsidies, and many of the impact assessments make no attempt to calculate the counterfactual, focusing solely on participants.

In the absence of random assignment, quasi-experimental methods can be used which attempt to control statistically for selection bias (Heckman and Smith, 1995; 1996). However, these have mainly been used in evaluations of training programmes and only rarely been applied to wage subsidies or job search assistance. Riddell (1991) argues that non-experimental methods produce estimates that are highly sensitive both to the comparison group and to the statistical method employed, and that even if specification tests could be developed to discriminate between different approaches, experimental methods will generally produce more precise impact estimates. However, more recent work suggests that the combination of better data and specification tests, such as those in Heckman and Hotz (1989), can produce non-experimental findings that are comparable to those from experimental studies (Hotz, 1992; Heckman, Ichimura and Todd, 1997; Heckman, Ichimura, Smith and Todd, 1998).

Job search assistance

One of the few areas of general agreement within the debate about active labour market policy is that measures to enhance job search assistance are effective (US Department of Labour, 1995; Fay, 1996). These results are based almost exclusively on impact assessments, although there have been a small number of supporting macroeconomic studies. Interestingly, although the issue is equally relevant, or irrelevant, there has been virtually no discussion of substitution within the job search assistance evaluations (Lehmann, 1993, appears to be unique in attempting to measure the substitution effect).

Delander (1978, cited in Björklund, 1993) examines the only random experiment in Swedish labour market policy evaluation. Intensified employment services were offered to a random sample of workers who had been unemployed for at least 3 months in the town of Eskilstuna. The treatment group used the employment agency's services for an average of 7.5 hours during the experiment, which ran from 10 March 1975 to 6 June 1975. The control group had access to the normal services, using the agency for an average of 1.5 hours. By the end of the experimental period, 48% of experimentals had obtained a job, compared with only 34% of controls. They also spent less time in unemployment over the 9 months following the start of the experiment, and had higher monthly average earnings when in work. These results were all statistically significant. Björklund (1993) and Johannesson (1995) cite results from a number of subsequent, but non-experimental, studies in Sweden, most of which support these positive results for intensified employment services.

Meyer (1995) assesses the results of five randomised experiments in the US, promoting enhanced job search among Unemployment Insurance (UI) claimants. The experiments involved different mixes of services, principally increased referrals and formal job search training, and tighter requirements on claimants to report their job search activities. One experiment, in Washington DC, included a treatment group for which existing reporting requirements were relaxed, so that no report of job search activity was required, and UI payments were continued until the claimant indicated that they were no longer eligible.

Four of the five experiments showed modest declines in UI receipt, about one-half week less over the benefit year (6 months in one case), from programmes providing

more intensive services and requirements. Three of these four results were at or near statistical significance. The fifth experiment, which involved caseworking together with higher quality services, showed a significant and much larger reduction in UI, 3.9 weeks over the benefit spell. However, methodologically, this was the weakest of the experiments. The relaxed conditions offered to one treatment group in Washington DC led to a significant increase in UI claiming, of just over 3 weeks in the benefit year. But since there was no reduction in earnings for this group, the effect may have been due to later notification of job finding rather than lower job search intensity.

Friedlander and Burtless (1995) look at the long-term effects of four 'welfare-to-work' programmes in the US, primarily for single mothers, using random assignment. This updates earlier, similar, findings from Gueron and Pauly (1991). Job search assistance was the predominant service provided. They found that whilst earnings gains lasted for up to three to four years, the programmes did not lead to greater job security. Instead they appeared to hasten the initial transition into work without affecting subsequent job duration or job finding. All of these programmes included other measures, such as compulsory unpaid work experience, as well as job search assistance. Whilst these were relatively rarely used, they may still have had a threat effect. However, Brock, Butler and Long (1993) looked at separate job search assistance/compulsory work experience and job search assistance only treatment groups in one of the experiments. They found no significant additional employment effect for combined job search assistance and workfare over job search assistance alone.

Findings from more recent US experiments have continued to show positive impacts from job search assistance, and in particular from programmes that emphasise a 'work first' approach. Of six California GAIN programmes examined by Riccio *et al* (1994), the results for Riverside county stand out: over a three year period, the treatment group's earnings exceeded those of the control group by 49%, and welfare payments were reduced by 15%, the largest effects found in large-scale state welfare-to-work experiments. Riverside placed an unusually large emphasis on job search and rapid job entry, whereas the other five GAIN programmes had a greater emphasis on basic education, with more modest results. The Riverside model was subsequently adopted by Los Angeles which had previously placed considerable emphasis on education in its GAIN programme (Riccio *et al*, 1994; Freedman, Mitchell and

Navarro, 1998). Early findings from Los Angeles again suggest large earnings impacts: a 46.3% increase after 6-9 months.

However, the Riverside experiment also suggests that there are limits to the effectiveness of increasing the intensity of job search support. In addition to the control group, two treatment groups were randomly assigned between a 'regular' and an 'enhanced' group. Case managers were also randomly assigned between the groups, to prevent possible biases from the quality of staff (Doolittle and Riccio, 1992). Staff working with the 'regular' group had an average caseload of 97, against an average of 53 for case managers working with the 'enhanced' group. Although both groups obtained large earnings gains and reductions in AFDC receipt relative to the controls, there was no additional impact for the enhanced group (Riccio *et al*, 1994).

Virtually the only use of random assignment in UK labour market evaluations was the Restart experiment. Restart involved interviews with the unemployed every six months. During these interviews, an Employment Service adviser assessed the claimant's recent unemployment history and offered advice on benefits, search behaviour, training courses, and in some instances initiated direct contact with employers. Interviews lasted around 15-25 minutes and attendance was compulsory, with benefit sanctions for those not attending. In addition, there was a threat effect, with sanctions imposed on those deemed not to be actively seeking work (Dolton and O'Neill 1995a). A randomly assigned control group, drawn from the inflow into Restart in March-July 1989, were not sent the letter asking them to attend. White and Lakey (1992) found that controls were significantly less likely to leave unemployment in the following year, and that, of those that did leave the register, controls on average left significantly later. Taking these two effects together, they estimated that, on average, controls took 55 days more before first leaving unemployment.

However, since Restart acted as a gateway to other government programmes, many of these exits from unemployment would have been transitions onto programmes rather than into employment. Dolton and O'Neill (1995a) examine the effects of Restart on transitions into employment, and also into 'stable' jobs, which they define as full-time jobs lasting at least 3 months. They find that whilst Restart increased

the transition probability into 'any job', there was no significant difference between Restart and control groups in transitions to 'stable jobs'. However, Restart did not appear to reduce reservation wages (Dolton and O'Neill, 1995b), nor did it reduce the duration of the 'out of unemployment' state (Dolton and O'Neill, 1996), so that the gains, whilst modest, were genuine and not offset by other factors. In line with Friedlander and Burtless, Restart appeared to speed up the initial transition, without affecting subsequent employment prospects.

Overall, the experimental literature suggests that job search assistance can have positive effects, reducing the time participants spend unemployed before transiting into employment. These effects were generally modest, but so were the interventions. Programmes involving enhanced services, greater search requirements, or both, all seemed potentially effective. However, whilst the experimental approach accounts for deadweight, possible substitution effects are ignored. Nor are any effects that might operate through wage pressure considered. Hence we cannot directly translate the positive results of these studies into assessments of aggregate unemployment effects.

Wage subsidies

Although much of the evaluation literature for wage subsidies has concentrated on deadweight and substitution, there have been a number of studies that have looked instead or as well at the effects of subsidy eligibility on unemployed workers' exit probabilities. In addition, there is some, limited, evidence on the duration of employment in subsidised jobs. This is particularly relevant to the likely effects of wage subsidies on the inflow into unemployment. In a simple neo-classical model of the labour market, a temporary wage subsidy could only lead to a temporary increase in the firm's labour demand. Once the subsidy expired, the worker would be laid off. However, if there are fixed costs to hiring, such as training or lower initial productivity, then a temporary subsidy may lead to a permanent increase in the firm's employment (Layard, 1979). In this case the effects of policy on inflow are ambiguous.

There have been fewer experimental studies of wage subsidies than of job search assistance, perhaps because of the greater cost of wage subsidy programmes. The most dramatic result comes from Burtless (1985), who finds that wage subsidies in the form of vouchers reduced the probability of finding work for the treatment

group. Burtless considers the evidence from an experiment in Dayton, Ohio, in 1980-81, which involved two treatment groups, given vouchers for direct cash payments and tax credits respectively, and a randomly-assigned control group. Participants were recipients of either Aid to Families with Dependent Children (AFDC), primarily single mothers, or general assistance, primarily young one or two-person families without children. Whilst the programme was not especially successful at finding jobs for any of the participants, the striking result is that the control group were significantly more successful than either of the treatment groups, suggesting that the vouchers were harmful. Whilst 20.6% of controls found a job within the eight weeks of the programme, only 12.8% of the treatment groups (which were virtually identical to one another) did.

Burtless suggests that employers may have used the vouchers to screen out public assistance recipients, so that they had a stigmatising effect. This would be consistent with O'Neill (1982) who found that take-up rates of US wage subsidies fell sharply when they were targeted on narrow socioeconomic groups. Unfortunately, the Dayton experiment was cancelled before a planned employer survey was undertaken, so that this explanation remains speculative.

How relevant the negative finding is to other programmes is difficult to assess. Haveman and Hollister (1991) note that all the control group were referred to the Employment Service, who may have made special efforts on behalf of those denied the voucher. Hostility to welfare recipients may be more severe in the US than other countries. Furthermore, the Dayton subsidy was targeted according to a characteristic, receipt of AFDC or general assistance, which was unobservable to employers. The description of the subsidy programme on the vouchers may have drawn particular attention to the limitations of voucher-holders (Haveman and Hollister, 1991). In contrast, subsidies targeted according to the duration of unemployment may be less likely to play a stigmatising rôle if employers already have this information. There is clearly a risk, however, that providing subsidies for particular groups of unemployed workers will simply serve to reinforce negative perceptions among employers. Against this, Atkinson and Meager (1994) found that among employers in the UK who actually hired subsidised workers, attitudes towards the long-term unemployed improved.

If the Dayton result was due to stigma attached to welfare benefits, we might expect a different effect for Unemployment Insurance claimants, if UI is less stigmatising. Evidence from the Illinois Unemployment Insurance experiment (Woodbury and Spiegelman, 1987) presents a mixed picture. Employers were eligible for a $500 subsidy, if they hired a UI recipient within 11 weeks of their initial claim, and employed them for at least 4 months. The level of subsidy was considerably below that offered in most wage subsidy programmes, but unusually the Illinois experiment was specifically targeted on the short-term unemployed. The eligible group did record small reductions in the length of their first unemployment spell compared to the control group, about two-thirds of one week, and had about a 3% greater probability of leaving unemployment within 11 weeks. But these results were not sustained over the whole benefit year. Taking total weeks of claiming over the benefit year, there was no significant reduction, except for white women.

However, Dubin and Rivers (1993) question these findings. Participants in the experiment had to agree to take part after random assignment, and findings are averaged across both participants and non-participants to eliminate effects from selection bias in participation. However, this also serves to dilute the programme effect. Dubin and Rivers contrast this with biomedical experiments, where the use of placebos allows random assignment to take place after permission has been obtained. In the Illinois experiment, only 68% of the treatment group actually agreed to take part. Dubin and Rivers estimate the effect of participation, controlling for selection bias in the participation decision by making use of the assumption that, in the absence of selection bias, non-participants in the treatment group would have the same outcomes as the control group. They obtain somewhat larger, and statistically significant, effects, with a reduction of just over 1 week in the initial benefit spell and of $102 in benefit payments over the benefit year.

One final source of experimental information on wage subsidies are the re-employment bonus experiments carried out in a number of US states (Meyer, 1995). Here, the employee rather than the firm was eligible for a bonus, if they exited unemployment within a certain period. Most of the experiments produced modest, but significant, reductions in unemployment duration of about half to one week over the benefit year. Coasean deals should make these equivalent to subsidies paid to employers. However the findings that wages are unaffected by subsidy entitlement,

whether the subsidy is paid to the firm or the worker (Woodbury and Spiegelman, 1987), suggests that subsidies are probably captured by the recipient.

Felli and Ichino (1988) use a quasi-control group to study the effects of an employment subsidy offered by the *Agenzia del Lavoro* of Trento, Italy in 1985-86. The subsidy was targeted at workers in receipt of unemployment benefit from the *Cassa Integrazione Guadagni Straordinaria* (CIGS), a group with very low exit rates due to the generous terms of the CIGS. Subsidies were offered in 1985 to those with more than 3 years duration, whilst in 1986 the subsidy was available to those with over 6 months duration, but increased in value with duration up to 3 years. Workers eligible for the CIGS in 1983-84 make up the quasi-control group. Clearly labour market conditions would have changed between the two periods, so Felli and Ichino control for aggregate effects using monthly dummies. These can be identified separately to subsidy eligibility, since their sample of CIGS recipients had varying durations and hence varying eligibility in time series.

They find that eligibility for the subsidy had a positive and highly significant effect on the probability of re-employment. The average probability of exit increases from 0.0132 to 0.0278 per month because of the subsidy, equivalent to an expected reduction of time in the CIGS of 21 months (compared with an average time in the CIGS of 43 months). This is a substantial effect, but since the CIGS covers only a fraction of the unemployed in Italy, the scope for substitution is considerable, so that the aggregate effect may be much less.

Duration of subsidised employment

If we are interested in the duration of subsidised employment, as well as the probability of obtaining it, then we must return to the survey data. None of the experiments tracks employees for long enough to estimate duration effects. A number of surveys of employers contain information on the proportion of subsidised hires still with the firm at some subsequent date, including some after the expiry of the subsidy. In addition surveys of employees give some data on subsequent employment. Unfortunately, however, in the absence of a control group, the counterfactual is less clear cut. Hence we cannot easily assess the net impact of the policy on subsidised workers' subsequent prospects. We can, however, address the question of whether temporary subsidies inevitably lead only to temporary employment for the subsidy duration.

Breen and Halpin (1989) find that 85% of employees hired under the Employment Incentive Scheme (EIS) were still with the firm at the end of the 24 week subsidy period. However, firms were only able to claim EIS subsidies for employees continuously employed for the full period, so we might expect a high survival rate. Participating firms were also surveyed approximately 8 months after the subsidy had expired, by which point 54% of EIS hires were still with the firm. In a further 11% of cases, the job was still in existence, although the specific EIS employee was no longer with the firm. Employees taken on as deadweight or substitution might be expected to survive, since the post would have been viable even in the absence of the subsidy. More interesting is the fate of additionality positions. Breen and Halpin find that slightly over half of the additional posts survived for at least 8 months after the subsidy had expired. Similarly, the Department of Employment (1978) found that employers expected 66% of additional jobs created by the Small Firms Employment Subsidy to survive subsidy expiry. This might imply the existence of fixed costs in the hiring process, although it is clearly also possible that these firms simply experienced an unanticipated positive demand shock. Unfortunately, Breen and Halpin provide no reference group to compare their survival rates against.

Arwady (1988) does provide a comparison between subsidised hires and normal hires for equivalent jobs. He studies the operation of the US Targeted Jobs Tax Credit (TJTC) in one firm, Borg-Warner Protective Services, the largest user of the TJTC. Arwady finds that subsidised workers remained with the company for around 20% longer than equivalent unsubsidised employees. Subsidy-eligible workers differ systematically from their unsubsidised colleagues. They are more disadvantaged and so may be less likely to quit to obtain better jobs. However, they may also have worse labour market characteristics that increase the risk of being fired. Moreover, Arwady's study is of a single firm in a high turnover industry, and so may not be representative.

A survey of Workstart employees (RSGB, 1996) found that 40% were still with their Workstart employers 3 months after the 12 month subsidy had expired, with a further 15% employed elsewhere. Most of the remainder had returned to unemployment. No counterfactual is provided, although Sweeney (1996) shows that among all UK unemployment benefit claimants who exit into employment, 51.8% returned to unemployment within 12 months, 40.1% within 6 months. Nor is there evidence that layoffs from Workstart are concentrated at the expiry point. Among

employees who remained with the firm until subsidy expiry, 77% were still with the same employer three months later and only 13% unemployed. The primary cause of returns to unemployment appears to be poor matches, which fail to last for the duration of the subsidy, rather than subsidy expiry. Post-programme monitoring of Jobstart participants suggests that those who do gain sustain those gains: 59.1% of participants whose subsidies expired between April and June 1994 were in unsubsidised employment 3 months later (DEETYA, 1996b). After 12 months, the proportion was essentially unchanged at 58.8%, although the study does not say whether these were the same people.

Pay and productivity

Atkinson and Meager's (1994) employer survey provides us with information on two other variables of interest: pay and productivity. They found that 81% of Workstart employers paid their subsidised workers the same rate as existing employees in similar jobs. This is consistent with Woodbury and Spiegelman (1987) who find no difference in earnings between subsidy-eligible workers and randomly-assigned controls. Atkinson and Meager also found that most employers were satisfied with their Workstart employee's skills and productivity. Overall, they found that 80% of recruits met employers' standards and expectations, with only 8% deemed unsuitable. No extra help was needed, in addition to that which would have been offered to a normal recruit, for 62% of Workstart employees, whilst 23% needed some extra help. Only 13% needed considerable help at a significant cost to the business. Productivity showed a similar pattern, with 64% of Workstart employees as productive or more productive than ordinary recruits. A further 12% were initially less productive, but subsequently caught up, with only 11% less productive throughout.

Long-term effects

Layard (1997) argues that a central feature of wage subsidies is their long-term effect on participants. By returning the long-term unemployed to the world of work, even on a temporary basis, they would re-acquire work habits and skills, and obtain a recent reference, which would increase their long-term employability: 'the main justification for the proposal is not that it employs people on a subsidised basis but that, by doing so, it restores them to the universe of employable people' (Layard, 1997, p. 336).

The survey of Workstart employees (RSGB, 1996) provides some support for this view. Around 60-65% of participants felt that Workstart had been helpful in building confidence, improving existing skills, learning new skills and getting an up-to-date work reference.

Studies of supported work give a long-term perspective on the possible effects of wage subsidies. The National Supported Work Demonstration (Hollister *et al*, 1984) provided 12 to 18 months of subsidised employment, in a highly structured environment. Because of the substantial element of training and support involved, this is not directly comparable to a wage subsidy, but the notion of subsidised employment with on-the-job training to re-integrate participants into the labour market was central to the programme. Positive results were obtained only for women on AFDC. However, for this group the effects were both substantial and very long-lasting. Participants had higher earnings than a randomly-assigned control group for at least 8 years after the end of the programme (Couch, 1992). The Homemaker-Home Health Aide Demonstrations were similar in approach, including 12 months of subsidised employment, but with a far less intensive training and support element (Bell and Orr, 1994). They too produced positive effects for earnings and benefit receipt for at least 5 years following participation (US Department of Labor, 1995).

Implications

The impact assessments paint a generally positive picture of the rôle of wage subsidies, with the striking exception of Burtless (1985). For the unemployed, eligibility for a wage subsidy generally increases the probability of exiting unemployment into work, but there is a risk of stigma attaching to subsidised workers, especially when targeting is on narrow socioeconomic grounds. Once in a subsidised job, workers generally receive the same wage as regular employees and most are equally productive, at least after an initial period. There is little evidence that workers are systematically laid off once the subsidy expires, even for jobs that would not have been created without the subsidy. This suggests that subsidies may overcome fixed costs of hiring or training. Survival in subsidised positions compares favourably with that for general hirings from unemployment. Finally, there may be long-term beneficial effects arising from re-integration into the labour market. However, by focusing on participants, these studies ignore possible detrimental effects on non-participants as well as any general equilibrium factors.

1.4 Macroeconomic Evidence

Whilst the macroeconomic literature is less comprehensive than its microeconomic counterpart, there have been a number of evaluations published, particularly in recent years, using varying methodologies. The most straightforward approach to evaluating the success of active labour market policy would seem to be cross-country macroeconomic studies, to evaluate whether the total extent of ALMP spending or participation reduces the aggregate unemployment rate. A number of such studies have been undertaken, but there remain formidable difficulties in identifying programme effects. Hence a number of alternative methodologies have also been applied.

If we are concerned about possible wage pressure effects in general equilibrium, then we should study the significance of ALMP variables in wage equations. Such studies have mainly been undertaken for the Nordic countries, with somewhat mixed results. Alternatively, we can attempt to evaluate the effect of policy on the outflow rates from unemployment of both the target group and the non-target group to obtain aggregate flow effects. If we assume that inflow is essentially constant, then we can use these estimates to calculate aggregate unemployment changes. This approach has generally given favourable results. Finally, at least one study has used a natural experiment framework to bypass identification problems, again giving favourable results.

Cross-country studies

Comparable cross-national data on active labour market policy effort is difficult to obtain. Policies vary between countries in their design and implementation as well as their level. Simple expenditure measures may ignore important differences in the effectiveness of programmes, or in the balance between incentives and requirements in national systems. In addition, policies may interact with other features of the labour market in ways which are difficult to measure. Nonetheless, several studies have attempted to include active labour market policy variables in cross-country unemployment regressions, generally using OECD measures of expenditure on policy.

Jackman *et al* (1990) estimate the effects of active labour market policy on national Beveridge curves in 14 OECD countries between 1970 and 1989. They use a two-stage process to control for world shocks to unemployment and vacancies, firstly

regressing all countries' unemployment and vacancy rates on 19 year dummies, and then using the residuals from these regressions as reflecting country-specific factors. The residual of the unemployment rate is then regressed against the residual of the vacancy rate, country-specific time trends and policy variables. Controlling for benefit duration, the replacement ratio and an index of corporatism, they find that active labour market policy has a significant and negative effect on unemployment. Hence, ALMP shifts the Beveridge curve inwards, reducing unemployment for any given level of vacancies.

They use two measures of policy. Firstly, a general policy stance variable, the level of active labour market expenditure per unemployed person in 1985. This reflects cross-country differences. The second consists of two dummies for the introduction of new labour market policies. The first switches from zero to one when a new policy is introduced, the second when a second policy is introduced. These reflect within-country changes. In general it is the second policy change that has the larger and more significant effect, although these are somewhat crude measures of policy. For the Nordic states and the UK, Jackman *et al* construct time series data for expenditure on ALMP, which has a negative and significant effect on unemployment for four of the five countries (Norway is the exception).

Layard *et al* (1991) estimate a cross-country regression for 20 OECD countries, using the average unemployment rate for 1983-88 as their dependent variable. They obtain the following relation:

Unemployment rate (%) = 0.24 (0.1)
+ 0.92 (2.9) benefit duration (years)
+ 0.17 (7.1) replacement ratio (%)
− 0.13 (2.3) ALMP expenditure
+ 2.45 (2.4) coverage of collective bargaining (1–3)
− 1.42 (2.0) union co-ordination (1–3)
− 4.28 (2.9) employer co-ordination (1–3)
− 0.35 (2.8) change in inflation (% points)

Where the t-statistics are in brackets. The ALMP measure is 1987 expenditure on active labour market programmes per unemployed person as a proportion of GDP

per capita. Even if we assume that all of the ALMP expenditure is used on scheme-based policies, this estimate implies that an additional one person placed onto a scheme reduces open unemployment by 1.5 persons, and hence increases employment by 0.5 persons (Calmfors, 1994, footnote 18).

Zetterberg (1995) obtains a similar effect of increased ALMP expenditure on a country's aggregate unemployment rate. He pools time-series and cross-section data for 19 OECD countries between 1985 and 1991. Controlling for benefit duration, the replacement ratio, the change in inflation and various measures of corporatism, he also finds a negative and significant co-efficient for ALMP. Active policy in this case is measured by the proportion of total labour market expenditure that goes on active policies. The implications of his finding for open unemployment and regular employment are similar to those of Layard *et al* (Calmfors, 1994).

In a related study, Heylen (1993) examines the effects of labour market policy on the wage responsiveness to unemployment, using cross-national data for 17 OECD countries. He constructs an index of real wage flexibility on the basis of a number of existing studies, and then estimates the effects on this of various supply side variables. Active policy stance is measured by the 1986 expenditure on active labour market policy, excluding direct job creation, per unemployed person. He finds positive and statistically significant effects on wage flexibility for overall expenditure, and also separate measures for expenditure on public employment services and training, but not employment subsidies.

However, these studies all face a common problem of potential simultaneity bias. The assumption that the variation in ALMP expenditure is purely exogenous is implausible. Instead, we would expect active labour market expenditure to be related to unemployment through a policy reaction function as well as through the labour market (OECD, 1993). In the short-term, if budgets are fixed, higher unemployment will automatically mean lower expenditure per unemployed person. In the long-run, the effect could go either way. Higher unemployment increases the costs of a high standard of provision, but at the same time increases the urgency of provision. The political economy of active labour market policy is discussed by Saint-Paul (1995), King (1995) and Janoski (1996). Grubb (1994) and OECD (1993) find that, typically, active programme expenditures rise less than proportionately with unemployment,

so that the long-run bias would be in the same direction as the short-run. Layard *et al* average unemployment rates over 6 years (although their ALMP expenditure measure is only for one year), which should eliminate spurious correlation from the short-term policy function, but still leaves the ambiguous effects from the long-term.

OECD (1993) re-run the Layard *et al* regression using ALMP expenditure/(wage x labour force) as their policy measure, and fail to find any significant effect. This eliminates the potential bias in Layard *et al*, but introduces a potential opposing bias. Unless the budget for active labour market policy is completely fixed, even in the long-term, then a rise in unemployment is likely to bring about a rise in total expenditure, even if expenditure per unemployed person falls. Hence the policy reaction function in this case will bias the co-efficient on ALMP in the other direction.

Furthermore, these results may not be stable over time. Forslund and Kreuger (1994) run similar regressions to those of Layard *et al* for 1983-88 and for 1993. They use two measures of active policy stance, the fraction of GDP spent on active programmes, and the share of active expenditure in total labour market expenditure. These are likely to be biased in opposite directions by the policy reaction function. However their key interest is in the behaviour of the co-efficients over time. The co-efficients on both ALMP measures are negative for the first period, although only the second is significant. However, for 1993, both measures are positive, again with only the second significant.

The comparison between a six-year average and a single year may not be a reasonable one. In any one year, cyclical effects may dominate the structural components of unemployment that these equations seek to determine. Jackman *et al* (1996) run pooled regressions of averages over 1983-88 and 1989-94 for 20 countries. They use the same ALMP measure as Layard *et al*, but instrument it using 1987 active expenditure as a proportion of GDP per capita, divided by the average unemployment rate from 1977-79. Active labour market policy now has no significant effect on total unemployment, but a significant negative effect on long-term unemployment. However, even this latter effect disappears if Sweden is excluded from the sample. This highlights a general difficulty of these regressions: because they have so few degrees of freedom it is impossible to control for all the differences in labour market institutions that might be relevant. Where, as with Sweden and ALMP, one or a

few countries are significant outliers, the co-efficient may proxy for any uncontrolled-for features of those labour markets, capturing effects beyond ALMP itself.

Overall, the results of cross-country studies are somewhat mixed. Although most of the studies find a significant effect of active labour market policy in reducing unemployment, there are serious problems. The data itself is poor and in particular concentrating on expenditure ignores issues of design and implementation of policy that may be equally important. With few degrees of freedom, it is impossible to control for all potentially relevant factors. Furthermore, there are potential biases arising from the endogeneity of policy. Finally, co-efficients may not be stable over time.

Wage equations

Concern about the possible wage pressure effects of active labour market policy has led to a number of studies of the impact of ALMP on wages, mainly in the Nordic states. The OECD (1993) run a cross-country wage equation, allowing for country-specific effects of active labour market policy, over the period 1985-90. For most countries, the co-efficient on ALMP expenditure is negative, often significantly, implying a wage moderating effect. ALMP appeared to increase wage pressure significantly only in Ireland and Spain. However, the number of observations on each country is small.

Studies of wage pressure effects in single countries, predominantly Sweden, have been able to make use of longer time series, and also to eliminate difficulties in comparing ALMP stances across countries. Calmfors and Forslund (1990, 1991) find that an increase in the accommodative stance – the number of people on programmes as a proportion of open unemployment plus programme participation – increases wage pressure in Sweden. Calmfors and Nymoen (1990) estimate wage equations for the four Nordic states, again finding positive and significant co-efficients for the accommodative stance of ALMP in Sweden, and also in Denmark and Finland. In Norway, however, the effect of policy is to reduce wage pressure. Finland was also studied by Eriksson, Suvanto and Vartia (1990), but they could find no effect of labour market programmes on wage pressure, pointing out that Finland has made only limited use of such policies.

These studies are subject to a number of criticisms. As with the cross-country studies, they suffer a potential bias from the policy reaction function. High wage pressure will lead to higher unemployment, and this in turn may lead to a higher accommodative stance if policy is counter-cyclical, as it appears to be in Sweden (Calmfors, 1994). In addition, these estimates generally assume a union bargaining model, which seems most appropriate given the extremely high level of union membership in these countries. However, no attempt is made to control for union bargaining strength, due to the lack of any suitable measure. Since, in Sweden at least, active labour market policy was substantially the invention of the trade unions and has always been promoted by them, a greater accommodative stance might be proxying for higher union power. Furthermore, the variation in the ALMP variable in Sweden arises principally from a small number of observations, mainly in the 1970s (Edin, Holmlund and Östros, 1994). Newell and Symons (1987) find no effect of policy on Swedish wage pressure in a regression including a dummy variable for the 1972-1976 period, which they identify as the peak of union militancy.

The lack of variability in the time series data has led to two attempts to exploit cross-sectional variation in the policy stance. Edin, Holmlund and Östros (1994) use pooled cross-section and time-series data from the Swedish engineering industry between 1972 and 1987. The policy stance is measured by the level of programme activity in the worker's regional labour market. They find that policy has a negative effect on wage pressure, significantly so in most of their specifications.

Calmfors and Skedinger (1995) also make use of regional variation, although their study uses regional unemployment (including ALMP participants), rather than wages, as its dependent variable and hence is a reduced form. Their policy variables are the accommodation ratios for direct job creation (relief work) and training programmes, the major types of Swedish ALMP. In an attempt to tackle the problem of simultaneity bias, they use two sets of instruments. The first consist of political variables, the share of seats in the region held by parties of the left, and the share of seats held by parties of government. The assumption here is that left-wing parties will tend to favour ALMP, and also that parties in power nationally will tend to channel resources to regions where they are strong. The second approach is to use the national jobless and accommodation ratios, on the assumption that regional accommodation ratios are determined in a two-stage process. The first stage,

determined at national level, is exogenous to the region. Calmfors and Skedinger find that direct job creation increases the total jobless rate (including ALMP participants), crowding out regular employment, but that co-efficients for training programmes are unstable.

As with the cross-national studies, the wage equation literature presents a mixed picture. Time series data, at least for Sweden, suggests that active labour market policy may increase wage pressure, but there are considerable difficulties with these studies. Attempts to use cross-sectional data to overcome these problems present a more favourable picture of Swedish labour market policy, at least for training if not relief work. Nonetheless, the problems of identification and simultaneity remain considerable.

Outflow rates

If we assume that the inflow into unemployment is largely independent of the effects of active labour market policy, then we can evaluate the effects of policy by looking at outflow rates or at the Beveridge curve. Where policies are targeted, we can assess substitution and displacement effects in general equilibrium, by examining the outflow rates not only of the targeted group, but also of the non-targeted group.

The basic idea is straightforward (Bellmann and Jackman, 1996). We assume that there is an aggregate matching function:

$$(1.11)\quad x = x(cu, v)$$

Where x is the total number of hires per period, and hence the total outflow from unemployment, u is unemployment, v vacancies, and c is the average employability of the unemployed. We assume that the matching function is increasing in both its parameters. Hence the per period outflow rate from unemployment, a, is given by:

$$(1.12)\quad a = \frac{x}{u} = x(cu, v)/u$$

If we further assume that the matching function is constant returns to scale (see for example Coles and Smith, 1996, for evidence of constant returns to scale), then we can write the aggregate outflow rate as:

$$(1.13)\ a = cx\left(1, \frac{v}{cu}\right)$$

And if we take a log-linear approximation of (1.13), we have that:

$$(1.14)\ \log a = \log c + \delta_1 \log\left(\frac{v}{cu}\right) = (1-\delta_1)\log c + \delta_1 \log\left(\frac{v}{u}\right)$$

Finally, if we assume that the impact of the policy stance, ALMP, on employability takes the form:

$$(1.15)\ c = \hat{c}(1+\alpha ALMP)$$

and relax the restrictions on the co-efficients in (1.14), then, provided $\alpha ALMP$ is small, we obtain a general estimatable equation of the form:

$$(1.16)\ \log a = \log \hat{c} + \gamma_1 \log v + \gamma_2 \log u + \gamma_3 \log ALMP + \varepsilon$$

An early attempt at this approach is the study of the UK Community Programme (CP) by Haskel and Jackman (1988). The CP was a job creation scheme, targeted on the long-term unemployed over 18, and offering temporary, and usually part-time, work on projects of community benefit. The scheme was voluntary, and the rules meant that it mainly appealed to younger workers. Haskel and Jackman consider only the outflows for those with unemployment durations between 1 and 2 years, because they assume a given equilibrium stock of short-term unemployed, independently of the programme. Since CP funding was only eligible for projects that would not otherwise have happened, spillovers are likely to have been small. However, because this assumption remains untested, their estimates may only capture the partial effect for this duration. Haskel and Jackman find a statistically significant and positive effect of the number of CP vacancies on the outflow rate of men aged 18-24, but no effect on men aged 25-55. There is a negative effect for men over 55, suggesting a possible substitution effect, with the older age groups losing out to CP workers, but no substitution of the intermediate age group. The net effect on outflows however is small relative to the number of CP places, suggesting that the CP may have taken on young men who otherwise would have found work of their own accord.

Lehmann (1993) goes a step further, using SURE (Seemingly Unrelated Regression Estimators) to evaluate the effects of Restart on outflow rates across all durations of unemployment. This allows an aggregate assessment of the unemployment effect of Restart, by measuring the effect not just on participants, but also on non-participants. Lehmann uses the proportion of the eligible population who actually received a Restart interview as his measure of policy stance. Simultaneity bias from the policy reaction function should not be a problem for Restart, since from its introduction (apart from an initial pilot phase), the scheme was intended to be universal, so that Lehmann's measure should tend towards unity, with deviations due to initial delays in implementation and idiosyncratic factors.

However, there are at least two possible sources of bias remaining which Lehmann does not consider. Firstly, unemployed workers who exit before going to their Restart interview will not, of course, participate, and therefore a high outflow rate at the relevant durations will be correlated with a lower Restart participation rate. This implies a possible source of downward bias in Lehmann's estimates. Secondly, if outflow rates are high at shorter durations, then the numbers of people becoming eligible for Restart will fall. If administrative capacity is quasi-fixed, then eligible unemployed are likely to be seen sooner, reducing the probability that they will have exited in the meantime, and increasing the participation rate. This might impose an upward bias.

Lehmann estimates that Restart had a positive and significant effect on the outflow rate of the unemployed with durations of 9-12 months and 12 months or more. The effect on the 6-9 month group, who would receive their first Restart interview, is also positive, but not significant. For the 0-3 month group there is a significant negative effect, suggesting that part of the Restart effect was substitution of the shortest-term unemployed. However, the net effect implies a substantial reduction in unemployment, and Lehmann estimates that Restart was responsible for 35% of the reduction in unemployment between 1984 and 1990. However, Restart may in part be proxying for a tightening of benefit conditions that came into effect around the time that Restart was being introduced (Dicks and Hatch, 1989).

Boeri and Burda (1996) also obtain positive effects for active labour market policy on aggregate outflows using a pooled time-series and cross-section data set for the

Czech Republic. They consider the effects of direct job creation ('publicly useful jobs') and wage subsidies ('socially purposeful jobs') on aggregate outflow rates. They find small, but significantly positive, effects of policy. They are able to instrument for policy stance, in part using the allocation rule from the Slovak Republic, which had the same labour market policies, but a different means of allocating resources across districts, prior to the separation of the two states. Co-efficients on an expenditure-based policy measure were robust to instrumentation, but co-efficients on ALMP placement measures were substantially larger using instruments.

Natural experiments

Natural experiment evaluations use one-off changes in the policy environment to bypass problems arising from the endogeneity of the policy variable. The argument is that the change in the environment provides a source of exogenous variation in the policy variable. Katz (1996) examines the effect of restrictions in the eligibility rules for the US Targeted Jobs Tax Credit as a natural experiment. On 1 January 1989, eligibility was restricted to disadvantaged youth aged 18-22, excluding those aged 23-24 who had previously been eligible.

By comparing the difference in employment rate of disadvantaged 23-24 year olds before and after the change with that for non-disadvantaged youth of the same age, Katz obtains a differences-in-differences estimator of the effect of TJTC eligibility. However, this does not take account of other, non-TJTC related, factors that might affect disadvantaged youth over the period differently from non-disadvantaged youth. Katz therefore also takes the differences-in-differences estimate for disadvantaged versus non-disadvantaged youth using 18-22 year olds (always eligible for TJTC), and 25-29 year olds (never eligible for TJTC). This allows him to control for non-TJTC, but disadvantage, related factors in a differences-in-differences-in-differences (DDD) estimator. Finally, the DDD estimator is adjusted to take account of differences in the composition of the treatment and control groups.

Katz's final estimate is that withdrawal of TJTC eligibility reduced the employment rate of disadvantaged 23-24 year olds by 3.4 percentage points, suggesting that between 40 and 52% of subsidies for this group represented additional jobs.

Assessing the macroeconomic evidence

A range of different methodologies have been applied in an attempt to assess the aggregate effects of active labour market policies. Cross-country evaluations and matching functions have generally produced positive results, whilst wage equations have more often been negative. The widely varying results from microeconomic evidence of the impact of different policies suggests that it may be optimistic to expect too much from cross-national studies using highly aggregated measures of national policy stance such as expenditure variables. Instead, single country studies would seem more likely to be fruitful, especially if we wish to shed some light on particular types of active labour market policy. All these approaches face the same basic problem, however: endogeneity of the policy variable. If the policy stance responds to unemployment, and hence indirectly to the real wage and outflow rates, then macroeconomic evaluations will suffer from simultaneity bias.

A lack of suitable instruments has restricted attempts to tackle this problem, although Jackman *et al* (1996), Calmfors and Skedinger (1995) and Boeri and Burda (1996) are exceptions. Lehmann (1993) argues that the implementation of Restart on a universal basis eliminates policy endogeneity, although the unemployment rate may nonetheless influence participation through administrative rather than policy considerations. Katz (1996) also relies on a one-off change in programme rules to provide a source of exogenous variation in the policy variable, finding, like Lehmann, a positive result. The problem of simultaneity remains a serious concern with the macroeconomic evaluations, and there is clearly scope for further attempts to identify suitable instruments or natural experiments.

1.5 Conclusion

Active labour market policies have been a frequently used, but rarely sustained, weapon in the armoury of governments faced with mass unemployment. Alongside the shifts of policy a substantial body of literature has developed, but little consensus. We have argued that there are three broad strands to the existing theory of active labour market policy, which correspond to the main evaluation methodologies within the empirical literature. Each contains genuine insights, but none completes the picture.

The first, and oldest, approach emphasises the effect of wage subsidies on labour demand. At a theoretical level, the effect of policy is to shift out the labour demand schedule by reducing the marginal cost of hiring to the firm. Empirically, surveys of firms have sought to establish the level of additional job creation, net of deadweight, substitution and displacement. Deadweight in particular is generally found to be high, but far from total. Depending on the design of the scheme, net job creation accounts for between 10-30% of the total number of subsidised jobs. Hence, it is argued, wage subsidies will only be cost effective, at least in fiscal terms, if the subsidy is no more than 30% of the total fiscal cost of someone remaining unemployed for the expected duration of the created post.

The second strand focuses on the outflow rates, or search effectiveness, of the unemployed. Programmes of job search assistance, work experience or training, in the classroom or on-the-job, might improve the ability of workers to find suitable jobs, increasing their outflow rate from unemployment. Offsetting this, search intensity may fall whilst workers are in programmes, although this is not a problem for transition-based policies that directly increase the outflow. Empirically, random assignment or quasi-experimental techniques can be used to evaluate the net effect of policies, controlling for possible selection biases.

Job search assistance appears to enhance the outflow rate of unemployed workers, without leading them to take lower paying or shorter-term jobs. The effect is generally modest and appears to be one-off, hastening the initial transition into work, but not having long-term effects. However, the interventions needed are also modest. The effect of eligibility for wage subsidies has been less studied and the picture is more mixed. Some eligible workers appear to gain a substantially higher probability of leaving unemployment, but there is a risk that subsidies stigmatise workers, especially where they are targeted on narrow socioeconomic groups. In this case, workers may actually be worse off with subsidies. Where subsidised workers are employed, there is little evidence that jobs automatically break up when the subsidy expires, and pay and productivity levels are comparable to regular employees, at least after an initial period.

The assumptions underlying both these approaches, however, have been challenged by the third strand within the literature. Calmfors, in particular, argues that if the effect of policy is to reduce the utility cost to the unemployed, then that will raise

wage pressure. Hence, even if there are positive effects from increased labour demand and greater employability, they may be offset in general equilibrium. Conversely, if policies lower wage pressure, they may give an extra boost to reductions in aggregate unemployment. Attempts to assess these theoretical insights require macroeconomic studies. Unfortunately, these have suffered from considerable problems both of data and in identifying programme effects, leaving a somewhat mixed picture.

Most advocates of active labour market policy have preferred one of the first two approaches to modelling policy, and most models in these traditions have yielded positive predictions for the effects of active labour market policy. Undoubtedly these effects are important. Korpi (1995), for example, argues that Swedish ALMP prevents the decline in employability with unemployment duration seen in most other OECD countries. But by setting wages exogenously, or using *ad hoc* formulations that ensure the independence of wages from policy, these approaches simply rule out the most powerful objection of their critics by definitional fiat.

Instead, we believe that the Calmfors critique must be faced head on, if a credible case for active labour market policy is to be made. It is relevant to too many leading theories of wage setting to be ignored. However, not all the contributions to the wage pressure literature imply that policy is ineffective, or at best ambiguous. Baily and Tobin's seminal paper argues that policy will work precisely by reducing wage pressure, and this case has also been argued recently, but informally, by Jackman (1994) and Layard (1996).

Furthermore, even the most sophisticated model in this strand, Calmfors and Lang (1995), considers only scheme-based policies. Disappointment with these policies has led to a shift in emphasis towards transition-based approaches in many countries. We need a formal theory of these transition-based policies that responds to the Calmfors critique and fully incorporates wage pressure effects. Chapter 2 attempts to address this, and argues that transition-based policies targeted at the long-term unemployed, or those most likely to become long-term unemployed, will reduce wage pressure, and hence unemployment at given labour demand.

Moreover, we should not lose the insights of the labour demand and outflow approaches. Calmfors and Lang (1995) move some of the way towards this. They

allow that policy may have beneficial effects in maintaining the unemployed within the effective labour force, and that this in turn may reduce the cost to employers of opening vacancies, so that they open more. However, for wage subsidies, the subsidy itself is intended to boost labour demand directly, and this too needs to be modelled. Chapter 3 extends our analysis to include the demand side effects of wage subsidies targeted at the long-term unemployed, as well as explicitly modelling job search assistance.

The wage pressure literature has emphasised the importance of targeting ALMPs, and we consider only targeted policies in Chapters 2 and 3. Almost all policies in the 1980s and 1990s have been targeted, normally using duration of unemployment as the main criterion for eligibility, although some untargeted policies were enacted in the 1970s. The experience of *Working Nation* in Australia, however, suggests that exclusive targeting of policies onto the long-term unemployed may be counter-productive. A large scale shift in resources from the short-term unemployed to the long-term unemployed under *Working Nation* led to a substantial increase in the inflow into long-term unemployment, which in turn overwhelmed the programmes targeted on the long-term unemployed (DEETYA, 1996a). Recent work drawing on the Mortensen-Pissarides (1994) model of job creation and job destruction has simulated the effects of untargeted active labour market policies for the UK economy (Mortensen, 1996; Millard and Mortensen, 1997). In Chapter 4 we extend this approach to consider whether targeting the long-term unemployed is always desirable. We are able to show that, because of diminishing returns, some resources, although always less than half the total, should be used for the short-term unemployed.

Empirically, we believe that two areas of research are likely to prove particularly fruitful in assessing the effectiveness of transition-based active labour market policies. More macroeconomic evidence is needed to assess the impact of policy on unemployment, notwithstanding the considerable difficulties involved. We suspect that the lack of degrees of freedom and the difficulties in comparing widely different policy design and implementation will seriously hamper cross-country studies, even if the problem of simultaneity can be addressed. Hence we suspect that single-country, and ideally single-policy, studies will prove more practical. Some attempts have been made to tackle the problems of identification at this level. Natural experiments may provide important new data in the future.

Secondly, virtually all the existing theory, and much of the evidence, is static. Long-term effects, especially of wage subsidies, have received little attention, despite the claims of subsidy advocates that they at least as important as the immediate effects (Layard, 1996). The focus of policy initiatives is gradually shifting towards the fashionable, if somewhat ill-defined, notion of 'employability'. Yet our knowledge of what happens to participants in wage subsidy programmes, once the subsidies expire, is minimal. In Chapter 5, we make an attempt to examine this issue, using data on Australian youth who participated in wage subsidies in the mid-1980s. We show that there is only weak evidence of subsidised jobs ending with subsidy expiry, and that instead the effect of subsidies appears to be to extend very short duration jobs. Furthermore, we find a substantial and strongly significant positive impact on the probability of being employed between 1 and 2 years after subsidy expiry.

2. Can Active Labour Market Policy Work?

Persistent high unemployment in Europe has led to renewed interest in Active Labour Market Policy. However, most existing theory suggests that its effects are ambiguous at best. We argue that job search assistance and wage subsidies are more appropriately modelled as a transition rather than the state-based approach of existing theory. This eliminates the ambiguity. We present two main models, one in which negative duration dependence in unemployment arises from state dependence, the other where it is due to heterogeneity. In both cases policy is unambiguously effective provided it is targeted on those who are, or are most likely to become, long-term unemployed.

2.1 Introduction

The persistence of high unemployment in much of western Europe has led to renewed interest in active labour market policies (ALMPs). Yet, although there is a wealth of micro level studies (see Chapter 1) there have been few attempts to model ALMPs explicitly in a general equilibrium context. This is despite the fact that success of the programmes at micro level is neither sufficient nor necessary for ALMP to reduce aggregate unemployment: successful programme effects may simply substitute one group of unemployed for another, or be offset by increased wage pressure (Calmfors and Forslund, 1991; Calmfors and Lang, 1995). Conversely even apparently useless schemes may be effective by reducing wage pressure among workers keen to avoid ending up on them (Jackman, 1994).

Compounding the difficulties in interpreting the micro-level studies, most of the attempts at macroeconomic modelling have concluded that the effect of policy is ambiguous (Holmlund and Lindén, 1993; Aarnio, 1993; Jackman, 1994; Calmfors and Lang, 1995). Typically, increased competition for jobs among the unemployed and improvements in the matching process are offset by reduced welfare loss for the unemployed and possible reduced search whilst on programmes, leaving the overall effect uncertain. At a time when governments are being urged to allocate increased resources to active labour market policy, the message is far from clear.

However, we argue that the ambiguity in existing models arises out of a view of active labour market policy that is not universally applicable. An understandable tendency to model policy along Swedish lines has led to an emphasis on scheme-based ALMP, where policy is seen as the creation of an explicit state into which unemployed workers are placed (Snower, 1994, and Layard, 1997, are exceptions). Exit rates both during and after scheme-participation, together with in-scheme conditions, offer a host of policy parameters and consequent scope for ambiguity.

By modelling policy as a transition, rather than a state, we are able to obtain simple and unambiguous effects. Provided policy is targeted on those who are, or who are most likely to become, long-term unemployed, ALMP leads to a fall in equilibrium unemployment. We believe that this approach is particularly suited to modelling job search assistance and wage subsidies. For the moment, however, we model policy in a stylised manner, taking the effect of policy to be an increase in the outflow rate of the target group relative to untargeted unemployed workers. We assume that the target group are at some disadvantage within the pool of unemployed, and that the effect of policy is to narrow that disadvantage[1]. It seems reasonable to suppose that well-designed policies are capable of achieving at least this, and the question that we are interested in is what the aggregate effects of such policies are in general equilibrium. In the next chapter, we model both job search assistance and wage subsidies explicitly.

We look exclusively at targeted policies, in particular those targeted at the long-term unemployed, or those at risk of becoming long-term unemployed. We return to the question of whether targeting is optimal in Chapter 4. One of the main justifications for the targeting of many active labour market policies onto the long-term unemployed has been the widespread observations of falling outflow rates as unemployment durations rise (Layard *et al*, 1991). We present two sets of models, one in which negative duration dependence among the unemployed is a consequence of state dependence, and one where it is due to heterogeneity among the unemployed.

Section 2 below sets out the assumptions we make in modelling policy as a transition rather than a state, and considers the supporting evidence. Sections 3 and 4 consider the state dependence case with efficiency wages and union bargaining respectively. Section 5 sets out three variants of the model under the alternative assumption of heterogeneity. Section 6 concludes.

2.2 Active Labour Market Policy as a Transition

The OECD (1993) categorises active labour market policies into five types: temporary job creation; training; job search assistance; wage subsidies for regular employment; and assistance for those starting their own enterprises. Of these only the first is unambiguously a separate state within the labour force. Trainees are arguably out of the labour force altogether, whilst the availability of job search assistance, wage or self-employment subsidies do not constitute a separate state into which the unemployed are placed, but rather act to increase transition probabilities into regular (or self) employment. Wage formation in self-employment is not adequately captured within our model, but such programmes are inevitably on a limited scale since self-employment is of interest to only a small sub-group of the unemployed (US Department of Labour, 1995). By capturing the effects of job search assistance and wage subsidies we consider that our transitions approach is at least as relevant as the predominant state-based models.

We model policy in the simplest possible way, as an increase in the relative outflow rate of those on whom the policy is targeted. It is easy to see within the models that this implies an increase in their absolute outflow rate as well, but overall outflow rates are of course endogenous. Implicit in this is the idea of a matching function with the potential for productivity gains (Pissarides, 1990), and we will make extensive use of this framework in Chapters 3 and 4. However, for the moment we do not explicitly model search. As Calmfors and Lang (1995) show, the introduction of search does not affect the wage-setting schedule, which is our primary focus here.

We take it for granted that well-designed programmes are capable of increasing the outflow rates of those who participate in them, at least relative to other unemployed workers. Furthermore we assume that not all of this effect is simply 'queue jumping' at the expense of other members of the target group (although it may be at the expense of other unemployed workers not in the target group), so that the relative outflow rate for the target group as a whole rises. Alternatively, we could assume that the programme covers the whole of the target group so that the possibility of queue jumping within the target group does not arise.

Job search assistance is straightforward to model in this way. Such programmes do not carry the risk of reduced search for their duration, which is anyway typically very short. Nor do they generally involve enhanced benefit payments beyond some possible token element to cover expenses. Hence their sole effect is through increasing outflow rates of the target group. One of the few areas of agreement among the micro studies is that job search assistance programmes generally succeed in increasing outflow rates among participants (Fay, 1996).

Modelling wage subsidies as a transition involves a greater degree of simplification, but we believe that it captures a central feature of wage subsidy programmes, namely that they provide a direct entry into regular employment. Moreover, by ignoring the possible effects of subsidies on labour demand, we are taking an overtly pessimistic view of what wage subsidies can achieve.

The impact of wage subsidies is generally disaggregated into four effects:

i) *Deadweight*: where the vacancy would anyway have been filled by someone eligible for the subsidy so that the hiring decision is unaffected.

ii) *Substitution*: where the vacancy would otherwise have been filled by another unemployed person from outside the target group.

iii) *Displacement*: where firms receiving the subsidy are able to win orders at the expense of competitors, leading to a drop in labour demand in rival firms.

iv) *Additionality*: Net expansion of labour demand.

We consider only the case where deadweight is less than total so that the subsidy has at least some effect. Although measures of deadweight are often high (OECD, 1993; Fay, 1996), they are always less than 100%. Provided that the programme has a reasonable degree of coverage and that the target group have a low initial outflow rate this condition is certain to be met.

Although difficult to measure, displacement effects are generally found to be quite small (Atkinson and Meager, 1994; Breen and Halpin, 1989), in part because subsidies are relatively low and most firms take on only one or two subsidised workers. We deal with endogenous job destruction in detail in Chapter 4. For simplicity, we will

assume here that displacement occurs through natural wastage rather than redundancies, so that the job separation rates are unaffected. Hence we can treat displacement as another form of substitution: the hiring of a subsidised worker at the expense of an unsubsidised one, where now the unsubsidised worker would have been employed at a rival firm.

This leaves additionality. All the micro studies identify this as the measure of success. Implicit in this view is the assumption that the policy acts by increasing labour demand at given wages, a view that can be traced back to Kaldor (1936) and Pigou (1933). However, the studies suggest that the contribution of additionality, (measured at firm level, ie in partial equilibrium), is relatively modest, at most about one-quarter of the total. Even this may be an over-estimate, since studies are typically based on surveys of employers who may have an incentive to disguise substitution.

Instead, we shall assume that there is no effect on labour demand, turning the conventional criterion of programme success on its head. Net of deadweight, we shall treat wage subsidies as having a pure substitution effect. It is easy to see that this is precisely equivalent to an increase in the relative outflow rate of those eligible for the subsidy, at given labour demand. Formally, therefore, we are providing an analysis only of the substitution effects of wage subsidies and not also of their labour demand effects. The neglect of the macroeconomic implications of these substitution effects in most past studies provides sufficient justification for this approach. We will return to the labour demand effects in Chapters 3 and 4.

One further issue remains, however: whether expiry of temporary subsidies will lead to higher separation rates for subsidised workers. We have seen, in Chapter 1, that what little empirical evidence there is does not support this view. For the moment, therefore, we simply note that given that we are assuming that there is no effect on labour demand, then there is also no reason to suppose that the job would be terminated as a consequence of expiry of the subsidy. We go on to model endogenous job destruction in Chapter 4 and to consider the evidence in Chapter 5.

2.3 State Dependence

Two competing explanations for negative duration dependence exist. State dependence argues that unemployment itself leads to reduced subsequent outflow rates, whilst heterogeneity assumes that people differ in their outflow probabilities, so that low exit rate types are disproportionately represented among the long-term unemployed. Of course the two are not mutually exclusive, and moreover there are considerable empirical difficulties in distinguishing between them (Heckman, 1991). We do not wish to come down on one side or the other of this dispute, but will demonstrate instead that policy is effective whichever is the dominant cause of negative duration dependence.

We consider state dependence first, treating heterogeneity in Section 5 below. We model state dependence as a one-off fall in the relative outflow rate, after one period of unemployment. Unlike Calmfors and Lang (1995) who model duration dependence through a zero outflow state, this allows policy to be targeted on those who have already suffered duration dependence. Policy is then modelled as a reduction in the extent of state dependence, equivalent to an increase in the relative outflow rate of the long-term unemployed.

The model

We assume that wage determination follows the Shapiro-Stiglitz (1984) efficiency wage model. This ensures that we capture the possible effect of ALMPs in increasing wage pressure through reducing the utility loss involved in unemployment (see for example Calmfors and Forslund, 1991; Calmfors and Lang, 1995). In Section 4 below, we show that union bargaining over wages leads to identical conclusions.

Following Shapiro and Stiglitz (1984), we assume that workers in employment are paid a real wage, w, and have linear utility functions. They can choose either to work, in which case they must expend effort, e, or not work (shirk), in which case they are detected with probability, q, and fired. In addition, there is an exogenous probability of separation, s.

We model the structure of unemployment in the simplest possible way that will allow for targeting, having only two states: short-term and long-term. This captures a widespread feature of subsidies, whereby eligibility is determined by a simple

duration threshold. For example, in the UK's New Deal for 18-24s, young people become eligible for a subsidy after 8 months of unemployment (including 2 months on the New Deal Gateway). In the New Deal for 25+ long-term unemployed, the threshold is 2 years. We think that this is, therefore, the most appropriate approach, but clearly more complex structures might yield fewer unambiguous results, requiring more simulations of the kind used in Chapter 4.

After separation, a worker becomes short-term unemployed. If they fail to find a job within one period, they become long-term unemployed in the next period, and remain so until they exit. Exit rates from long-term unemployment are lower than from short-term unemployment by a factor, $0<\beta<1$, either because the long-term unemployed search less effectively or because employers discriminate against them. Hence, the exit rate from long-term unemployment is βa. Unemployed workers receive per period utility, b, including the value of leisure time as well as unemployment benefits.

Let W_E be the expected present discounted value of working, W_N be the expected present discounted value of not working (shirking), and U_{ST} be the expected present discounted value of short-term unemployment. We assume a stationary equilibrium, so that a worker choosing to work this period will make the same choice next period, and similarly for a shirker. Once unemployed, workers are indistinguishable, except by their unemployment duration, so that firms cannot tell whether an individual previously worked or shirked. It follows that:

$$(2.1)\quad rW_E = w - e + s(U_{ST} - W_E)$$

$$(2.2)\quad rW_N = w + (s+q)(U_{ST} - W_N)$$

Workers will choose to work only if $W_E \geq W_N$. Since shirkers produce zero output, it is always optimal for firms to set a wage such that workers choose to work, which implies from (2.1) and (2.2) that:

$$(2.3)\quad w \geq rU_{ST} + (r+s+q)e/q$$

Since there is no incentive for the firm to pay above the wage required to ensure that workers work rather than shirk, we assume that (2.3) holds with equality. Let W be the expected present discounted value of employment, given that firms pay the no-shirking wage, allowing us to rewrite (2.1) as:

$$(2.4)\quad W = \frac{w - e + sU_{ST}}{r + s}$$

Following Manning (1993), we allow that workers may exit from unemployment at the beginning of each period, and hence, following separation, workers have probability a of being immediately re-employed. This avoids the problem of unemployment being bounded below by the normal assumption that at least one period of unemployment follows separation. None of our results depend upon this assumption, but it does simplify the algebra somewhat. The Bellman equations for short- and long-term unemployment respectively are:

$$(2.5)\quad U_{ST} = aW + \frac{1-a}{1+r}(b + U_{LT})$$

$$(2.6)\quad U_{LT} = \beta aW + \frac{1-\beta a}{1+r}(b + U_{LT})$$

Where U_{LT} is the expected present discounted value of long-term unemployment.

Solving (2.3)–(2.6) yields:

$$(2.7)\quad w = b + e + \frac{e}{q}\left[(r+s) + \frac{a(r+\beta)}{1-a}\right]$$

Following Manning (1991) we define unemployment as the *end of period* stock, allowing for the fact that a proportion of those flowing into unemployment in any period also flow out during that period, and are thus not captured in empirical stock measurements. Let u_S, u_L be short- and long-term unemployment respectively. We normalise the labour force to unity, so that these are also the short- and long-term unemployment rates. Employment then equals $1-u$, where u is total unemployment.

Following Shapiro and Stiglitz (1984), we assume a stationary equilibrium. This is also the approach taken in the union bargaining and search models which we adopt below (Manning, 1991; Pissarides, 1990; Mortensen and Pissarides, 1994), and in most of the existing theoretical literature on active labour market policies (eg Aarnio, 1993; Piggott and Chapman, 1995; Holmlund and Lindén, 1993; Calmfors and Lang, 1995; Mortensen, 1996; Millard and Mortensen, 1997). However, it implies that the effects arising in our models are the effects on equilibrium unemployment, and may not hold in disequilibrium.

In stationary equilibrium flows into and out of each state must balance:

$$(2.8)\quad u_S = (1-a)s(1-u)$$

$$(2.9)\quad u_S(1-\beta a) = \beta a u_L$$

The end of period stock of short-term unemployment equals the per period inflow, less the proportion of the inflow who flow out during that period. Similarly, the remaining short-term unemployed, less those of them who flow out in the next period, make up next period's net inflow into long-term unemployment, which must equal the outflow from the existing stock. Solving gives:

$$(2.10)\quad a = \frac{1}{1+\beta u/s(1-u)}$$

whilst substituting (2.10) into (2.7) yields the wage-setting schedule:

$$(2.11)\quad w = b + e + \frac{e}{q}\left[r + s + \frac{s(1-u)(r+\beta)}{\beta u}\right]$$

which can easily be seen to be upward-sloping in wage-employment space. The model is closed by the labour demand schedule:

$$(2.12)\quad w = F'(1-u)$$

where $F(.)$ is the aggregate production function, with $F'(.) > 0, F''(.) \leq 0$, and which we assume to be independent of policy.

Policy

We model policy as an increase in the relative outflow rate of the long-term unemployed, β. We can obtain the effect of policy by equating (2.11) and (2.12) and differentiating. However, it will be easier to identify the offsetting effects by using (2.7) instead and substituting for a later. Furthermore, since we are assuming that the labour demand curve is unaffected by policy, we can focus exclusively on the marginal effect on the wage setting curve. Hence, from (2.7), we have:

$$(2.13)\quad \left.\frac{\partial u}{\partial \beta}\right|_{dw=0} = \left[-1\Big/\frac{\partial a}{\partial u}\right]\left[\frac{\partial a}{\partial \beta} + \frac{a(1-a)}{(r+\beta)}\right]$$

where:

$$(2.14)\quad \frac{\partial a}{\partial \beta} = \frac{-u/s(1-u)}{\left[1+\beta u/s(1-u)\right]^2} = \frac{-a(1-a)}{\beta} < 0$$

$$(2.15)\quad \frac{\partial a}{\partial u} = \frac{-\beta/s(1-u)^2}{\left[1+\beta u/s(1-u)\right]^2} < 0$$

From (2.13), we can see that there are two off-setting effects represented by the terms in the second bracket:

i) A competition effect, whereby increasing β reduces a since the short-term unemployed face greater competition for jobs. This increases the utility cost of unemployment, reducing wage pressure and lowering unemployment at given wages.

ii) A utility effect, whereby increasing β reduces the utility costs of long-term unemployment, pushing wage pressure up and increasing unemployment at any given wage level.

However, it is immediately obvious from (2.14) that the competition effect will dominate for any $r>0$. Because the utility gain to the long-term unemployed is discounted more heavily than the cost to the short-term unemployed from greater competition in the job market, the threat of unemployment becomes more severe. Hence a lower wage is needed to prevent shirking, which allows employment to rise.

Formally, we can solve out to give:

$$(2.16)\ \frac{du}{d\beta} = \frac{-r(1-u)u}{\beta\{(r+\beta) - F''(1-u)\beta q u^2/se\}} < 0$$

It follows that programmes targeted at the inflow into unemployment would have no effect, since as the length of a period tends to zero, $\beta \to 1$ and $r \to 0$, so that the effectiveness of policy will tend to zero.

It is also worth noting from (2.16) that $\frac{du}{d\beta} < 0$ does not require that $\beta<1$ and hence negative duration dependence is not a prerequisite for policy effectiveness, although it will increase the effectiveness of policy, since the lower is β, the higher is the proportion of u who are long-term unemployed.

Short-term unemployment

We have modelled wage subsidies as an incentive for employers to substitute long-term unemployed for short-term unemployed workers when hiring. Hence we would expect, even where policy is effective in reducing overall unemployment, that short-term unemployment will rise. Indeed, this is precisely the mechanism by which we can reduce unemployment without also reducing the disutility of unemployment, which would increase wage pressure.

Given that there is a fixed inflow rate, any policy that reduces unemployment will automatically increase the inflow into short-term unemployment, simply because $(1-u)$ is now greater. Of more interest, though, is the effect of policy on the outflow rate from short-term unemployment, a. It is easy to show from (2.10) that:

$$(2.17)\ \frac{da}{d\beta}=\frac{-a^2u}{s(1-u)}\left[1-\frac{r}{\{(r+\beta)-F''(1-u)\beta qu^2/se\}}\right]<0$$

So that the outflow rate from short-term unemployment always falls, but the higher the discount rate, r, the less the increase in short-term unemployment.

2.4 Union Bargaining

Union bargaining models of wage formation have been popular in the literature on active labour market policy (eg Calmfors and Forslund, 1991; Calmfors and Lang, 1995). Such models share with the Shapiro-Stiglitz model, and more widely with the concept of a non-accelerating inflation rate of unemployment (NAIRU), the presumption that unemployment acts as a discipline on wage setters, and hence counters upward wage pressure. Hence it is unsurprising that our results, which depend on the interaction of policy with the appropriately discounted utility of unemployment, carry over from the efficiency wage case.

Following conventional practise, we assume that the wage is set so as to maximise the Nash bargain:

$$(2.18)\ w_{it}=\arg\max V_{it}^{\chi}\Pi_{it}^{1-\chi}$$

where V_{it} is the utility of the union at time t; Π_{it}, the firm's operating profit, and χ the relative bargaining strength of the union. Following Manning (1993), we assume a union utility function of the form:

$$(2.19)\ V_{it}=N_{it}^{\psi}(W_{it}-U_{STt})$$

where N_{it} is the level of firm employment; ψ the union's preference for employment relative to wages; W_{it} the present discounted value of employment at the firm and U_{STt} the present discounted value of short-term unemployment.

If, as above, we assume that exits from unemployment occur at the beginning of each period, we can write the value functions as:

$$(2.20)\ W_{it} = \frac{1}{1+r}\left[v(w_{it}) + s_{it}U_{STt+1} + (1-s_{it})W_{it+1}\right]$$

$$(2.21)\ U_{STt} = a_t\overline{W}_t + \frac{1-a_t}{1+r}\left[v(b_t) + U_{LTt+1}\right]$$

$$(2.22)\ U_{LTt} = \beta a_t\overline{W}_t + \frac{1-\beta a_t}{1+r}\left[v(b_t) + U_{LTt+1}\right]$$

$$(2.23)\ \overline{W}_t = \frac{1}{1+r}\left[v(\overline{w}_t) + \bar{s}_t U_{STt+1} + (1-\bar{s}_t)\overline{W}_{t+1}\right]$$

where U_{LTt}, $\overline{W}_t$ are the present discounted values of long-term unemployment and outside employment respectively; $v(.)$ is the utility function of union members; b_t is the real value of unemployment benefits; s_{it} the probability of separation from the firm; and $\overline{w}_t$, $\bar{s}_t$ the wage and separation rate in outside employment.

If we assume that the wage is set for one period only, and that employment is set unilaterally by the firm, we can write the first order condition for the maximisation of (2.18) as:

$$(2.24)\ w_{it} = \mu(W_{it} - U_{STt}) \qquad \text{where: } \mu = \frac{1}{v'(w_{it})}\left(\psi\varepsilon_{Nw} + \frac{1-\chi}{\chi}\varepsilon_{\pi w}\right)$$

and ε_{Nw}, $\varepsilon_{\pi w}$ are the elasticities of employment and profits with respect to the wage. It is convenient to assume that μ is constant across time and independent of unemployment, at given wages. This would be the case, for example, with a Cobb-Douglas production function and constant union preferences, ψ, and power, χ, (Manning, 1993).

If we solve equations (2.20) – (2.24) for a stationary solution, and impose the equilibrium conditions $w_i = \overline{w} = w$, and $s_i = \bar{s} = s$, we obtain:

$$(2.25)\ w = \frac{\mu(1-a)}{(r+\beta a) + s(1-a)}\left[v(w) - v(b)\right]$$

Differentiating (2.25) with respect to u and β, holding the wage constant, yields:

$$(2.26)\quad \left.\frac{\partial u}{\partial \beta}\right|_{dw=0} = \left[-1\Big/\frac{\partial a}{\partial u}\right]\left[\frac{\partial a}{\partial \beta}+\frac{a(1-a)}{(r+\beta)}\right]$$

exactly as in the efficiency wage case. Since a is affected only by the flow equilibrium, and not by wage setting, we can see that the effect of policy is the same in the union bargaining case as in the efficiency wage model.

2.5 Heterogeneity

Existing models of active labour market policy under duration dependence have tended to assume state dependence as the cause (Calmfors and Lang, 1995; Layard, 1997). However, the empirical difficulties inherent in distinguishing state dependence from unobserved heterogeneity suggest that we should also consider the effects of policy under heterogeneity.

Furthermore, modelling heterogeneity allows us to examine another question of some policy interest. Suppose that we can distinguish, to some extent at least, those at risk of becoming long-term unemployed at the point where they enter unemployment. Australia's *Working Nation* programme, for example, included an early intervention strategy, which identified high risk workers using an automated screening system, supplemented by employment service staff assessments (DEETYA, 1996a). Should we target policy on such 'at risk' individuals immediately, or is it necessary to wait, in order to reap the benefits of discounting, as above?

Extending our model to examine heterogeneity, we find that the basic conclusion is the same as for the state dependence case. Policy is effective, provided that it is targeted at the less able. Furthermore, under heterogeneity, it is no longer necessary for policy to target the long-term unemployed directly. A policy of targeting those 'at risk', provided that they can be identified, can reduce aggregate unemployment. Given heterogeneity, the less able make up an increasing proportion of the unemployed as duration increases, so that targeting the less able, even in the inflow, implicitly targets the long-term unemployed.

We look first at the simplest case, where 'at risk' workers can be identified and policy is targeted on the inflow into unemployment. Below we extend this, first to the case where workers' type can still be identified, but policy is targeted on the long-term unemployed. This might be because type is not immediately revealed to the employment service, but can only be determined after a period of unemployment, or because policies are costly, and government prefers to intervene only after conventional job search has failed. Finally, we consider the case where type is not revealed, so that policy cannot be targeted explicitly on those with poor prospects. However, we assume that policy is targeted on the long-term unemployed, since deadweight would be very high if the short-term unemployed were also included and no distinction could be made between those with naturally high and low exit rates.

For simplicity, we revert to Shapiro-Stiglitz wage-setting, but the results from Section 3 above suggest that equivalent results would be found in the union bargaining case. We assume that there are two types of labour, with the least employable having an outflow rate γ times that of the most employable, where $0<\gamma<1$. This enables us to model policy as an increase in γ. We label workers with a high outflow rate 'good', and those with a low outflow rate 'bad', and assume that workers are good with probability π, and bad with probability $1-\pi$.

We also assume that employability is drawn randomly on entry into unemployment and is unemployment-spell-specific. Since we are interested in whether government should target 'at risk' individuals in the inflow, we are primarily interested in the case where type is observable. But if type were worker-specific, rather than unemployment-spell-specific, and observable, then there would be no differences in outflow rates, contradicting our initial assumption. Since there are always queues of workers in the Shapiro-Stiglitz framework, observably high type workers must be more desirable in order to have a higher exit rate. But then competition amongst firms would bid up the wage of high type workers, above the no-shirking wage for low type workers, until firms were indifferent between the two, in which case outflow rates would be equalised. Even if unobserved, worker-specific types lead to the perverse implication that those most likely to get hired are also those most likely to shirk. We prefer therefore to define type for the unemployment spell, so that it might refer to some stochastic element in the worker's search motivation or effectiveness.

Targeting the inflow

Define $\tilde{a}$ as the exit rate of good workers, so that $\gamma\tilde{a}$ is the exit rate of bad workers. Let U_G be the expected present discounted value of unemployment for good types, and U_B be the expected present discounted value of unemployment for bad types. Note that since we are assuming no state dependence, these will be independent of duration. Equations (2.1) to (2.4) continue to define the no shirking criterion, where U_{ST} is now given by:

$$(2.27)\ U_{ST} = \pi U_G + (1-\pi)U_B$$

whilst the remaining value functions are given by:

$$(2.28)\ U_G = \tilde{a}W + \frac{1-\tilde{a}}{1+r}\left[b + U_G\right]$$

$$(2.29)\ U_B = \gamma\tilde{a}W + \frac{1-\gamma\tilde{a}}{1+r}\left[b + U_B\right]$$

and hence:

$$(2.30)\ w = b + e + \frac{e}{q}\left[(r+s) + \tilde{a}(1+r)\left(\frac{\pi + \gamma(1-\pi)\lambda}{(1-\tilde{a})\pi + (1-\gamma\tilde{a})(1-\pi)\lambda}\right)\right]$$

where $\lambda = \left(\frac{r+\tilde{a}}{r+\gamma\tilde{a}}\right)$

Let u_G, u_B be the unemployment rate of good and bad types respectively, with the labour force normalised to unity. The stock of unemployed at duration i equals the inflow times the survival rate at duration i. We again define unemployment as the end of period stock, giving:

$$(2.31)\ u_G = \pi s(1-u)\sum_{1}^{\infty}(1-\tilde{a})^i$$

$$(2.32)\ u_B = (1-\pi)s(1-u)\sum_{1}^{\infty}(1-\gamma\tilde{a})^i$$

which gives:

$$(2.33)\ \tilde{a} = \frac{\gamma\pi + (1-\pi)}{\gamma\left[1 + u/s(1-u)\right]}$$

Policy

We treat γ as the policy variable. This implicitly assumes that policy covers all the bad type workers, and also that the effects of policy persist throughout the unemployment spell, or alternatively that bad type workers continue to be eligible for policy intervention at subsequent durations. Since most active labour market policy is targeted on those at longer durations, the assumption that policy available to the short-term unemployed would also be made available to the longer-term unemployed seems reasonable.

As before the model is closed by the aggregate labour demand function, (2.12), but it is again more illuminating to look at the shift in the wage-setting schedule. Differentiating (2.30) with respect to γ and u, holding the wage constant, gives:

$$(2.34)\ \left.\frac{\partial u}{\partial \gamma}\right|_{dw=0} = \left[-1\Big/\frac{\partial \tilde{a}}{\partial u}\right]\left[\frac{\partial \tilde{a}}{\partial \gamma} + \frac{\tilde{a}(1-\pi)}{\gamma(1-\pi)+\pi/\lambda^2}\right]$$

where:

$$(2.35)\ \frac{\partial \tilde{a}}{\partial \gamma} = \frac{-(1-\pi)}{\gamma^2\left[1+u/s(1-u)\right]} = \frac{-\tilde{a}(1-\pi)}{\gamma\left[\gamma\pi+(1-\pi)\right]} < 0$$

$$(2.36)\ \frac{\partial \tilde{a}}{\partial u} = \frac{-\tilde{a}}{s(1-u)^2\left[1+u/s(1-u)\right]} < 0$$

Hence, from (2.34) we can again see that there are competing competition and utility effects, as in the state dependence model. From (2.35) it is clear that if r=0 the effects will exactly cancel out. Furthermore, $\frac{\partial \lambda}{\partial r} < 0$ so that the utility effect is decreasing in r, whilst the competition effect is independent of r. Hence for any r>0 the competition effect will dominate, and policy will again be effective.

We also note that as $\gamma \to 1, \lambda \to 1/\gamma$ and hence the competition and utility effects will again exactly cancel, regardless of r. Thus if there is no heterogeneity, policy targeted on the inflow into unemployment will be ineffective.

Finally, we can solve out the entire system to give:

$$(2.37)\ \frac{du}{d\gamma} = \frac{-r(1-\gamma)\pi(1-\pi)s(1-u)^2[1+\gamma\lambda]}{\gamma^2(r+\gamma\tilde{a})\{\tilde{a}[\pi+\gamma(1-\pi)\lambda^2]-F''(1-u)qs(1-u)^2\xi/e(1+r)\}} < 0$$

where: $\xi = [(1-\tilde{a})\pi + (1-\gamma\tilde{a})(1-\pi)\lambda][1+u/s(1-u)]$

Heterogeneity and policy for the long-term unemployed

So far we have modelled policy under heterogeneity as targeting the inflow into unemployment, on the assumption that type is observable. The effectiveness of policy in this case contrasts with Calmfors and Lang's (1995, p. 601) conclusion that 'targeting the long-term unemployed is crucial for the success of ALMP'. However, in practice, policies are often targeted on the long-term unemployed in order to reduce deadweight, or because of difficulties in identifying those at risk of becoming long-term unemployed. This is particularly true of relatively expensive programmes such as wage subsidies. We look first at the case where type is still observed, but policy is targeted only on the long-term unemployed. Below, we consider the case where type is not observed.

Suppose that high exit rate workers have exit rate $\tilde{a}$ at all durations. Low exit rate workers have initial exit rate $\gamma\tilde{a}$. After one period of unemployment, however they are subject to policy and obtain exit rate $\beta_0\gamma\tilde{a}$, where β_0 is the policy variable, which we assume to be unity in the absence of intervention.

The wage equation now becomes:

$$(2.38)\ w = b + e + \frac{e}{q}\left[(r+s) + \tilde{a}\left(\frac{\pi(1+r)+\gamma(1-\pi)(r+\beta_0)\tilde{\lambda}}{\pi(1-\tilde{a})+(1-\pi)(1-\gamma\tilde{a})\tilde{\lambda}}\right)\right]$$

where: $\tilde{\lambda} = \left(\frac{r + \tilde{a}}{r + \beta_0 \gamma \tilde{a}} \right)$

and flow equilibrium gives:

$$(2.39)\ \tilde{a} = \frac{(1-\pi) + \beta_0 \gamma \pi}{\gamma\left[(1-\pi) + \beta_0 \pi + \beta_0 u / s(1-u)\right]}$$

Solving as before yields:

$$(2.40)\ \left.\frac{\partial u}{\partial \beta_0}\right|_{dw=0} = \left[-1 \Big/ \frac{\partial \tilde{a}}{\partial u} \right] \left[\frac{\partial \tilde{a}}{\partial \beta_0} + \frac{\gamma \tilde{a}(1-\gamma \tilde{a})(1-\pi)}{\gamma(1-\pi)(r+\beta_0) + \pi(1+r)/\tilde{\lambda}^2} \right]$$

where:

$$(2.41)\ \frac{\partial \tilde{a}}{\partial \beta_0} = \frac{-\tilde{a}(1-\gamma \tilde{a})(1-\pi)}{\beta_0\left[(1-\pi) + \beta_0 \gamma \pi\right]}$$

so that we can again see that the competition effect dominates, provided $r>0$ and $\beta_0 \gamma < 1$, ie provided the bad type continue to have lower exit rates even allowing for the effects of policy.

Unobserved type

Suppose instead that policy is targeted onto all the long-term unemployed, because type is unobserved. It is unclear *a priori* whether we should expect the effect of policy to be greater or less for high exit rate workers than for low exit rate workers. Let β_1 be the effect of policy on bad types, so that their initial exit rate is $\gamma \tilde{a}$, and thereafter their exit rate is $\beta_1 \gamma \tilde{a}$. Let θ be the effectiveness of policy for the good types relative to the bad types, so that good types have initial exit rate $\tilde{a}$, and exit rate $\theta \beta_1 \tilde{a}$ after one period of unemployment. The policy variable is now β_1.

The system is now determined by:

$$(2.42)\quad w = b + e + \frac{e}{q}\left[(r+s) + \tilde{a}\left(\frac{\pi(r+\theta\beta_1) + \gamma(1-\pi)(r+\beta_1)\hat{\lambda}}{\pi(1-\tilde{a}) + (1-\pi)(1-\gamma\tilde{a})\hat{\lambda}}\right)\right]$$

where: $\hat{\lambda} = \left(\frac{r+\theta\beta_1\tilde{a}}{r+\beta_1\gamma\tilde{a}}\right)$ and:

$$(2.43)\quad \tilde{a} = \frac{[(1-\pi)+\gamma\pi]}{\gamma[1+\beta_1 u/s(1-u)]}$$

so that the policy effect is now:

$$(2.44)\quad \left.\frac{\partial u}{\partial \beta_1}\right|_{dw=0} = \left[-1\Big/\frac{\partial \tilde{a}}{\partial u}\right]\left[\frac{\partial \tilde{a}}{\partial \beta_1} + \frac{\tilde{a}[\theta\pi(1-\tilde{a}) + \gamma(1-\pi)(1-\gamma\tilde{a})\hat{\lambda}^2]}{\pi(r+\theta\beta_1) + \gamma(1-\pi)(r+\beta_1)\hat{\lambda}^2}\right]$$

$$(2.45)\quad \frac{\partial \tilde{a}}{\partial \beta_1} = \frac{-\tilde{a}[\gamma\pi(1-\tilde{a}) + \theta(1-\pi)(1-\gamma\tilde{a})]}{\beta_1[\gamma\pi + \theta(1-\pi)]}$$

so that, once again, the competition and utility effects cancel out if r=0, and the competition effect dominates for any r>0, provided θ is not too large. In particular, policy will always be effective if $\theta > \gamma$, so that, even allowing for policy, the good type have a higher exit rate, and $\theta \leq 1$, so that the bad type gain at least as much from policy as the good type.

The optimal timing of interventions

From (2.16), (2.37), (2.40) and (2.44) we can see that, under each of our sets of assumptions, policy is increasingly effective as r increases. Both greater discounting and a lower probability of remaining unemployed long enough to enter the programme reduce the wage-increasing utility effect as the target duration increases. This suggests that maximum policy effectiveness can be achieved by targeting the very long-term unemployed. Against this, however, we need to consider the likely increased difficulty of improving outflow rates at longer durations. To the extent that demoralisation and adaptation to a life on benefits set in (see for example, Warr and Jackson, 1987; Winefield and Tiggeman, 1989), the costs of achieving a given

improvement in outflow rates will rise with duration. Without more detailed empirical estimates of these offsetting effects, we cannot say more than that policy should only be targeted onto the inflow into unemployment when heterogeneity is important, and we can identify those at risk of becoming long-term unemployed.

2.6 Conclusion

Existing models of active labour market policy have tended to treat ALMP as a state into which the unemployed are placed, and which may or may not lead to an exit into employment. This is particularly true of the few general equilibrium models that take into account the possible effects on wage-setting. This literature has tended to have somewhat pessimistic conclusions as to the effectiveness of active labour market policy, whilst most of the models are both complex and produce frequently ambiguous results.

We argue that this state-based approach is relevant only to policies of direct job creation and training. Alternative active labour market policies, in particular job search assistance and subsidies to regular employment, do not constitute a separate state within the labour force. Instead, they act to increase the probability of making the transition from unemployment to employment. By modelling policy as a transition, rather than a state, we can better capture the effects of these types of ALMP. Moreover, we have shown that this approach allows us to generate unambiguous results within a relatively simple framework, even ignoring any potential benefits from increased labour demand.

We have presented a number of closely-related models of active labour market policy in a macroeconomic framework. These take the possibility of programme effectiveness at micro-level (for the participants) for granted, instead asking what the general equilibrium effects of such policies would be. Our results suggest that policies that involve directly improving an unemployed person's chances of obtaining a regular job, rather than sending them onto a scheme, are unambiguously effective provided that they are targeted on those who are, or are likely to become, long-term unemployed.

Our models start from the widely observed phenomenon of negative duration dependence, and we treat policy under the alternative assumptions of state dependence

and worker heterogeneity. Our main conclusion, that policy can be unambiguously effective holds regardless of which of these is the dominant cause of negative duration dependence. With state dependence, we find that policy must be targeted on the long-term unemployed to work, in line with Calmfors and Lang (1995). However, where there is heterogeneity among the unemployed, this result need not hold. Provided that those with low outflow rates can be identified, policies targeted on less employable workers in the inflow will reduce aggregate unemployment. Especially where policies are relatively cheap to implement, there may be a strong case for employment services seeking to identify those at risk of becoming long-term unemployed, and intervening early.

1. Strictly, we only require that the target group is disadvantaged in the case of heterogeneity. With state dependence, policy would still be effective under positive duration dependence, although less so than with negative duration dependence. However, the widely-observed decline of outflow rates with duration suggests that positive duration dependence is of little policy interest.

3. Targeted Wage Subsidies and Job Search Assistance

We build on the models in Chapter 2, introducing labour demand effects into the model to develop explicit models of targeted wage subsidies and job search assistance. Modelling job search intensity as an endogenous choice highlights the importance of interactions between job search assistance and 'actively seeking work' requirements in the unemployment benefit system. If policy simply cuts the cost of search, the short-term unemployed will search less, anticipating lower future costs, whilst the long-term unemployed will take part of the reduced cost as extra consumption. However, where the benefit system mandates search intensity, these effects can be avoided, leading to reduced unemployment. We go on to model wage subsidies, under the assumption that falling outflow rates with unemployment duration arise from genuine state dependence. One firm's hiring decision is then an externality for other firms. Hiring a short-term unemployed worker reduces the average quality of the remaining unemployed pool faced by other firms with vacancies. A subsidy targeted at the hiring of long-term unemployed workers can overcome this externality, reducing unemployment.

3.1 Introduction

Job search assistance and wage subsidies, in particular programmes targeted at the long-term unemployed, are the predominant forms of 'transition-based' active labour market policy. Whereas there is general agreement that measures to enhance job search assistance are effective (Fay, 1996), wage subsidies have always attracted opposition on the grounds that they have very high levels of deadweight and substitution: those who are helped by the scheme either didn't need help or were only helped at the expense of someone else. Perhaps because there is less public money at stake, evaluation of job search assistance programmes has not become bogged down in the discussion of substitution and displacement effects, even though such issues are potentially just as relevant, or irrelevant.

In the previous chapter, we argued that the scepticism arising from substitution effects was a consequence of partial equilibrium analysis. If we consider substitution in the context of equilibrium wage-setting models, the positive effects of policy on the long-term unemployed are discounted relative to any negative effects on the short-term unemployed. This implies that what is generally identified as an entirely negative substitution effect would instead reduce unemployment by reducing wage pressure.

Here we extend that approach into a fuller general equilibrium setting, looking in more depth at the behaviour of both individuals and firms. Search theory provides a natural framework in which we can account for labour demand as well as wage-setting. Using a general framework similar to Pissarides (1990), we develop explicit models of both job search assistance and wage subsidies, targeted towards the long-term unemployed.

Somewhat contrary to the received wisdom, we find that wage subsidies have an unambiguous negative effect on unemployment, whilst job search assistance can have ambiguous effects. If unemployed workers' search intensity is fully endogenous, then short-term unemployed workers will respond to job search assistance targeted to the long-term unemployed by cutting their own search intensity. Although the search intensity of the long-term unemployed will generally increase, they too will take some of benefit of job search assistance as higher consumption. Overall the effect on unemployment is ambiguous.

However, if the search intensity of the long-term unemployed, or of all the unemployed, is constrained from below by requirements of the benefit system, then job search assistance will unambiguously lead to a reduction in unemployment.

Wage subsidies for the long-term unemployed also unambiguously reduce unemployment. Subsidies directly reduce the costs of hiring to any firm that hires the long-term unemployed, and hence increase labour demand. But they also reduce the costs faced by other firms. Because the long-term unemployed are now more 'employable', the expected duration of vacancies falls and hence their expected cost, so that more firms are induced to open vacancies. Furthermore, more of the unemployed are 'higher quality' short-term unemployed, further reducing the cost of recruiting.

In addition, the wage pressure effects discussed in the previous chapter continue to exert downward pressure on unemployment. However, it is no longer clear what the effect will be on short-term unemployment. Here, the substitution effects that are generally assumed to increase short-term unemployment bring about positive externalities and the effect on short-term unemployment is ambiguous. At best, in general equilibrium there may be no substitution effects. Both short- and long-term unemployment can fall. At the least, the estimates of substitution derived from partial equilibrium analysis of wage subsidies are overstated.

Section 2 below examines the effects of job search assistance under varying assumptions about the benefit system, and consequent constraints on the search intensity of the unemployed. Section 3 looks at the effects of a subsidy to employers who hire the long-term unemployed. Section 4 concludes.

3.2 Job Search Assistance

Job search is intimately linked with the unemployment benefit system. We shall assume, for simplicity, that all the unemployed are entitled to unemployment benefits, but also subject to the requirements of the benefit system. In particular that they may be bound by conditions about the amount of job search that they undertake: 'actively seeking work' requirements. We shall further assume that, although these requirements may be binding on the unemployed, they are never sufficiently onerous to deter people from the benefit system altogether.

Whether the benefit system imposes binding job search requirements on the unemployed affects not only their behaviour, but also the policy instruments to which government has access. If the system binds, then government can act directly on the job search intensity of the affected group, but if there are no binding restrictions (and assuming that we do not impose any), then government can only act indirectly, altering the incentives to search.

We consider models in which there are two groups of unemployed workers, the short-term unemployed and the long-term unemployed, and we consider only policies targeted on the long-term unemployed. We start with the most general case, where search intensity

is fully endogenous, with no binding requirements from the benefit system. The policy instrument in this case is the cost of search for the long-term unemployed.

We then consider restrictions on the unemployed's choice of search intensity. Firstly we suppose that the benefit system binds on both short- and long-term unemployed. Secondly we consider the case where there are no binding requirements on the short-term unemployed, but search intensity is binding for the long-term unemployed. This latter case might arise either endogenously, if the required level of job search falls between the optimum levels of the long- and short-term unemployed, or through choice of policy instrument if search intensity binds on the long-term unemployed precisely because of our policy. The remaining possibility, that search intensity is binding only for the short-term unemployed can also easily be considered within our framework, but seems of little policy relevance.

A model of job search assistance

We start from the concept of an aggregate matching function of the form:

$$(3.1) \quad x = x(c_S u_S + c_L u_L, v)$$

where x is the total number of matches per period, v is the number of vacancies, c_S and c_L the (average) 'search effectiveness' of the short- and long-term unemployed and u_S and u_L are short- and long-term unemployment. We normalise the labour force to unity, so that these are also unemployment rates. We might consider c_S, c_L as the number of 'units of search' provided by short- and long-term unemployed workers, so that $c_S u_S + c_L u_L$ is the total number of 'units of search' in the market, sometimes referred to as cu. We assume that the matching function is increasing in both its arguments and exhibits constant returns to scale. The CRS assumption is widely supported in the empirical data (see for example, Pissarides, 1986; Blanchard and Diamond, 1989; Coles and Smith, 1996).

The probability that a given vacancy is matched is given by:

$$(3.2) \quad q = \frac{1}{v} x(c_S u_S + c_L u_L, v)$$

so that if we define labour market tightness, $\theta = v/(c_S u_S + c_L u_L)$, we can re-write (3.2) to give:

$$(3.3) \quad q = x\left(\frac{1}{\theta}, 1\right) = q(\theta)$$

where $q'(\theta) < 0$ and η, the absolute value of the elasticity of q, is between 0 and 1, from our constant returns to scale assumption.

Unemployed workers choose the intensity of their search, subject to a cost of searching. If an individual unemployed worker chooses search intensity c^i, the probability that they will get a job per period is given by:

$$(3.4) \quad p^i = \frac{c^i}{c_S u_S + c_L u_L} x(c_S u_S + c_L u_L, v)$$

The cost of search is given by $\kappa(c^i)$ for the short-term unemployed and $\mu\kappa(c^i)$ for the long-term unemployed, where $\kappa(0) = 0; \kappa' > 0; \kappa'' \geq 0$. If the long-term unemployed suffer from negative duration dependence we will have $\mu > 1$. Duration dependence might arise because employers discriminate against the long-term unemployed, so that fewer of their applications are acceptable, or because they become discouraged or lose contact with the labour market, and search less effectively. In addition, unemployed workers receive per period real benefits, b.

If W, U_{ST}, and U_{LT} are the expected present discounted values of employment, short- and long-term unemployment respectively, then we have:

$$(3.5) \quad rU^i_{ST} = b - \kappa(c^i_S) + p^i(c^i_S)\left[W^i - U^i_{ST}\right] + \left[1 - p^i(c^i_S)\right]\left[U^i_{LT} - U^i_{ST}\right]$$

$$(3.6) \quad rU^i_{LT} = b - \mu\kappa(c^i_L) + p^i(c^i_L)\left[W^i - U^i_{LT}\right]$$

Where c^i_S, c^i_L are the level of search intensity chosen by the worker when short- and long-term unemployed respectively. Unemployed workers will set their search intensity so as to maximise the expected present discounted value of unemployment. We assume that workers set their search intensity for that period only, so that W is independent of c^i. Maximising (3.5) and (3.6) gives:

$$(3.7)\quad \kappa'(c_S^i)+\frac{\partial p^i}{\partial c_S^i}\left[U_{LT}^i-W\right]=0$$

$$(3.8)\quad \mu\kappa'(c_L^i)+\frac{\partial p^i}{\partial c_L^i}\left[U_{LT}^i-W\right]=0$$

We then seek a symmetrical solution such that $c_S^i=c_S$ and $c_L^i=c_L$. However, from (3.4) we can obtain:

$$\frac{\partial p^i}{\partial c_S^i}=\frac{\partial p^i}{\partial c_L^i}$$

Furthermore, if we define the probabilities of exiting unemployment for the short- and long-term unemployed as:

$$p_S=\frac{c_S}{c_S u_S+c_L u_L}x(c_S u_S+c_L u_L,v)=c_S\theta q(\theta)$$

and $$p_L=\frac{c_L}{c_S u_S+c_L u_L}x(c_S u_S+c_L u_L,v)=c_L\theta q(\theta)$$

we can write:

$$\left.\frac{\partial p^i}{\partial c_S^i}\right|_{c_S^i=c_S}=\left.\frac{\partial p^i}{\partial c_L^i}\right|_{c_L^i=c_L}=\frac{p_S}{c_S}=\frac{p_L}{c_L}=\theta q(\theta)$$

and hence:

$$(3.9)\quad \kappa'(c_S)+\theta q(\theta)\left[U_{LT}-W\right]=0$$

$$(3.10)\quad \mu\kappa'(c_L)+\theta q(\theta)\left[U_{LT}-W\right]=0$$

We could solve (3.9) and (3.10) from the value functions to give expressions for the optimal levels of search intensity. However, it will prove simpler to solve a similar problem for wages first, and then substitute.

Vacancies, jobs and wages

Our basic unit of analysis is the job. Jobs are filled and productive or empty and vacant. Productive jobs produce per period output with real value y' and pay real wages w. It seems safe to ignore taxes completely when considering job search assistance, since the cost of such programmes is generally very small.

Vacant jobs incur a per period cost γ. We assume that employers are indifferent between short- and long-term unemployed, but this assumption is not restrictive since we could alternatively define μ such that the probability that a long-term unemployed worker will be acceptable to an employer is factored into their greater cost of searching. We also assume that if more than one applicant arrives at a vacancy then employers choose randomly from the pool of applicants.

Hence, the value functions for vacant and filled jobs will be given by:

$$(3.11)\quad rV = -\gamma + q(\theta)(J - V)$$

$$(3.12)\quad rJ = y' - w - s(J - V)$$

where V is the expected present discounted value of a vacant job; J is the expected present discounted value of a filled job; and s is the exogenous separation rate. We assume that there is free entry in vacancies, so that the value of vacancies, V, will be driven to zero in equilibrium, giving:

$$(3.13)\quad J = \frac{\gamma}{q(\theta)}$$

and hence:

$$(3.14)\quad y' - w - (r+s)\frac{\gamma}{q(\theta)} = 0$$

We assume that wages are set to maximise the Nash bargain:

$$(3.15)\quad \left(W^i - U^i_{ST}\right)^{\beta}\left(J^i - V\right)^{1-\beta}$$

Where the i superscript denotes the particular match, and β is a measure of the worker's relative bargaining power. The value function for W is given by:

$$(3.16)\quad rW^i = w^i + s\left(U_{ST} - W^i\right)$$

So that maximising (3.15) with respect to the wage gives:

$$(3.17)\quad W^i - U^i_{ST} = \frac{\beta}{(1-\beta)} J^i$$

However if we substitute the value functions for W^i and J^i we obtain:

$$w^i = rU^i_{ST} + \beta\left(y' - rU^i_{ST}\right)$$

From which it follows that there will be a single wage in symmetric equilibrium where $U^i_{ST} = U_{ST}$. Hence we can drop the i superscript. Solving the value functions, (3.5), (3.6) and (3.16) together with (3.17) and (3.13) gives the wage equation:

$$(3.18)\quad w = b - \left\{\frac{\kappa(c_S)\left[r + c_L\theta q(\theta)\right] + \mu\kappa(c_L)\left[1 - c_S\theta q(\theta)\right]}{1 + r + (c_L - c_S)\theta q(\theta)}\right\} + \left(\frac{\beta}{1-\beta}\right)\left(\frac{\gamma}{q(\theta)}\right)\left[r + s + \frac{\theta q(\theta)(rc_S + c_L)}{1 + r + (c_L - c_S)\theta q(\theta)}\right]$$

The wage equals the instantaneous value of the worker's outside option, unemployment, (suitably weighted by the probabilities of being short- and long-term unemployed), plus the worker's share of the surplus value of the filled job over the firm's and worker's combined outside options (where the firm's outside option is zero from the free entry condition).

Search intensity

We can use the Nash condition (3.17) and the free-entry condition (3.13), together with the value functions to give:

$$[U_{LT} - W] = \frac{1}{1+r+(c_L - c_S)\theta q(\theta)}\left[\kappa(c_S) - \mu\kappa(c_L) - \frac{\beta(1+r)}{(1-\beta)}\left(\frac{\gamma}{q(\theta)}\right)\right]$$

and hence we can obtain the optimum search intensity, given the wage-setting behaviour, from (3.9) and (3.10):

$$(3.19)\ \kappa'(c_S) + \frac{\theta q(\theta)}{1+r+(c_L - c_S)\theta q(\theta)}\left[\kappa(c_S) - \mu\kappa(c_L) - \frac{\beta(1+r)}{(1-\beta)}\left(\frac{\gamma}{q(\theta)}\right)\right] = 0$$

$$(3.20)\ \mu\kappa'(c_L) + \frac{\theta q(\theta)}{1+r+(c_L - c_S)\theta q(\theta)}\left[\kappa(c_S) - \mu\kappa(c_L) - \frac{\beta(1+r)}{(1-\beta)}\left(\frac{\gamma}{q(\theta)}\right)\right] = 0$$

which are simply the conditions that the marginal cost of search equals its marginal benefit for the short- and long-term unemployed respectively.

Flow equilibrium

Finally, to close the model, we assume a steady state, so that flows into and out of each state must be equal. It is convenient to assume that we measure unemployment within the period after inflows, but before outflows (see discussion of this in Chapter 4). If $u = u_S + u_L$ is the overall unemployment rate, we have:

$$(3.21)\ s(1-u) = u_S$$

$$(3.22)\ u_S\left[1 - c_S\theta q(\theta)\right] = c_L\theta q(\theta)u_L$$

Since short-term unemployment lasts only for one period, the existing stock must always have flowed out by the following period. Hence, the stock of short-term unemployed, measured before this period's outflow, is simply the inflow into unemployment. Similarly the inflow into long-term unemployment is made up of all those who were short-term unemployed at the end of the last period, less those who flow back into employment from short-term unemployment. Since we assume that the stocks are constant in equilibrium, this net inflow must equal the outflow from the pre-existing stock of long-term unemployed. Combining (3.21) and (3.22) gives:

$$(3.23)\quad u=\frac{s\left[1+(c_L-c_S)\theta q(\theta)\right]}{c_L\theta q(\theta)+s\left[1+(c_L-c_S)\theta q(\theta)\right]}$$

The model has five unknowns, u, θ, c_S, c_L and w determined by the five equations (3.14), (3.18), (3.19), (3.20) and (3.23). However, we can simplify somewhat by substituting w out between (3.14) and (3.18) to give:

$$(3.24)\quad y'-b+\left\{\frac{\kappa(c_S)\left[r+c_L\theta q(\theta)\right]+\mu\kappa(c_L)\left[1-c_S\theta q(\theta)\right]}{1+r+(c_L-c_S)\theta q(\theta)}\right\}-\frac{\gamma}{q(\theta)(1-\beta)}\left[r+s+\beta\theta q(\theta)\left(\frac{rc_S+c_L}{1+r+(c_L-c_S)\theta q(\theta)}\right)\right]=0$$

Policy

Policy comprises a reduction in the cost of job search for the long-term unemployed, which we model through a reduction in μ. Whilst this might involve the provision of some resources, such as at Job Clubs, it will more generally imply a reduction in the effort required per application, either following simple job search training or through more intensive referrals of vacancies.

If we define:

$$\lambda_1=(rc_S+c_L)\left[q(\theta)(1-\eta)\mu\kappa'(c_L)+\frac{\gamma\eta\theta q(\theta)\beta}{1-\beta}\right]+\frac{\eta\gamma}{1-\beta}(r+s)\left[1+r+(c_L-c_S)\theta q(\theta)\right]>0$$

we can differentiate (3.24), (3.19) and (3.20) and solve to give:

$$(3.25)\quad \lambda_1\frac{d\theta}{d\mu}=\theta q(\theta)\left[1-c_S\theta q(\theta)\right]\kappa(c_L)$$

$$(3.26)\quad \lambda_1\frac{dc_S}{d\mu}=\frac{\kappa(c_L)}{\kappa''(c_S)}\left\{q(\theta)(1-\eta)\mu\kappa'(c_L)+\frac{\gamma\eta\theta q(\theta)(\beta+r+s)}{1-\beta}\right\}$$

$$(3.27)\quad \lambda_1 \frac{dc_L}{d\mu} = \frac{\kappa(c_L)}{\mu\kappa''(c_L)}\left\{q(\theta)(1-\eta)\mu\kappa'(c_L) + \frac{\gamma\eta\theta q(\theta)(\beta+r+s)}{1-\beta}\right\} - \frac{\kappa'(c_L)}{\mu\kappa''(c_L)}\lambda_1$$

Hence, θ and c_s are both increasing in μ, whilst the effect on c_L is ambiguous. Thus a reduction in the cost of searching for the long-term unemployed, ie a reduction in μ, will lead to θ and c_s both falling. A fall in μ has an effect similar to an increase in unemployment benefit for the long-term unemployed. The costs of unemployment fall, which tends to push up wages, but there are no first-order effects on search intensity because we were initially at the optimum. Firms react to the increased wages by reducing the number of vacancies that they offer and hence θ falls. For the short-term unemployed, a fall in θ reduces the returns to searching, and hence the incentive to search. In addition, the lower future cost of search reduces the incentive for current search. The short-term unemployed search less; c_s falls. The effect on c_L however is ambiguous. Both the marginal cost and the marginal return of searching fall, and hence search may increase or decrease depending on which effect dominates. Note, however, that if the absolute value of the elasticity of $\kappa(c_L)$ with respect to c_L is greater than or equal to unity, as for example with quadratic search costs, then c_L rises.

Unemployment

Finally, to obtain the effect on unemployment, we can differentiate (3.23) to give:

$$(3.28)\quad \frac{du}{d\mu} = \frac{-s(1-u)}{c_L\theta q(\theta) + s\left[1+(c_L-c_s)\theta q(\theta)\right]} \times \left\{\theta q(\theta)\frac{dc_s}{d\mu} + \frac{\left[1-c_s\theta q(\theta)\right]}{c_L}\frac{dc_L}{d\mu} + \frac{q(\theta)(1-\eta)}{\theta q(\theta)}\frac{d\theta}{d\mu}\right\}$$

Which is clearly ambiguous in general. The effect is similar to the point made by Jackman (1994) and Calmfors and Lang (1995) that if active labour market policies reduce the cost of unemployment to the unemployed, then that may offset the beneficial effects from increased incentives. Unlike policies which directly impact on outflow probabilities, reducing the cost of search allows the long-term unemployed to take at least some of the gains from policy in the form of increased utility in unemployment, for which there is no offsetting loss to the short-term unemployed.

Constrained search intensity

Ambiguity arises in the model in part because the short-term unemployed anticipate reduced search costs in the future, and hence reduce current search. Suppose, however, that job search intensity is mandated by the benefit system, for example through requirements to be 'actively seeking work' (see Atkinson and Micklewright, 1991 for a general discussion of these issues).

We consider first the case where the benefit system imposes binding minimum search levels on all unemployed workers, which is equivalent to both c_S and c_L being determined exogenously from the perspective of workers. Note that this not only changes the determining equations, but also the choice of policy instrument. If the policy-maker can directly influence search intensity, then the level of search becomes a potential policy instrument. Moreover, if search requirements are binding, then altering the costs of search, at the margin at least, will have no effect. Workers are already searching more than they would choose to. Hence search intensity is the only relevant policy instrument. This does assume however, that a mandated increase in search activity corresponds to an increase in search effectiveness. With a one-dimensional search strategy this follows automatically, but in the presence of differing search strategies, a mandated increase in intensity may lead to substitution between different search techniques, with potentially negative effects on search effectiveness (Thomas, 1996; 1997; 1998).

With binding requirements for all the unemployed, the endogenous search intensity choice equations (3.19) and (3.20) no longer hold. Instead, θ is determined by (3.24), given which u can be obtained from (3.23) and w from (3.14). If we define the marginal benefit of search as:

$$\xi = \frac{\theta q(\theta)}{1+r+(c_L - c_S)\theta q(\theta)}\left[\mu\kappa(c_L) + \frac{\beta(1+r)}{(1-\beta)}\left(\frac{\gamma}{q(\theta)}\right) - \kappa(c_S)\right]$$

and differentiate (3.24) with respect to c_L we obtain:

$$(3.29)\left\{\lambda_1 - q(\theta)(1-\eta)(rc_S + c_L)\left[\mu\kappa'(c_L) - \xi\right]\right\}\frac{d\theta}{dc_L} = \theta q(\theta)\left[1 - c_S\theta q(\theta)\right]\left\{\mu\kappa'(c_L) - \xi\right\}$$

Where the left hand term is positive, and reduces to λ_1 if search intensity is optimal, from (3.20). Similarly, if we were at the optimum level of search intensity, then the right-hand side would equal zero, (from the envelope theorem). However, if we assume that c_L is bounded below by restrictions in the benefit system, then it must be that the marginal cost of search exceeds the marginal (private) benefit, and hence the right-hand side is positive. By further increasing the search requirement, we are reducing the utility of unemployment, in much the same way as a reduction in benefits for the long-term unemployed. This lowers wage pressure, causing firms to open more vacancies, so that θ rises. Hence, if we let:

$$\lambda_2 = \lambda_1 - q(\theta)(1-\eta)(rc_S + c_L)\left[\mu\kappa'(c_L) - \xi\right]$$

we have:

$$\left.\frac{du}{dc_L}\right|_{dc_S=0} = \frac{-s(1-u)\left[1-c_S\theta q(\theta)\right]}{c_L\lambda_2\left\{c_L\theta q(\theta) + s\left[1+(c_L-c_S)\theta q(\theta)\right]\right\}} \times \left\{\lambda_2 + c_L q(\theta)(1-\eta)\left[\mu\kappa'(c_L) - \xi\right]\right\} \tag{3.30}$$

Unemployment unambiguously falls. There is a direct effect, because increased search by workers is a positive externality for firms, who respond by opening more vacancies. In addition, there is an indirect effect, since increased search requirements act like a reduction in benefits for the long-term unemployed, reducing wage pressure.

Partially endogenous search

Many labour market programmes are targeted solely on the long-term unemployed. The short-term unemployed have high exit rates, and correspondingly high levels of deadweight in any programmes targeted on them. Furthermore, it is often argued on equity grounds that policy should be targeted at the most disadvantaged. It is therefore worth considering the effects of policy targeted directly on the search intensity of the long-term unemployed, but where the search intensity of the short-term unemployed is endogenous. Suppose that elements of the benefit system, such as compulsory attendance at Job Clubs or job search assistance courses, are binding on the long-term unemployed but are not applied to the short-term unemployed. Alternatively, a fixed 'actively seeking work' requirement may be binding only on the

long-term unemployed if their costs of search are higher, so that their optimal level of search is lower than that for the short-term unemployed.

As above, the long-term unemployed's search intensity optimisation, (3.20) no longer holds, but now we reinstate the equivalent for the short-term unemployed, (3.19). The policy variable is again c_L. Equations (3.14), (3.19), (3.23) and (3.24) determine the four unknowns, c_S, w, u and θ. Furthermore, the system is recursive, (3.19) and (3.24) determine c_S and θ. Unemployment then follows from (3.23) and wages from (3.14). As before, from (3.24), we obtain:

$$\lambda_2 \frac{d\theta}{dc_L} = \theta q(\theta)\left[1 - c_S \theta q(\theta)\right]\left\{\mu\kappa'(c_L) - \xi\right\}$$

and hence, from (3.19), we can then obtain:

$$\lambda_2 \frac{dc_S}{dc_L} = \frac{\left\{\mu\kappa'(c_L) - \xi\right\}}{\kappa''(c_S)}\left\{q(\theta)(1-\eta)\xi + \frac{\gamma\eta\theta q(\theta)(\beta + r + s)}{1-\beta}\right\} \geq 0$$

Because the long-term unemployed are now forced to search harder than they would choose, the costs of long-term unemployment rise. This tends to depress the wage, leading firms to open more vacancies. The increase in θ, and the greater costs involved in becoming long-term unemployed, increase the returns to search for the short-term unemployed, and hence the short-term unemployed are also induced to search harder. In contrast to the initial model, where c_S fell, we now find that both c_S and c_L rise. It is immediately obvious that unemployment must fall, since all the relevant variables are moving in the right direction.

$$\frac{du}{dc_L} = \frac{-s(1-u)\left[1 - c_S \theta q(\theta)\right]}{c_L \lambda_2 \left\{c_L \theta q(\theta) + s\left[1 + (c_L - c_S)\theta q(\theta)\right]\right\}} \times$$

$$\left\{\lambda_2 + c_L\left[\mu\kappa'(c_L) - \xi\right]\left[q(\theta)(1-\eta) + \frac{\theta q(\theta)}{\kappa''(c_S)\left[1 - c_S\theta q(\theta)\right]} \times \left(q(\theta)(1-\eta)\xi + \frac{\eta\gamma\theta q(\theta)(\beta + r + s)}{1-\beta}\right)\right]\right\} \tag{3.31}$$

3.3 Wage Subsidies for the Long-term Unemployed

Whilst job search assistance programmes are widely perceived as successful (OECD, 1993; Fay, 1996), they generally deliver only modest increases in outflow rates for participants. The persistence of high and long-term unemployment in many OECD countries during the 1980s and 1990s has led to a search for policies that offer a bigger impact. Disappointment with government training schemes has led to a growing interest in wage subsidies. In Australia, the *Jobstart* programme, introduced in 1985, accounted for 80% of placements of the long-term and very long-term unemployed by 1993 (Byrne and Buchanan, 1994), whilst in the UK, wage subsidies are central to the New Deal.

However, wage subsidy schemes have always attracted opposition on the grounds that they have very high levels of deadweight and substitution: those who were helped by the scheme either didn't need help or were only helped at the expense of someone else. Casey and Bruche (1985), for example, claim that the net employment effect is generally only about 10%. But this scepticism is based on a partial equilibrium analysis. The possibility that, in general equilibrium, targeting could reduce equilibrium wage pressure goes back to Baily and Tobin (1977). However, the claim that wage subsidies targeted on the long-term unemployed will not provoke inflationary pressures has been subject to little theoretical analysis since then. Snower (1994), for example, merely invokes it as an axiom.

In contrast, Calmfors and others have warned that active labour market policies could increase wage pressure (eg Calmfors and Forslund, 1990; 1991; Calmfors and Nymoen, 1990; Calmfors and Skedinger, 1995). Calmfors and Lang (1995) provides a comprehensive analysis of Swedish-style programme-based active labour market policy that formalises this notion.

However, Calmfors and Lang's analysis assumes that active labour market policies take the form of specific programmes into which the unemployed are placed, such as relief work or training schemes. Wage subsidies, like job search assistance, act differently. Their purpose is to increase the probability of transitions directly from unemployment into regular employment.

As with our models of job search assistance above, search theory provides a natural framework to model wage subsidies in general equilibrium. We abstract from search intensity, assuming that all workers search equally effectively, but introduce a degree of duration dependence arising from loss of human capital. It is well-known that the outflow rates from unemployment fall substantially with unemployment duration in most OECD countries (Layard *et al*, 1991). Various reasons have been suggested for this and there is a substantial literature on the extent to which this arises from agent heterogeneity or from true duration dependence (see Heckman, 1991). We saw in the previous chapter that the implications for policy are rather similar whichever of these is the case. For the UK at least, there is reasonable evidence that duration dependence is a genuine phenomenon (Arulampalam and Stewart, 1995; Jackman and Layard, 1991; Atkinson *et al*, 1984).

A number of reasons have been suggested for duration dependence including skill attrition, employer discrimination and worker demoralisation. The last of these is connected to our models of reduced search intensity above. Here we assume that duration dependence arises from skill attrition, but the model could equally be interpreted as one of employer discrimination, with employers requiring the subsidy to overcome their disutility of hiring the long-term unemployed. Employers certainly perceive the long-term unemployed as less able (Meager and Metcalf, 1987; DEETYA, 1996a), regardless of whether this is well-founded.

Subsidies and skill attrition

Suppose the government offers a subsidy to employers hiring long-term unemployed workers. We assume that there would be some provisions within the scheme to prevent 'subsidy-farming': firms which were laying off other workers would be ineligible. However, we do not impose any other restrictions on eligibility. Firms would not be required to show that vacancies would not otherwise have been created, nor would there be any restriction on their using the subsidy to replace workers who quit voluntarily.

For simplicity, we drop our previous assumptions about search intensity, assuming simply that all workers search costlessly at some uniform fixed intensity. Instead, we assume that long-term unemployment leads to an attrition of the skills of the long-term unemployed, and hence that firms must pay a cost for initial training when hiring the long-term unemployed. If this cost is too high it will be optimal for a firm

to reject the worker and continue searching either for a short-term unemployed worker, or a lower cost long-term unemployed worker. However, once training is provided, the worker becomes fully productive. Provided the worker is properly re-integrated into regular employment, there are no permanently damaging effects from long-term unemployment. This is consistent with the evidence from wage subsidy schemes that, beyond an initial period, the productivity of scheme participants and regular employees are the same (Arwady, 1988; Atkinson and Meager, 1994).

We further assume that the initial training cost is stochastic and match-specific. It is likely that individuals' various skills will decline in varying ways, which will affect their suitability differently for different potential jobs. Hence different individuals will need different patterns and extents of retraining for different jobs. Stochastic costs ensure that all unemployed workers have a positive probability of leaving unemployment, but that the probability is lower for the long-term than the short-term unemployed.

The basic idea is very similar to Pissarides' (1990) stochastic job matching model. Whereas Pissarides has a stochastic productivity that affects the worker for as long as they are in a given job, we assume that the stochastic element is an initial cost only, along the lines of Diamond's (1982) 'coconut' model. This has the advantage that it is the experience of employment, specifically here initial training, that restores productivity, whereas in Pissarides (1990) a low productivity worker can only regain productivity after a period of unemployment.

Separations

We assume that the separation rate, s, is fixed and exogenous. Within our model, this is entirely consistent. Once the initial training cost is paid, the worker is fully productive and hence the match always has positive value. Thus there is never any incentive for the firm to separate with the worker and we can assume that the rate of separation of subsidised workers is the same as unsubsidised workers.

In practise, however, there are two sources of concern about the interaction of subsidies and inflows. Firstly, that subsidised jobs will only be viable for as long as the subsidy is paid, and secondly that subsidies will create an incentive for firms to fire existing workers, so as to be able to take on subsidised workers in their place. There is little empirical evidence on either. Such data as there is suggests that separations when

subsidies expire are relatively rare. For example, RSGB (1996) found that 77% of *Workstart* participants who remained with the firm until the end of the subsidy period were still with the same employer three months later, whilst only 13% were unemployed. Where separations occurred it was earlier, because the employee was unsatisfactory. Overall, 55% of participants were employed three months after the end of the 12 month subsidy period. This compares favourably with the general experience of unemployed workers who exit into employment, 51.8% of whom return to unemployment within 12 months (Sweeney, 1996). We present further evidence supportive of our assumptions in Chapter 5.

We assume that the second effect is ruled out by the rules of the subsidy scheme, so that firms cannot simultaneously fire existing workers and hire subsidised replacements. Such rules generally apply to actual programmes, although no doubt some employers are able to evade them. There will also be an offsetting effect, since many jobs taken by the unemployed are for very short durations. Forty per cent return to unemployment within 6 months (Sweeney, 1996), and these jobs may be extended up to the duration of the subsidy (see Chapter 5). *A priori* it is not clear that subsidies will have a significant effect on inflows, so for the moment we assume that they are fixed. In the next chapter, we relax this assumption, introducing fully endogenous job destruction. Although our unambiguous algebraic results no longer hold, simulations suggest that our basic findings remain valid for reasonable parameter values.

A model of wage subsidies

As in our models of job search assistance, we start from the notion of an aggregate matching function, but now assume that all workers search costlessly and with equal intensity. By setting $c_S = c_L = 1$, equation (3.1) reduces simply to $x = x(u,v)$, where x is now the total number of contacts between firms and workers per period. Since there are differential costs across workers, not all contacts will now necessarily lead to matches. We further assume that contacts are random and that any vacancy is contacted by no more than one worker per period.

We now have $\theta = v/u$, so that the probability that any given vacancy is contacted by an unemployed worker is $q(\theta) = x(u,v)/v$. Since we are assuming that all workers search equally effectively, for the worker the probability of contacting a vacancy is independent of their unemployment duration, and is just $\theta q(\theta) = x(u,v)/u$.

Vacancies

Let σ be the proportion of short-term unemployed amongst the pool of people searching. Short-term unemployed workers are 'job-ready' – they have not yet suffered from any loss of human capital. Hence if a vacant job is contacted by a short-term unemployed worker, it can be filled with no additional cost[1]. Since, as we show below, there will be a single wage greater than the benefit level, both the firm's and the worker's acceptance decisions are trivial in this case and such matches will never be rejected.

However, if the vacancy is contacted by a long-term unemployed worker, the firm must pay an additional initial training cost, α, if it hires the worker. We assume that wages are set by Nash bargaining and subject to continuous renegotiation, or alternatively that only renegotiation proof contracts are agreed to. Hence the firm cannot pass on the cost to the worker. This is consistent with the empirical evidence that subsidised workers receive the same wages as regular workers, (Atkinson and Meager, 1994; Woodbury and Spiegelman, 1987). The long-term unemployed vary in how well matched they would be with any particular vacancy, and hence what costs would have to be incurred to make them fully productive. We assume, therefore, that *ex ante* the training cost α is unknown and drawn randomly from some underlying, known, distribution $G(\alpha)$. *Ex post*, once contact has been made, α is revealed and the firm can decide whether to accept or reject the worker with full information.

We assume that $G(\alpha)$ is continuous and at least once differentiable, and has finite range within the positive quadrant. Provided the lower support of $G(\alpha) \leq \gamma$, the long-term unemployed will always have a positive outflow rate. Since the firm must pay at least γ if it rejects the worker, it will always accept any worker whose training cost is less than γ. We also suppose that the upper support of $G(\alpha)$ is sufficiently above γ to ensure that rejection is optimal in some cases. Since the short-term unemployed are never rejected, this will generate negative duration dependence.

A subsidy ψ is payable when firms hire the long-term unemployed, financed by a proportional wage tax. Suppose the firm adopts a reservation training cost, α_r, hires all long-term unemployed workers with costs below α_r, and rejects all those with training cost above α_r. We show below that this is optimal, given that wages must be renegotiation proof. It follows that firms will hire a long-term unemployed worker, given that contact has been made, with probability $G(\alpha_r)$.

Let V be the expected present discounted value of a vacant job and J be the expected present discounted value of a filled job. We have:

$$(3.32)\ rV = -\gamma + \sigma q(\theta)[J - V] + (1-\sigma)q(\theta)G(\alpha_r)\left[J - V + \psi - E(\alpha|\alpha \le \alpha_r)\right]$$

Where r is the interest rate, E is the expectations operator, and the expectation term is the *ex ante* expected training cost of hiring a long-term unemployed worker, given that this cost is low enough that they are not rejected.

There is free entry of vacancies, and hence firms open vacancies until the marginal value of a vacancy is driven to zero, giving V=0.

Hiring

Once contact has been made between a vacancy and a worker, both parties must decide whether to accept or reject the match. We will show below that all jobs offer the same wage, which is always at least as great as unemployment benefit. Hence the worker's decision is trivial: workers always accept jobs if offered.

The firm's hiring decision is slightly more complex. The return to rejecting the worker is simply the value of a vacancy, V, which equals zero. If the firm is contacted by a short-term unemployed worker, then the return to hiring them is simply J, the value of a filled job. Since this is always positive, the decision is again trivial in this case. Firms always accept short-term unemployed workers. However, if the firm is contacted by a long-term unemployed worker, with a realised training cost of α^i, then the firm will only accept them provided the return is greater than zero:

$$J - \alpha^i + \psi \ge 0$$

Provided the wage is renegotiation proof, J will be independent of the training cost, α^i. Hence there will exist a unique reservation training cost, α_r, such that:

$$J - \alpha_r + \psi = 0$$

so that the firm will reject all workers with realisations of α greater than α_r, and accept all others. Hence, we can write:

(3.33) $J = \alpha_r - \psi$

Substituting (3.33) and the free entry condition V=0 into (3.32) gives the firm's vacancy opening, or job creation, condition:

(3.34) $$\frac{\gamma}{q(\theta)} = \sigma[\alpha_r - \psi] + (1-\sigma)G(\alpha_r)[\alpha_r - E(\alpha|\alpha \le \alpha_r)]$$

Filled jobs and wages

Filled jobs produce per period real output y' and pay real after tax wages of w and a proportional wage tax τ. Hence, the value functions for filled jobs, J, and for the worker of being employed, W, are the same as above, (3.12) and (3.16), except that now we must take account of taxation. Since we define w as the after-tax wage, the value function for J is now:

(3.35) $rJ = y' - w(1+\tau) - sJ$

Whilst that for W is unchanged:

$$rW = w + s(U_{ST} - W)$$

Wages are determined by Nash bargaining and must be renegotiation-proof, which implies that neither the sunk costs of training nor the benefits of subsidies form part of the wage bargain. Maximising the Nash bargain $(W^i - U_{ST})^{\beta}(J^i - V)^{1-\beta}$ now gives:

(3.36) $$W^i - U_{ST} = \frac{\beta}{(1-\beta)(1+\tau)} J^i$$

Taxes lead to the worker obtaining a lower share of the surplus to be bargained over. With a proportional wage tax, the higher the worker's share, and hence the wage, the greater is the loss to both parties through taxation. Maximising the available surplus therefore requires a lower worker's share the higher the tax rate.

By the same logic as in our job search assistance model, we can show that there will be a single wage, and hence we can drop the i superscripts. The probability that an unemployed worker will contact a vacancy is $\theta q(\theta)$. Since the short-term unemployed are always accepted, this is also their probability of being hired, whilst for the long-term unemployed the probability of being hired is given by $G(\alpha_r)\theta q(\theta)$. Hence, the value functions for unemployment are given by:

$$(3.37)\quad rU_{ST} = b + \theta q(\theta)[W - U_{ST}] + [1 - \theta q(\theta)][U_{LT} - U_{ST}]$$

$$(3.38)\quad rU_{LT} = b + G(\alpha_r)\theta q(\theta)[W - U_{LT}]$$

Where b is the per period real level of benefits. Substituting from (3.33) and solving for the wage equation gives:

$$(3.39)\quad w = b + \frac{\beta}{(1-\beta)(1+\tau)}(\alpha_r - \psi)\left[r + s + \frac{\theta q(\theta)[r + G(\alpha_r)]}{1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)}\right]$$

If we further assume that benefits are set to maintain a constant replacement ratio ρ then we have:

$$(3.40)\quad w = \frac{\beta}{(1-\beta)(1+\tau)(1-\rho)}(\alpha_r - \psi)\left[r + s + \frac{\theta q(\theta)[r + G(\alpha_r)]}{1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)}\right]$$

Combining equations (3.33), (3.35) and (3.40) gives the reservation training cost schedule:

$$(3.41)\quad y' - \frac{\beta}{(1-\beta)(1-\rho)}(\alpha_r - \psi)\left[r + s + \frac{\theta q(\theta)[r + G(\alpha_r)]}{1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)}\right] - (r+s)(\alpha_r - \psi) = 0$$

Flow equilibrium

Our flow equilibrium conditions are essentially the same as (3.21) and (3.22) above, except that now outflow rates are given by $\theta q(\theta)$ and $G(\alpha_r)\theta q(\theta)$:

$$s(1-u) = u_S$$

$$u_S\left[1-\theta q(\theta)\right] = G(\alpha_r)\theta q(\theta)u_L$$

Giving:

$$(3.42)\quad u = \frac{s\left[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right]}{G(\alpha_r)\theta q(\theta)+s\left[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right]}$$

Which is the Beveridge curve. Similarly, short-term unemployed searchers fail to find a job within one period with probability $1-\theta q(\theta)$, and flow into the pool of long-term unemployed searchers. In equilibrium this inflow equals the outflow from the pool of long-term unemployed searchers, giving: $\sigma\left[1-\theta q(\theta)\right] = (1-\sigma)G(\alpha_r)\theta q(\theta)$ and hence:

$$(3.43)\quad \sigma = \frac{G(\alpha_r)\theta q(\theta)}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}$$

Finally, we impose a balanced budget requirement:

$$(3.44)\quad \tau w(1-u) = \rho w u + \psi G(\alpha_r)\theta q(\theta)u_L$$

$$\text{where, } u_L = \frac{s\left[1-\theta q(\theta)\right]}{G(\alpha_r)\theta q(\theta)+s\left[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right]}$$

Total taxes must equal benefit payments to the unemployed plus subsidy payments to the per period flow out of long-term unemployment.

Policy

The model has six unknowns $\theta, \alpha_r, w, \tau, u$ and σ and is determined by the job creation condition, (3.34), the reservation training cost condition (3.41), the wage curve (3.40), the balanced budget constraint (3.44), the Beveridge curve (3.42) and the flow equilibrium condition (3.43). Moreover, the system is recursive. If we substitute σ from (3.43), then equations (3.34) and (3.41) are sufficient to determine

labour market tightness, θ, and the reservation training cost α_r. We can then solve for u and σ from (3.42) and (3.43) and w and τ from (3.44) and either (3.40) or, by substituting from (3.33), from (3.35).

The policy variable of interest is ψ, the level of subsidy offered to employers who hire the long-term unemployed. To obtain the effect of ψ on unemployment, wages and taxes we first need to differentiate (3.34) and (3.41) to obtain the effect on θ and α_r. Differentiating (3.41) is straightforward and yields:

$$(3.45)\quad \left\{\frac{y'}{(\alpha_r-\psi)}+\frac{\beta(\alpha_r-\psi)(1+r)G'(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]}{(1-\beta)(1-\rho)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]^2}\right\}\frac{d\alpha_r}{d\psi}+ \left\{\frac{\beta(\alpha_r-\psi)\left[r+G(\alpha_r)\right](1+r)q(\theta)(1-\eta)}{(1-\beta)(1-\rho)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]^2}\right\}\frac{d\theta}{d\psi}=\frac{y'}{(\alpha_r-\psi)}$$

Where all the terms are positive. However differentiating (3.34), given (3.43), yields:

$$(3.46)\quad \theta q(\theta)\left\{\sigma+(1-\sigma)G(\alpha_r)+\zeta\frac{\theta q(\theta)G'(\alpha_r)}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}\right\}\frac{d\alpha_r}{d\psi}+ \left\{-\eta\gamma+\zeta\frac{q(\theta)(1-\eta)\sigma}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}\right\}\frac{d\theta}{d\psi}=\theta q(\theta)\sigma$$

where: $\zeta=(\alpha_r-\psi)-G(\alpha_r)\left[\alpha_r-E(\alpha|\alpha\le\alpha_r)\right]=J-G(\alpha_r)\left[J+\psi-E(\alpha|\alpha\le\alpha_r)\right]$ the difference between the *ex ante* expected value of contacting a short-term unemployed worker versus contacting a long-term unemployed worker. We shall assume that subsidies are not so large that ζ becomes negative. The first and last terms of (3.46) are always positive, but the middle term is ambiguous: if η is sufficiently small it could be positive.

The term represents the (partial) marginal effect of an increase in labour market tightness on the *ex ante* expected cost of opening a vacancy. There are two offsetting components: an increase in θ makes it less likely that you will contact a worker in any period, tending to increase the cost of vacancies. However, there is also a compositional effect, an increase in θ means that more of the unemployed are short-

term unemployed. If the short-term unemployed are less costly than the long-term unemployed, ie if $\zeta>0$, then the change in composition tends to reduce the cost of vacancies. If this effect dominates, then as the labour market tightens, the firm will open more vacancies, further tightening the market. This is similar to the thin market externality in Pissarides (1992). However, it is somewhat perverse in this case, and provided η is not too small we can rule it out. In general, we will assume therefore that this term is negative, so that as the labour market tightens it becomes more costly to fill vacancies, in line with the normal assumptions of search theory[2].

Solving gives:

$$\lambda_3 \frac{d\alpha_r}{d\psi} = \frac{y'}{(\alpha_r - \psi)}\left\{\eta\gamma - \zeta\frac{q(\theta)(1-\eta)\sigma}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}\right\}+ \frac{\beta(\alpha_r-\psi)(1+r)\theta q(\theta)\left[r+G(\alpha_r)\right]q(\theta)(1-\eta)\sigma}{(1-\beta)(1-\rho)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]^2} \tag{3.47}$$

$$\lambda_3 \frac{d\theta}{d\psi} = \frac{y'}{(\alpha_r-\psi)}\theta q(\theta)\left[(1-\sigma)G(\alpha_r)+\zeta\frac{\sigma G'(\alpha_r)}{G(\alpha_r)\left[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right]}\right]- \frac{\beta(\alpha_r-\psi)(1+r)G'(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]}{(1-\beta)(1-\rho)\left[1-\theta q(\theta)+r+G(\alpha_r)\right]^2} \tag{3.48}$$

where:

$$\lambda_3 = \left\{\eta\gamma-\zeta\frac{q(\theta)(1-\eta)\sigma}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}\right\}\left\{\frac{y'}{(\alpha_r-\psi)}+G'(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]\omega\right\}+$$

$$\left[r+G(\alpha_r)\right]q(\theta)(1-\eta)\omega\left\{\sigma+(1-\sigma)G(\alpha_r)+\zeta\frac{\theta q(\theta)G'(\alpha_r)}{\left[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right]^2}\right\}>0$$

and: $\omega = \dfrac{\beta(\alpha_r-\psi)(1+r)\theta q(\theta)}{(1-\beta)(1-\rho)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]^2}$

Thus, $0 \le \dfrac{d\alpha_r}{d\psi} \le 1$. The subsidy serves to offset the training cost the firm must

incur if it hires the long-term unemployed. Hence, it is able to relax its hiring criterion, hiring long-term unemployed workers who previously would have been too expensive. However, as firms relax α_r, the outflow rate of the long-term unemployed rises which puts upward pressure on wages. This chokes off the increase in α_r, so that the increase is less than the full amount of the subsidy. We can show this directly by substituting (3.33) into (3.35) and differentiating to give:

$$(3.49)\quad \frac{d\alpha_r}{d\psi} = 1 - \frac{1}{(r+s)}\frac{d\tilde{w}}{d\psi} \quad \text{where: } \tilde{w} = w(1+\tau)$$

α_r rises by the amount of the subsidy, less the increase in the wage costs discounted over the expected duration of the job.

The effect on θ is ambiguous. As we shall see below, u falls, which tends to make θ increase. However, the effect on vacancies is ambiguous. The cost of vacancies falls, so more vacancies are opened, which tends to increase v and hence θ. However, vacancies are also more rapidly closed, since the long-term unemployed are less likely to be rejected, which tends to reduce v and hence θ. Whilst a fall in θ will cause the outflow rate of the short-term unemployed to drop, the outflow rate of the long-term unemployed can still rise provided the increase in α_r is sufficient.

Unemployment

Our primary interest is in the effect on unemployment. From (3.42), (3.47) and (3.48), we obtain:

(3.50)

$$\frac{du}{d\psi} = \frac{-s(1-u)G'(\alpha_r)q(\theta)(1-\eta)}{\lambda_3 G(\alpha_r)\{G(\alpha_r)\theta q(\theta) + s[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)]\}} \times$$

$$\left\{ \frac{y'}{(\alpha_r-\psi)}\left[G(\alpha_r)(1-\sigma)\frac{G(\alpha_r)}{G'(\alpha_r)} + \frac{\eta\gamma[1-\theta q(\theta)]}{q(\theta)(1-\eta)} + \zeta\frac{\theta q(\theta)\sigma}{[1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)]}\right] + \right.$$

$$\left. \frac{r\sigma\beta(\alpha_r-\psi)(1+r)\theta q(\theta)[1-\theta q(\theta)]}{(1-\beta)(1-\rho)[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)]^2} \right\}$$

Which is negative. Hence unemployment unambiguously falls. There are two principal effects: the first term is the labour demand effect, the second a net wage pressure effect. The labour demand effect has three components:

i) The direct effect of the subsidy is to lower the cost of recruiting the long-term unemployed and hence to make recruiting more attractive;

ii) Because it increases the probability that contact with a worker will lead to hiring, the subsidy also reduces the expected duration of any given vacancy, and hence lowers the cost of vacancies;

iii) Finally, there is a composition effect. Increased outflow rates among the long-term unemployed mean that more of the unemployed are short-term unemployed, who are more desirable, provided $\zeta>0$;

The net wage pressure effect arises because an increase in the outflow rate of the long-term unemployed is discounted more heavily by wage setters than a fall in the outflow rate of the short-term unemployed. Hence, at constant disutility of unemployment the long-term outflow rate can be increased by more than the short-term outflow rate falls. Thus, even if there were no labour demand effect, it would be possible to reduce unemployment by inducing employers to substitute hiring the long-term unemployed instead of the short-term unemployed, as in the previous chapter. Note that this term would be zero if $r=0$.

Substitution

Much of the discussion of wage subsidy programmes has focused on substitution effects (OECD, 1993), although some economists, notably Layard (1996), have sought to play them down. Substitution is where the firm fills a vacancy with a long-term unemployed (or other target group) worker, in response to the subsidy, but where they would otherwise have filled the vacancy anyway, but with a short-term unemployed or other non-target group worker. Substitution effects are generally measured through surveys of employers participating in wage subsidy schemes (eg Atkinson and Meager, 1994; Byrne and Buchanan, 1994) and are usually found to be quite high, about 60-70% of the non-deadweight effect (OECD, 1993).

However, much of the concern about substitution effects is misplaced. Substitution does not simply involve churning the unemployed pool with no net gain. In a matching

framework, each firm's hiring decision is an externality for other firms. When choosing to hire the short-term unemployed in preference to the long-term unemployed, firms do not take account of the effect of their decision on the pool of applicants faced by other firms, nor of the effect on the utility cost of unemployment, and hence there is too little hiring of the long-term unemployed. There are gains to inducing employers to hire the long-term unemployed in place of the short-term unemployed. Wage pressure is reduced, allowing lower equilibrium unemployment, and a larger pool of highly employable short-term unemployed are available to other firms. This reduces the costs of opening vacancies, so that more jobs are created. Employers observe these as improvements in the general economic climate, rather than the specific effects of the wage subsidy scheme. Nor are they specific to those employers who participate in the scheme. But many of these additional jobs will go to the short-term unemployed.

We can formalise this by considering the effect of policy on the short-term unemployed. With a fixed inflow rate, we are principally interested in the outflow rate from short-term unemployment[3]. But this is just $\theta q(\theta)$, so that the effect of policy will be $q(\theta)(1-\eta)\frac{d\theta}{d\psi}$, which is clearly ambiguous from (3.48).

There are no restrictions within our model on firms' ability to use wage subsidies for vacancies that they would have filled anyway. Nonetheless, at the aggregate level, both short- and long-term outflow rates can rise.

Wages and taxes

We have seen in equation (3.49) that the total wage bill $w(1+\tau)$ rises with increased labour demand. However, the separate effects on wages and taxes are more complex. If the costs of the subsidy – which includes deadweight payments to employers who would anyway have hired the long-term unemployed – exceed the savings from reduced benefits payments then taxes will have to rise. Potentially this could lead to a fall in take-home pay for employees, so that the policy would be redistributive rather than improving the lot of both the employed and the unemployed.

Formally, we can solve for wage and tax effects by differentiating the balanced budget constraint (3.44) and substituting from (3.49) to obtain:

(3.51)

$$\frac{dw}{d\psi}=\frac{1}{\left[1-(1-\rho)u\right]}\left\{(r+s)(1-u)\left[1-\frac{d\alpha_r}{d\psi}\right]-(\rho+t)w\frac{du}{d\psi}-\psi\frac{d(a_L u_L)}{d\psi}-a_L u_L\right\}$$

Where $a_L = G(\alpha_r)\theta q(\theta)$ the outflow rate from long-term unemployment. There are four effects, two positive, one ambiguous, and one negative, leading to an ambiguous result. The first term is the effect of increased labour demand, which tends to increase wages. Secondly, lower benefit payments and higher tax revenues from reduced unemployment tend to reduce the tax burden and hence also increase wages. The third term is the effect of changes in the total outflow from long-term unemployment on the amount of subsidy that is paid. This effect is ambiguous. The outflow rate, a_L increases, but the total outflow can fall if the inflow into long-term unemployment falls, ie if the short-term unemployment rate falls sufficiently. Finally a higher level of subsidy needs to be financed, tending to increase taxes, lowering wages, which is the last term.

The parallel effect on taxation is given directly from (3.49) as:

$$(3.52)\quad \frac{d\tau}{d\psi}=\frac{(r+s)}{w}\left[1-\frac{d\alpha_r}{d\psi}\right]-\frac{(1+\tau)}{w}\frac{dw}{d\psi}$$

which is, unsurprisingly, also ambiguous.

3.4 Conclusion

The persistence of mass unemployment in many OECD countries throughout the 1980s and 1990s has led to a renewed interest in active labour market policies, and in particular in policies aimed at directly increasing transitions into employment among the long-term unemployed. Search theory provides a framework in which the macroeconomic equilibrium effects of these policies can be considered. We consider two leading policy options, job search assistance and wage subsidies for the long-term unemployed.

Our findings are somewhat contrary to the received wisdom. Job search assistance is viewed favourably within the literature. Microeconomic impact assessments show

that programmes of job search assistance can have large and sustained positive impacts for individuals (see for example, Riccio *et al*, 1994; Freedman, Mitchell and Navarro, 1998). These studies also show that programmes can be cost effective from the government's perspective at the microeconomic level: reduced benefit claims and increased tax revenues exceed net programme costs. But we argue that the success of job search assistance is not a universal outcome in macroeconomic equilibrium. We find that wage subsidies, often viewed less favourably, would unambiguously reduce unemployment.

The effects of job search assistance policies depend critically on our assumptions about the interaction between the benefit system and unemployed workers' job search decisions. The choice of policy instrument is also dictated by this interaction. If we impose binding constraints on the amount of job search required of the unemployed, then we can act directly on search intensity. In the absence of such constraints, we can act only indirectly on the incentives to search.

Where search intensity is fully endogenous, reducing the cost of search for the long-term unemployed has an ambiguous effect even on their search intensity, whilst search by the short-term unemployed falls. The effect on unemployment is consequently ambiguous. Cutting the costs of search for the long-term unemployed has a similar effect to increasing their benefit levels. The utility cost of unemployment falls, wage pressure rises and hence employers open fewer vacancies. This reduces the benefit of searching for the short-term unemployed since vacancies are a positive externality for them.

Where search intensity for the short-term unemployed is fixed, this effect is of course ruled out. Increasing search intensity requirements for the long-term unemployed, beyond their optimal private choice, leads to a reduction in unemployment. At least in the UK and the US, job search assistance programmes have made increasing use of mandatory job search requirements for participants in recent years. Finally, we consider the case where search by the short-term unemployed is endogenous, but search by the long-term unemployed is mandated by the benefit system. By requiring the long-term unemployed to search harder than they would otherwise choose, we increase the costs of long-term unemployment, reduce wage pressure and increase the incentive for firms to open vacancies. This in turn increases

the incentive for the short-term unemployed to search and they consequently search more intensely. Unemployment falls unambiguously.

We also show that a policy of targeted wage subsidies for the long-term unemployed unambiguously reduces unemployment. Moreover, we show that the analysis of substitution effects that has dominated much of the debate about wage subsidies is flawed. There are positive externalities to persuading employers to favour the long-term unemployed, and these externalities lead to an increase in the total number of jobs. Many of these new jobs will go to the very short-term unemployed people who are apparently the victims of substitution.

Wage subsidies have been tried before in many countries at various times. In many cases they have proved relatively ineffective because they have been introduced at times of high cyclical unemployment when firms may well have been hoarding labour anyway, and when active labour market policies in general appear to be at their least effective (Robinson, 1995). But in other cases they have undoubtedly been undermined by an excessive concern among policy-makers with substitution effects, arising from partial equilibrium analysis. We have shown that these concerns are at least overstated, and possibly wholly misplaced.

Our models do not provide a basis for a direct comparison of different possible policy interventions. To do that we would need to consider the implementation costs of each option, which are undoubtedly higher for wage subsidies than for job search assistance. We would also need to balance the welfare costs of imposing greater search on the unemployed against the costs imposed by unemployment, and the effects of distortionary taxation required to pay both for benefits and for subsidies. Nor should job search assistance and wage subsidies necessarily be seen as competing policy options: both seek to achieve the same outcome, a direct transition from unemployment into employment. A combination of job search assistance and wage subsidies, such as in the UK's New Deal for 18-24s, may prove a more effective option than either individually.

However, our findings should at least serve to question the prevailing wisdom that job search assistance is more effective than wage subsidies. In particular, job search assistance programmes need to consider not only the incentives faced by the target

group, but also by those outside the target group. To ensure their success, it may prove wise to ensure that the gains to the long-term unemployed are taken solely in the form of increased search efficiency and not in part as reduced search effort.

---

1. It is convenient to suppose the cost is zero, but substituting a fixed cost would not affect our results, provided it were not so high that firms would reject a short-term unemployed worker in favour of waiting for a long-term unemployed one.
2. This condition is sufficient to ensure that λ_3 is non-negative. However, provided β is not very small, this condition is unlikely to bind.
3. Given the way we have set up the flow equilibrium, short-term unemployment is just equal to the per period inflow. In turn, this must rise, since employment rises and there is a fixed inflow rate. However, we need to take into account the full effect of the policy on the short-term unemployed, which arises primarily through their outflow rate.

4. Should Policy Always Target the Long-term Unemployed?

Most recent work on active labour market policies has advocated targeting them exclusively on the long-term unemployed. However, in Australia, an ambitious policy, Working Nation, *was undermined when a shift in emphasis towards the long-term unemployed led to a large increase in the inflow into long-term unemployment, following the withdrawal of services to the short-term unemployed. We use a modified version of the Mortensen-Pissarides job creation and job destruction model to examine the effects of wage subsidies on the UK economy. By allowing subsidies to be shifted between the short- and long-term unemployed we can consider the effects of targeting and map the optimum policy mix. Using simulations for the UK economy, we find that a subsidy programme could significantly reduce unemployment, provided the subsidies on offer were large enough. Whilst some targeting on the long-term unemployed is always desirable, this should not be to the complete exclusion of the short-term unemployed. As the size of the overall programme increases, so a substantial and increasing fraction should be allocated to the short-term unemployed.*

4.1 Introduction

Most recent work on active labour market policy (ALMP) has advocated targeting the long-term unemployed (Calmfors and Lang, 1995; Snower, 1997; Layard, 1996). The previous chapters have also focused on targeted wage subsidies, which we argued would unambiguously reduce unemployment. This argument has heavily influenced government policies in a number of countries. Active labour market policies in Australia, Denmark, Finland, the Netherlands, New Zealand, Sweden and the UK have all focused, almost exclusively, on the long-term unemployed (NERA, 1995). Within the UK, the government's New Deal for 18-24s is targeted on youths of more than 6 months duration, whilst the New Deal for 25+ is targeted at unemployed people of more than 2 years duration.

However, the question of whether the costs of targeting can outweigh the benefits has received little attention. In particular, the experience of Australia's *Working Nation*

programme suggests that an excessive shift of focus from shorter durations to the long-term unemployed may be counter-productive, increasing the inflow into long-term unemployment and overwhelming programme resources. In this chapter we examine the choice of targeting a wage subsidy between the short- and long-term unemployed. Wage subsidies are only one of a number of policies that come under the rubric of ALMP, but they are of particular interest in the UK, where they lie at the heart of the New Deal.

Furthermore, our framework allows an endogenous treatment both of the concerns of wage-subsidy sceptics about deadweight, substitution and displacement (Calmfors, 1994), and the claims of wage-subsidy advocates of positive 'employability' effects from targeting (Layard, 1996). Hence we are also able to address the competing claims about the efficacy of wage subsidies *per se*. We find that, in simulations for the UK economy, a wage subsidy policy could lead to a significant reduction in equilibrium unemployment. However, the optimal policy is not to target the long-term unemployed exclusively. As the size of the policy increases, so an increasing proportion of resources, though always less than half, should be reserved for the short-term unemployed.

The rest of this paper is as follows. We start by considering the arguments that have been made for targeting policies onto the long-term unemployed, and at the possible pitfalls illustrated by *Working Nation*. Section 3 develops the formal model, an extension of the Mortensen-Pissarides (1994) job creation and job destruction model. Algebraically, most of the results of interest are ambiguous, and so we use simulations, in Section 4, to analyse the model's implications for unemployment, the structure of unemployment, wages and taxes. Section 5 looks at welfare issues, whilst Section 6 concludes.

4.2 Targeting the Long-term Unemployed

Four main arguments have been advocated for targeting active labour market policies onto the long-term unemployed: equity, deadweight, wage pressure and 'employability'. It is often argued that policies should be targeted onto the long-term unemployed on equity grounds. The long-term unemployed are amongst the poorest and most disadvantaged members of society. But more than this, it is argued

that long-term unemployment 'corrodes the soul', leading to a loss of self-esteem and motivation, poor physical and mental health and a raft of related problems that have come to be labelled social exclusion. 'By wanting less, long-term unemployed people achieve less, and they become less' (Warr, Jackson and Banks, 1988, p. 55). However, even if we accept this view, a desire to assist the long-term unemployed does not tell us the form that such help should take.

Deadweight

Deadweight, where participants would have been hired regardless of the policy intervention, is a perennial concern with active labour market policies, especially where the cost per participant is high. Government cannot identify which unemployed workers will exit unassisted, nor which firms would anyway have hired those workers. Even where, for example, wage subsidies are only payable for hirings in excess of some base level of employment, there will be deadweight, since some firms would have expanded anyway. Moreover, there is likely to be a trade-off between such conditions and the scope of any policy, since some firms would otherwise be able to use subsidies to avoid or mitigate contraction.

Targeting the long-term unemployed is seen as a way of minimising deadweight, because the long-term unemployed have low exit rates (Snower, 1997). The relationship between deadweight and duration is more complex than this, since the cost per participant is also likely to be higher if the long-term unemployed are harder to help. Nonetheless, the evidence does suggest that deadweight falls with duration. Empirical studies of wage subsidy programmes find that where the relatively short-term unemployed are eligible, deadweight is generally in the region of 70% (Breen and Halpin, 1989; Byrne and Buchanan, 1994), compared with 40-50% for policies targeted on the long-term unemployed (Atkinson and Meager, 1994). Levels of subsidy were broadly equivalent between these schemes, although such comparisons between different schemes in different labour markets are inevitably crude.

Wage pressure

The argument that wage pressure can be reduced by targeting help onto the long-term unemployed goes back to Baily and Tobin (1977). Empirically, Nickell (1987) found that, for a given level of unemployment, wage pressure was higher the higher the proportion of long-term unemployed. Findings such as this have led some to

argue that policies targeted on the long-term unemployed can reduce unemployment, without stimulating inflation 'since the long-term unemployed exert little if any dampening influence on wage inflation' (Snower, 1997, p. 169). However, the proportion of long-term unemployed is highly correlated with the change in unemployment, so that it is not clear which of these the effect is due to (Nickell, 1987). If workers are forward-looking, then they should anticipate the risks of becoming long-term unemployed. However, if they discount the future, then reducing duration dependence, by targeting the long-term unemployed, can reduce wage pressure. Gains to the long-term unemployed are discounted more heavily than losses to the short-term unemployed, because wage-setters will always become short-term unemployed first (see Chapter 2).

Employability

The long-term unemployed may become less attractive to employers because their skills atrophy, they lose the habit of working, or simply because employers discriminate against them. In a matching framework, where firms and workers come together randomly, each firm's hiring decision is an externality for other firms. If we can induce some firms to hire the long-term unemployed in preference to the short-term unemployed, then the average quality of the unemployed pool faced by other firms increases. Hence their costs of filling vacancies will fall, and they will respond by opening more vacancies (see Chapter 3).

Working Nation

Much of the above argument informed the design of the Australian *Working Nation* programme, one of the most ambitious active labour market policies adopted in recent years (Commonwealth of Australia, 1994; Chapman, 1994). *Working Nation* offered a guaranteed work placement to all those unemployed for 18 months or longer. It was implemented in May 1994 and scrapped two years later, following the electoral defeat of the Labor government. Wage subsidies, delivered through the pre-existing Jobstart programme, were a major element of the policy, although various other options were used to meet the guarantee. Many of the features of *Working Nation* are replicated in the UK's 'New Deal', especially for the youth programme. If New Deal is to succeed, understanding the weaknesses of *Working Nation* is an essential starting point.

Table 4.1: Australian Labour Market Programme Participants by duration

Year	*Duration of unemployment (months)*			
	<12	12-18	18-36	36+
1992-93	37.9%	25.6%	28.5%	8.0%
1993-94	35.5%	21.7%	29.3%	13.5%
1994-95	31.8%	18.1%	29.1%	21.0%
1995-96	38.4%	12.5%	25.5%	23.6%

Source: Working Nation Evaluation Report, DEETYA, 1996

Working Nation involved a substantial reallocation of resources from the short-term unemployed to the long-term unemployed. Table 4.1 shows the proportion of labour market programme placements by duration of unemployment from 1992 to 1996, a period when aggregate unemployment was falling. The effect is clearest in the 12-18 month and 36+ month categories. The very long-term unemployed tripled their share of programme placements, from 8% to 24%, as *Working Nation* targeted the existing stock of long-term unemployed, as well as the new inflow into the target group. The share of resources going to the 12-18 month group halved over the same period, as services were withdrawn from them. The under 12 month category saw a more modest fall, until the final year. The increase in 1995-96, however, is probably due to people flowing off programmes, under the guarantee, back into unemployment, and being classified as 'at risk' and hence eligible for continuing assistance.

Working Nation is often described as having failed, although it may be more accurate to say that it failed to live up to its substantial expectations. It did not run for long enough to allow a thorough evaluation, but long-term unemployment did fall more rapidly than in Australia's previous boom (DEETYA, 1996a). However, one unforeseen consequence of *Working Nation* was a large increase in the inflow into long-term unemployment (here 18 months or longer), despite falling overall levels of unemployment. This was the major reason why the actual decline in long-term unemployment of 20% was less than half the forecast level of 47% (DEETYA, 1996a). These higher inflows appear to have been a direct consequence of the withdrawal of services to the short-term unemployed, especially the 12-18 month duration group.

We did not seek explicitly to model *Working Nation*, which was a complex policy relying on a variety of programmes as well as wage subsidies (see Piggott and

Chapman, 1995, for an attempt at modelling the full programme). Instead, we sought to examine the question it raised, as to whether it is always optimal to target active labour market programmes onto the long-term unemployed, in a somewhat simpler framework. We develop a modified version of the Mortensen-Pissarides (1994) model of job creation and job destruction to simulate the effects of wage subsidies, targeted between the long- and short-term unemployed.

An added advantage of this approach is that it allow a fully endogenous treatment of the issues raised both by critics and supporters of wage subsidies. Deadweight, substitution and displacement are all incorporated, as are loss of skills by the long-term unemployed and discounting by wage setters. Hence we can obtain estimates of their relative importance, without having to rely on *ad hoc* claims.

Millard and Mortensen (1997) and Mortensen (1996) look at untargeted policies in the same general framework. Millard and Mortensen find that a small hiring subsidy would increase equilibrium unemployment in a model with redundancy payments, but reduce unemployment in a model with zero redundancy payments. Mortensen looks at three types of subsidy: a recruitment subsidy offsetting the costs of vacancies; a hiring subsidy offsetting the costs of initial training; and a cut in payroll taxes. He finds that all three would reduce unemployment, even with redundancy payments, but for somewhat larger levels of intervention than those considered by Millard and Mortensen. However, redundancy payments reduce baseline unemployment in this model, whilst they increase it in Millard and Mortensen's.

Each paper provides results only for a single, and different, level of subsidy, so that is impossible to determine how far their varying results arise from differences in parameters and how far from differences in the way wages are modelled. Typically, the effects of firing costs on unemployment are highly sensitive to the assumptions made about wage-setting (see for example, Bertola, 1990). We prefer to ignore redundancy payments, which, in the UK, workers are only entitled to after two years continuous employment. Nonetheless, our results are potentially consistent with both papers. We find that at low levels of subsidy, unemployment may increase as in Millard and Mortensen (1997), whilst at higher levels of subsidy it falls, as in Mortensen (1996).

4.3 The Model

Each firm has one job, which can be in one of two states, vacant and searching, or filled and productive. Productive jobs produce a single unit of differentiated output per period, which has price $p+\varepsilon$, where p is a common element for all products, and ε is an idiosyncratic element, subject to random shocks. Shocks occur according to a Poisson process with arrival rate λ, leading to a new value of ε drawn from a fixed known distribution $F(x)$, which has finite upper support, ε_u, and no mass points.

We assume that jobs are created using the best available technology, so that their price is initially equal to $p+\varepsilon_u$. Jobs can be created and destroyed costlessly, but there is a cost to filling vacancies. Hence, jobs will not automatically be destroyed when they are hit by a shock. However, below some critical value, ε_d, it will be optimal for both firms and workers to separate, and the job will be destroyed. In addition, there is exogenous turnover of δ per period. Hence, the total separation rate equals $\lambda F(\varepsilon_d)+\delta$.

Vacant jobs and unemployed workers contact one another according to an aggregate matching function, $x = x(u,v)$, where x is the total number of contacts per period, and u and v are unemployment and vacancies respectively. We normalise the labour force to unity, so that these are also the unemployment and vacancy rates. We define $\theta = v/u$ as the labour market tightness and assume that the matching function exhibits constant returns to scale. Hence, we can define the per period probabilities of making contact for vacancies and unemployed workers respectively as:

(4.1) $q(\theta) = x(u,v)/v = x(\frac{1}{\theta},1)$

(4.2) $\theta q(\theta) = x(u,v)/u = x(1,\theta)$

After separation, workers enter short-term unemployment. If they do not find a job within one period, they become long-term unemployed. We assume, for simplicity, that all unemployed workers search with the same intensity, and hence have the same probability of contacting a vacancy, and also that vacancies are contacted by at most one worker per period. There is a per period cost, γ, of holding open a vacancy.

Short-term unemployed workers require some initial training, at a fixed cost k. The long-term unemployed may suffer from a loss of skills and require additional training. We assume that firms which hire the long-term unemployed incur a cost α, which is stochastic and match-specific. We assume that α is drawn from some fixed known distribution $G(x)$ in the positive quadrant, and that α is realised when contact is made between a vacancy and a long-term unemployed worker. Hence firms can decide whether to hire the long-term unemployed with full information. $G(x)$ has mean greater than or equal to k, and no mass points. We suppose that firms adopt a reservation training cost for the long-term unemployed, α_r, and hire any long-term unemployed worker making contact with a vacancy whose realised training cost is less than this. We show below that this is optimal. Provided the lower support of $G(x)$ is less than or equal to $\gamma+k$, the long-term unemployed will always have a positive outflow rate.

The government pays a hiring subsidy ψ_S for the short-term unemployed, and ψ_L for the long-term unemployed. We assume that the subsidy is paid as a lump-sum at the point of hiring. Furthermore, we assume that wages are subject to continuous renegotiation, or equivalently that only renegotiation-proof contracts are agreed to. Hence, both the subsidy and the training cost are sunk for the purposes of the wage bargain. Mortensen (1996) argues that this is the appropriate assumption for the UK. Furthermore, the empirical evidence suggests that wages are independent of subsidies, whether subsidies are paid to the employer (Atkinson and Meager, 1994) or the worker (Woodbury and Speigelman, 1987), implying that subsidies are captured by the recipient.

For simplicity, we ignore taxes for the moment, supposing that the subsidy is funded by non-distortionary taxation. This may be an appropriate model for the current UK situation, where wage subsidies, at least for a 5 year period, are to be financed by a 'windfall' tax retrospectively levied on privatised utility companies. However, more generally, we need to include any fiscal consequences of the policy, and we extend the model to include taxation in the technical appendix, examining the implications towards the end of Section 4.

Hiring and job creation

If V is the expected present discounted value of a vacancy, and $J(\varepsilon)$ the expected present discounted value of a filled job with idiosyncratic element ε, then we can write the value function for vacancies as:

$$(4.3)\quad \begin{aligned} rV = &-\gamma + \sigma q(\theta)\left[J(\varepsilon_u) - V + \psi_S - k\right] + \\ &(1-\sigma)q(\theta)G(\alpha_r)\left[J(\varepsilon_u) - V + \psi_L - E(\alpha|\alpha \le \alpha_r)\right] \end{aligned}$$

Where σ is the proportion of the pool of searching workers who are short-term unemployed, and hence impose only the fixed training cost k.

We assume that there is free entry for vacancies, so that V=0. Once contact has been made between an unemployed worker and a vacancy, both sides must decide whether to accept the match. We shall see below that the wage offered by vacant jobs is the highest available in the market, and hence the worker's decision is trivial. Workers always accept job offers. We can represent the firm's choices as:

	Hire	*Don't hire*
Short-term unemployed	$J(\varepsilon_u) + \psi_S - k$	$V = 0$
Long-term unemployed	$J(\varepsilon_u) + \psi_L - \alpha$	$V = 0$

Where α is the realised training cost. Hence the short-term unemployed are always hired provided $J(\varepsilon_u) \ge k - \psi_S$ and never hired otherwise. We shall assume that this condition always holds, ie that the subsidies for the long-term unemployed are not so great as to drive out all hiring of the short-term unemployed.

The long-term unemployed will be hired provided $J(\varepsilon_u) \ge \alpha - \psi_L$. We shall see below that $J(\varepsilon_u)$ is independent of α, and hence there will exist a unique reservation value of the training cost, α_r, given by:

$$(4.4)\quad \alpha_r = J(\varepsilon_u) + \psi_L$$

such that firms will optimally hire any long-term unemployed worker with a realised training cost less than α_r who contacts a vacancy.

If we substitute the free-entry condition, V=0, and equation (4.4) into (4.3), we obtain the job creation condition:

$$(4.5)\quad \frac{\gamma}{q(\theta)} = \sigma[\alpha_r - k + \psi_S - \psi_L] + (1-\sigma)G(\alpha_r)[\alpha_r - E(\alpha|\alpha \le \alpha_r)]$$

The *ex ante* expected cost of filling a vacancy is equal to the firm's expected return from a filled job.

Job destruction

Let $W(\varepsilon)$ be the expected present discounted value to a worker of employment in a job with idiosyncratic component ε, and U_{ST} the expected present discounted value of short-term unemployment. We can then define the total match surplus, $S(\varepsilon)$ as:

$$(4.6)\quad S(\varepsilon) = J(\varepsilon) + W(\varepsilon) - U_{ST}$$

We assume that the wage, $w(\varepsilon)$, is determined by Nash bargaining so that the surplus is split in fixed proportions, with β being the worker's share. Furthermore, we assume that the wage must be renegotiation proof, and hence that sunk costs or benefits cannot form part of the wage bargain. Thus the wage is independent of both the subsidy and the training costs.

$$(4.7)\quad W(\varepsilon) - U_{ST} = \beta S(\varepsilon)$$

$$(4.8)\quad J(\varepsilon) = (1-\beta)S(\varepsilon)$$

Since there is no cost of job destruction, filled jobs will be destroyed for any shock x such that $J(x) \le 0$, and hence $S(\varepsilon_d) = 0$. For a given realisation of ε, we can write the value functions as:

$$(4.9)\quad rJ(\varepsilon) = p + \varepsilon - w(\varepsilon) + \lambda\left[\int_{\varepsilon_d}^{\varepsilon_u} J(x)dF(x) - J(\varepsilon)\right] - \delta J(\varepsilon)$$

$$(4.10)\quad rW(\varepsilon) = w(\varepsilon) + \lambda\left[\int_{\varepsilon_d}^{\varepsilon_u} W(x)dF(x) + F(\varepsilon_d)U_{ST} - W(\varepsilon)\right] + \delta[U_{ST} - W(\varepsilon)]$$

(4.11) $rU_{ST} = b + \theta q(\theta)\left[W(\varepsilon_u) - U_{ST}\right] + \left[1 - \theta q(\theta)\right]\left[U_{LT} - U_{ST}\right]$

(4.12) $rU_{LT} = b + G(\alpha_r)\theta q(\theta)\left[W(\varepsilon_u) - U_{LT}\right]$

Hence, if we substitute (4.9) and (4.10) into (4.6), we obtain:

(4.13) $(r + \delta + \lambda)S(\varepsilon) = p + \varepsilon + \lambda\int_{\varepsilon_d}^{\varepsilon_u} S(x)dF(x) - rU_{ST}$

whilst from (4.7), (4.11) and (4.12), we have:

(4.14) $rU_{ST} = b + \dfrac{\beta\theta q(\theta)\left[r + G(\alpha_r)\right]S(\varepsilon_u)}{1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)}$

Finally, if we note that:

$$S'(\varepsilon) = \frac{1}{r + \delta + \lambda}$$

and that integration by parts implies:

$$\int_{\varepsilon_d}^{\varepsilon_u} S(x)dF(x) = \int_{\varepsilon_d}^{\varepsilon_u} S'(x)\left[1 - F(x)\right]dx$$

We have that:

(4.15)

$$(r + \delta + \lambda)S(\varepsilon) = p + \varepsilon - b + \frac{\lambda}{r + \delta + \lambda}\int_{\varepsilon_d}^{\varepsilon_u}\left[1 - F(x)\right]dx - \frac{\beta\theta q(\theta)\left[r + G(\alpha_r)\right]S(\varepsilon_u)}{1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)}$$

Given also that $S(\varepsilon_d) = 0$, we have:

(4.16) $S(\varepsilon) = S(\varepsilon) - S(\varepsilon_d) = \dfrac{\varepsilon - \varepsilon_d}{r + \delta + \lambda}$

and hence:

(4.17)

$$p+\varepsilon_d = b+\frac{\beta\theta q(\theta)\left[r+G(\alpha_r)\right](\varepsilon_u-\varepsilon_d)}{(r+\delta+\lambda)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]}-\frac{\lambda}{r+\delta+\lambda}\int_{\varepsilon_d}^{\varepsilon_u}\left[1-F(x)\right]dx$$

Which is the job destruction condition. The reservation level of productivity equals the opportunity cost of working to the employee less the option value of retaining the existing match. At the job destruction margin, the value of the match equals the value of the worker's and firm's outside options (the firm's outside option, V=0). Note also that because, from equation (4.15), $S(\varepsilon)$ is monotonically increasing in ε, there will be a unique reservation productivity, ε_d.

Furthermore, given that the wage is renegotiation proof, equation (4.9) implies that $J(\varepsilon_u)$ will be independent of the realised value of α when a long-term unemployed worker is hired, and hence that there will be a unique reservation training cost, α_r. From (4.4), (4.8) and (4.16) we have the reservation training cost condition:

$$(4.18)\quad \alpha_r-\psi_L=\frac{(1-\beta)(\varepsilon_u-\varepsilon_d)}{r+\delta+\lambda}$$

Since the firm's outside option is zero, it is prepared to pay up to its share of the expected surplus value of a filled job to secure a match.

Flow equilibrium

To close the model, we need to determine σ, the proportion of 'low cost' searchers among the total pool of searching workers, and u, the unemployment rate. We assume a stationary equilibrium, in which the unemployment rate is constant over time, since we are interested in the effect of policy on the NAIRU.

Short-term unemployed searchers fail to find a job within one period with probability $1-\theta q(\theta)$, and flow into the pool of long-term unemployed searchers. In equilibrium, this inflow must equal the outflow from the pool of long-term unemployed searchers. Hence:

$$(4.19)\ \sigma\left[1-\theta q(\theta)\right]=(1-\sigma)G(\alpha_r)\theta q(\theta)$$

Giving:

$$(4.20)\ \sigma=\frac{G(\alpha_r)\theta q(\theta)}{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)}$$

Unemployment

We could use a similar flow equilibrium condition to determine the overall unemployment rate, u, given that total inflows into unemployment must equal total outflows from unemployment. However, there are two different ways in which we could do this, measuring unemployment either before or after outflows have occurred. In models where the inflow is constant, this choice is essentially arbitrary, since the sign of du is unaffected, but this is no longer true when the inflow is endogenous. Measuring u after inflows but before outflows is equivalent to assuming that all the unemployed have a duration of at least one period, so that unemployment is bounded below at the per period inflow. In many countries the inflow is large compared to the stock, and this is a serious restriction. Moreover, it implies that short-term unemployment is independent of the outflow rate from short-term unemployment, so that by construction policies that target the outflow can never reduce short-term unemployment. However, if instead we measure u after both inflows and outflows, then we count none of the people who flow in and out in the same period, and this is not entirely satisfactory either.

Theoretically, the choice between measuring u before or after outflows is essentially arbitrary. However, we have to calibrate our model using actual unemployment statistics. In practise these statistics include some fraction of those who flow out during the period. Hence, for the purposes of simulating our model, we prefer to adopt an approach which finesses the choice of when to measure u so as to capture this feature of the unemployment statistics. Since equations (4.5), (4.17), (4.18) and (4.20) are recursive, the basic parameters, θ, ε_q, α_r and σ are unaffected by u, and our method also encompasses both of the conventional options. The effect is simply to provide a more realistic estimate of the magnitude of policy effects, but our basic findings do not depend on this formulation.

Formally, we can derive the unemployment equation from the normal flow equilibrium approach (see technical appendix). However, it will prove more intuitive to adopt an alternative, but algebraically equivalent, method. We start from the definition that the unemployment stock = inflow x average duration. Since we have normalised the labour force to unity, the unemployment stock equals the unemployment rate, u, whilst the inflow equals $\left[\lambda F(\varepsilon_d)+\delta\right](1-u)$. Given that we are in stationary equilibrium, the average duration is equal to the expected duration for a worker who has just been made unemployed.

Consider a worker who flows both in and out in the same period. We define a parameter, $0 \leq \mu \leq 1$, as their average duration, and similarly as the average incremental duration of an existing unemployed worker who flows out this period. For example, if workers flowed out uniformly across the period, μ would equal one-half. Workers do not start a new job until the beginning of the next period, but we might suppose that they cease searching, and hence no longer count as unemployed, once they have been offered the job (in fact, we can eliminate this entirely: see technical appendix).

Hence the average duration equals:

$$\theta q(\theta)\mu + G(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]\sum_{i=1}^{\infty}\left[1-G(\alpha_r)\theta q(\theta)\right]^{i-1}(i+\mu) = \frac{1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)}{G(\alpha_r)\theta q(\theta)}$$

Giving:

$$(4.21)\quad u = \frac{\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)\right]}{G(\alpha_r)\theta q(\theta)+\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)\right]}$$

It follows also that:

$$(4.22)\quad u_S = \frac{\left[1+(\mu-1)\theta q(\theta)\right]\left[\lambda F(\varepsilon_d)+\delta\right]G(\alpha_r)\theta q(\theta)}{G(\alpha_r)\theta q(\theta)+\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)\right]}$$

$$(4.23)\quad u_L = \frac{[1-\theta q(\theta)][\lambda F(\varepsilon_d)+\delta][1-G(\alpha_r)\theta q(\theta)]}{G(\alpha_r)\theta q(\theta)+[\lambda F(\varepsilon_d)+\delta][1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)]}$$

Wages

Finally, we can use (4.8), (4.9) and (4.17) to derive the wage:

$$(4.24)\quad w(\varepsilon) = \beta(p+\varepsilon)+(1-\beta)\left[b+\frac{\beta\theta q(\theta)[r+G(\alpha_r)](\varepsilon_u-\varepsilon_d)}{(r+\delta+\lambda)[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)]}\right]$$

The wage is equal to the worker's fallback position plus β times the surplus over the fallback value of a filled job with idiosyncratic component ε. The average wage will be given by:

$$(4.25)\quad \overline{w} = \frac{n(\varepsilon_u)}{N}w(\varepsilon_u)+\int_{\varepsilon_d}^{\varepsilon_u}\frac{n(x)}{N}w(x)dx$$

Where $n(\varepsilon)$ is the number of workers employed in jobs with idiosyncratic component ε, and $N = 1-u$, total employment. The distribution of employment over productivity is determined by the laws of motion:

$$(4.26)\quad \dot{n}(x) = \lambda F'(x)N-(\delta+\lambda)n(x) \qquad \varepsilon_d \le x < \varepsilon_u$$

$$(4.27)\quad \dot{n}(\varepsilon_u) = [\lambda F(\varepsilon_d)+\delta]N+\lambda F'(\varepsilon_u)N-(\delta+\lambda)n(\varepsilon_u)$$

And hence, in steady state, and given $F'(\varepsilon_u) = 0$, we have:

$$(4.28)\quad n(x) = \frac{\lambda}{\lambda+\delta}F'(x)N \qquad \varepsilon_d \le x < \varepsilon_u$$

$$(4.29)\quad n(\varepsilon_u) = \frac{[\lambda F(\varepsilon_d)+\delta]}{\lambda+\delta}N$$

The model is then defined by the job creation condition, (4.5), the job destruction condition, (4.17), the reservation training cost condition, (4.18), the flow equilibrium

condition (4.20), (4.21) which is the Beveridge Curve, and the wage equations (4.24) and (4.25). It is fairly easy to show that an increase in either ψ_S or ψ_L, or both, will lead to an increase in both job creation and job destruction. Analytically, we cannot say which effect will dominate. We therefore provide some simulation results in Section 4 below. First, however, we need to consider the policy variable in a little more detail.

Policy

We are interested in two aspects of policy, the overall level of subsidy and also the degree of targeting of any subsidy on the long-term unemployed. Clearly, these two effects are interlinked. In particular, an increase in targeting will also tend to change the overall level of subsidy paid out, since the long-term unemployed have a different outflow to the short-term unemployed, and hence the numbers of subsidy-eligible workers will also change.

In order to separate out these two effects as far as possible, we assume that the government policy rule is to allocate a certain level of subsidy per unemployed worker[1], $\overline{\psi}$, so that:

$$(4.30)\quad \overline{\psi} = \sigma\theta q(\theta)\psi_S + (1-\sigma)G(\alpha_r)\theta q(\theta)\psi_L$$

The government then determines the extent to which this is targeted on the long-term unemployed, by setting a parameter, ϕ, where $\phi\psi_S = (1-\phi)\psi_L$, so that if $\phi = 0$, subsidies are only available for the short-term unemployed, and if $\phi = 1$, subsidies are only available for the long-term unemployed. It follows that:

$$(4.31)\quad \psi_L = \frac{\phi\overline{\psi}}{\theta q(\theta)\left[(1-\phi)\sigma + \phi G(\alpha_r)(1-\sigma)\right]}$$

$$(4.32)\quad \psi_S = \frac{(1-\phi)\overline{\psi}}{\theta q(\theta)\left[(1-\phi)\sigma + \phi G(\alpha_r)(1-\sigma)\right]}$$

Hence a change in targeting only affects the aggregate subsidy level to the extent that targeting also affects the underlying unemployment rate. If targeting is neutral then a change in ϕ will have no effect on u, even if the overall subsidy level is non-

neutral. There is, however, an element of automatic stabilisation here, since a targeting policy that is more effective will tend to reduce the aggregate level of expenditure, by reducing the level of unemployment. We believe that this more accurately reflects actual policy decisions than the alternative assumption of a fixed total expenditure, although the evidence suggests that increases in active labour market policy are less than proportional with increases in unemployment in most countries (Grubb, 1994). However, none of our simulation results are fundamentally altered by assuming instead a fixed total expenditure.

4.4 Simulations

Algebraically, the effects of changing either of the policy parameters, ϕ or $\overline{\psi}$, are generally ambiguous. Increasing the overall subsidy level can be shown to increase both inflows and outflows from unemployment, leaving the overall effect ambiguous, whilst increasing the degree of targeting on the long-term unemployed has ambiguous effects on both inflows and outflows. Hence, we use numerical simulations to consider the predicted effects of wage subsidies.

We parameterise the model using the technique of Millard and Mortensen (1997) and Mortensen (1996). We start by setting values for the parameters from empirical evidence wherever possible, using the same values as Millard and Mortensen (1997). We then set the remaining parameters so that, with no subsidy, the model's predictions match observed patterns of unemployment. Below, we test the model's sensitivity to our assumptions.

We normalise the maximum per period productivity to equal unity. From Millard and Mortensen, we have values of r equal to 0.01 per quarter, δ equal to 0.014 per quarter, k equal to 0.275, γ equal to 0.33 per quarter, λ equal to 0.1 per quarter and η equal to 0.4 (on the assumption that the matching function is Cobb-Douglas). Income in unemployment is treated somewhat differently in Millard and Mortensen, so we set b equal to 0.32, in order to give a replacement ratio of 0.37 as found by Blöndal and Pearson (1995). We set the base price p to zero.

We follow Millard and Mortensen in assuming that idiosyncratic productivity levels are distributed uniformly, so that:

Table 4.2

Structural parameter	*Value*
Maximum productivity, ε_u	1 per quarter
Minimum productivity, ε_{min}	0.580 per quarter
Vacancy cost, γ	0.33 per quarter
Training cost for stu, k	0.275 per worker
Interest rate, r	0.01 per quarter
Exogenous turnover, δ	0.014 per quarter
Matching elasticity, η	0.4
Shock arrival rate, λ	0.1 per quarter
Base price, p	0
Worker's share, β	0.626
Max. ltu training cost, α_{max}	1.313
Min. ltu training cost, α_{min}	0.590

$$F(x) = \frac{x - \varepsilon_{\min}}{\varepsilon_u - \varepsilon_{\min}}$$

and we suppose a similar form for the long-term unemployed's training cost, α. We then calibrate the remaining parameters, $\varepsilon_d, \beta, \alpha_{\max}$ and $\alpha_{\min}$ so that the model correctly predicts the unemployment rate, inflow, and the ratios of short- to long-term unemployment and of the outflow rates of the short- and long-term unemployed. To be consistent with Millard and Mortensen's values, short-term is defined here as one quarter. We use average values for male claimant count unemployment in Great Britain over the period July 1987 to June 1996. Only the claimant count provides us with the outflow data that we require, but because of well-known problems with the claimant count as a measure of female unemployment, we follow Layard *et al* (1991) in using the male unemployment rate as the best proxy for overall unemployment. This gives aggregate unemployment of 10.6%, inflow of 4.6%, short-term unemployment/total unemployment of 0.28 and long-term outflow rate/short-term outflow rate of 0.375. This results in the parameter values shown in Table 4.2.

Job creation and job destruction

Figure 4.1a shows the job creation and job destruction curves, equations (4.5) and (4.17), for various values of the subsidy level, $\overline{\psi}$, targeted equally at the long- and short-term unemployed (ie ϕ =0.5). The job destruction curves slope upwards because as the labour market tightens, (θ increases), the opportunity cost of employment rises – workers are more easily able to find an alternative job. Hence the surplus value within a filled job falls, making job destruction more likely. This is not the same as firms laying off workers and replacing them with subsidised workers in the same jobs, something that is disallowed under the rules of the UK's New Deal and many other wage subsidies. Rather, jobs across the whole economy become more liable to break up because new jobs are also cheaper to create: whether or not they are filled by subsidised workers. The effect is similar to reducing a hiring cost: both hiring and firing increase. The job creation curves generally slope downward because as θ increases it becomes more costly to fill vacancies, requiring that jobs last longer to offset the higher costs. There is, however, an additional effect here. As θ increases, a greater proportion of the unemployed are short-term unemployed, who are less costly to hire. Hence, at high values of θ, the job creation curve can start to slope upwards.

Increased subsidies reduce the cost of creating vacancies, increasing job creation. However, they consequently reduce the option value of maintaining an existing match, increasing job destruction. Increases in the outflow rate also push up the worker's fallback position, moving us up the job destruction curve. We can see these effects in Figure 4.1a. However, the job creation curve gives only part of the outflow picture here. The outflow rate from short-term unemployment is solely a function of θ, but the long-term unemployed outflow rate is also a function of α_r.

As we can see in Figure 4.1b, an untargeted wage subsidy has little effect on α_r, as we might expect. However, Figures 4.2a and 4.2b show that there is a substantial effect when the subsidy is more heavily targeted on the long-term unemployed (here ϕ =0.95). An increase in subsidy now makes the long-term unemployed relatively more attractive to employers, causing α_r to increase, but θ increases correspondingly less than in the untargeted case.

The job creation and destruction curves are less useful in analysing the effects of targeting a given level of subsidy, since as we can see in Figure 4.3a, the effects are ambiguous. The job creation curves for different levels of targeting cross. Whilst the job destruction curve shifts up, the job destruction rate, determined by ε_a, is also ambiguous, first rising and then falling as ϕ increases. Instead, we observe a fall in the outflow rate of the short-term unemployed (equilibrium values of θ fall), and an offsetting increase in the relative attractiveness of the long-term unemployed, shown in Figure 4.3b. Changes in the equilibrium level of job destruction appear to be much smaller. To obtain the overall effects, however, we need to solve the complete system.

Unemployment

Figure 4.4 shows the unemployment rate against both the level of subsidy and the extent of targeting. The thick black line represents the minimum unemployment level for any given level of subsidy – the optimum degree of targeting. We set μ equal to one-half, equivalent to assuming that unemployed workers flow out at a constant rate throughout the period. Figure 4.5 shows the subsidy rates as a proportion of average annual wages implied by the combinations of $\overline{\psi}$ and ϕ plotted in Figure 4.4.

Three main features of Figure 4.4 are notable. Firstly, the effect of the subsidy is generally to reduce unemployment, but this is not true everywhere. In particular, large subsidies targeted mainly at the short-term unemployed increase unemployment. The combination of higher inflows, and increased wage pressure leads to rising unemployment. For this calibration, unemployment always falls at low levels of subsidy, but more generally, this may not be the case. Unemployment may rise at low levels of subsidy, before falling at higher levels of subsidy, as we will see below when we consider the sensitivity of our results to changes in the parameters.

Secondly, the magnitude of the policy effect is potentially significant, around 4 percentage points (40% of the level) for a combination of subsidies for the short-term unemployed of 5.4% of average annual earnings (16% of annual benefit payments), and for the long-term unemployed of 13% of average annual earnings (38% of annual benefits).

This, of course, is a high level of policy commitment. By comparison, the UK government's proposed wage subsidy for the long-term adult unemployed is about 11% of average annual earnings, with no subsidy for the short-term unemployed (subsidies for the short-term unemployed are more costly because considerably more of them flow out each period). This would be sufficient to generate a 1.5 percentage point fall in the unemployment rate within the model. However, the definitions of long-term unemployed used in the model and in the New Deal are significantly different, so that this overstates the predicted impact.

Finally, at least some targeting on the long-term unemployed is desirable, but the extent of targeting desired reduces as the level of subsidy increases. At low levels of subsidy, the optimal policy would be to target all subsidies on the long-term unemployed. Beyond a certain point, however, the optimum policy path is at neither extreme, but requires a gradual shift of the increasing resources, though always less than half, towards the short-term unemployed.

Increasing the extent of targeting on the long-term unemployed has two effects. There are positive externalities to targeting the long-term unemployed. Wage pressure is lower, and because more workers are 'employable', vacancy durations are shorter. This reduces the cost to firms of opening vacancies, so that more vacancies are opened. Outflow rates increase (see Chapter 3 for details). Inflow rates also increase, because the higher outflow rates improve the worker's outside option, but targeting is only a relevant issue if the outflow effects dominate the inflow effects, since otherwise we would prefer zero subsidy. Hence targeting subsidies onto the long-term unemployed can reduce equilibrium unemployment.

However there are also diminishing returns. Employers respond to the expected subsidy per hire. However, the overall cost of subsidies is a function both of the subsidy per hire, and the number of hires – the outflow rates. In particular, as we target subsidies more and more onto one group, we increase the relative outflow rate of that group, increasing the cost of any given marginal increment to the per hire subsidy level for that group. Hence, as we transfer a fixed level of resources from the short-term unemployed to the long-term unemployed, we obtain a diminishing marginal increment in the per hire subsidy for the long-term unemployed, ψ_L, and hence a diminishing marginal increase in their outflow rate, relative to the marginal

decrease in the outflow rate of the short-term unemployed. If this effect outweighs the gains to targeting from the positive externalities, then further targeting will increase the unemployment rate, as we observe in Figure 4.4 (see technical appendix for a formal derivation).

Short-term and long-term unemployment

Much of the debate surrounding wage subsidies has been concerned with substitution and displacement effects – the extent to which subsidies for the long-term unemployed simply increase short-term unemployment, rather than reducing overall unemployment. Figure 4.6 shows both short- and long-term unemployment. Long-term unemployment is initially (ie at zero subsidy) higher. The most notable feature of Figure 4.6 is that, as the subsidy level is increased, short-term unemployment always rises and long-term unemployment nearly always falls, regardless of targeting. Of course the magnitude of both changes is greater when the subsidy is targeted on the long-term unemployed, but the direction is the same. The only exception is that where subsidies lead to overall unemployment rising, long-term unemployment also rises. In fact it is this rise that drives the increase in aggregate unemployment.

We can see what underlies Figure 4.6 from the inflow and outflow rates in Figures 4.7, 4.8 and 4.9. In Figure 4.7, we can see that a subsidy targeted on the short-term unemployed increases their outflow rate sharply, whilst reducing the outflow rate from long-term unemployment, but more gently (from a low base). However, because the inflow into unemployment also rises (see Figure 4.8), short-term unemployment increases. The effects of a subsidy on the short-term unemployed are seen not primarily on short-term unemployment, but through a sharply reduced inflow into long-term unemployment, shown in Figure 4.9. This is generally more than sufficient to offset the lower outflow rate from long-term unemployment, so that long-term unemployment falls.

With a subsidy targeted on the long-term unemployed, the outflow rates from both short- and long-term unemployment rise, although the increase for the long-term unemployed is much greater as we would expect. Hence the concern that subsidised long-term unemployed workers will 'take the jobs' of the short-term unemployed is misplaced. The positive externalities are sufficient to increase the outflow rate even of the short-term unemployed. However, the subsidy does displace existing workers

out of jobs, increasing the inflow rate. This pushes up both short-term unemployment and the inflow into long-term unemployment. The increased outflow from long-term unemployment, though, is sufficient to reduce both long-term and overall unemployment.

Wages

In the UK context, the assumption in the Mortensen-Pissarides model that displaced workers re-enter employment at the highest wage level is not borne out empirically (Gregg and Wadsworth, 1995). The model's predictions about wages, and hence also about taxes, are therefore likely to be less robust than those for unemployment. It may be more illuminating to consider the effects of policy on wages at a given productivity (we report results at the highest productivity, but the pattern will be the same for any productivity level above ε_d). However, it is worth noting that it was an explicit aim of the Swedish model to put pressure on the least efficient industries and to use active labour market policy to redirect displaced labour into high productivity industries (Robinson, 1995).

Figure 4.10 shows the effects on average wages, and the wage of the highest productivity jobs. Both increase slightly as the subsidy increases, with the average increasing faster than the maximum. From equation (4.24), we can see that the wage of a job at any given productivity rises with the worker's fallback position, ie as outflow rates rise. This drives the increase in wages at the highest productivity. However, average wages rise faster than this because the distribution of productivities also changes. With more job destruction the minimum productivity increases, pushing up the tail of the distribution, whilst at the same time, more job creation implies more jobs at the highest productivity, since all new jobs start at that level.

Taxes

So far we have ignored taxation in the interests of simplicity, implicitly assuming that the costs of wage subsidies are met in some non-distortionary fashion. This assumption is unsatisfactory, and we extend the model to incorporate taxation in the technical appendix. Taxes increase job destruction since they remove a part of the surplus value of a filled job. Since this reduces the expected lifetime of a filled job, and thus its value, job creation falls. Hence unemployment is higher. Millard and Mortensen (1997) estimate that abolishing payroll tax in the UK would reduce

unemployment by two percentage points, although they do not discuss how this should be financed and do not link taxes with the costs of subsidies.

We assume a balanced budget constraint, so that tax revenues raised from a proportional wage tax equal total expenditure on labour market policies, unemployment benefits plus subsidies. This allows us to ask whether subsidies can ever pay for themselves in terms of savings on benefit payments, as well as to check that our previous results are robust to the introduction of distortionary taxes.

Figure 4.11 shows the unemployment rate in a model with taxes. Base level unemployment is now around 0.7 percentage points higher than without taxes, at 11.3%, but the effect of policy is very similar, with a reduction in unemployment again of around 4 percentage points at the highest subsidy level. The shape of the plot is also very similar.

Figure 4.12 shows the implied tax rate. Unsuprisingly, taxes rise sharply where the subsidy increases unemployment. More generally, we can see that, compared with the zero subsidy point, taxes always rise, so that the savings from reduced benefit payments are never sufficient to cover the costs of subsidies. The rise is modest though, around one-half of a percentage point (8% of the level) and, at the margin, an increase in subsidy along the tax-minimising path for ϕ reduces the tax rate, so that a marginal increase in subsidy can pay for itself.

Furthermore, even allowing for the increase in taxation, average wages still rise. Figure 4.13 shows the average and maximum after-tax wages. The subsidy always increases the average wage. However, this reflects in part the increased rate of job destruction implied by taxation, which increases the lowest wage by eliminating less productive jobs. The effect on the wage of jobs at any given productivity is more complex. Figure 4.14 shows the after-tax wage at the highest productivity. After tax wages now only rise when the subsidy is sufficiently large and effectively targeted, otherwise the gains from lower unemployment are offset by the costs of higher taxation. The magnitude of these changes though is small relative to the level of the wage.

Table 4.3

Parameter	*Initial unemployment*	*Minimum unemployment*	*Proportional change*	*Unemployment rises before falling?*
Baseline	10.6%	6.3%	40.7%	No
α_{max}=1.25	10.6%	6.3%	41%	No
α_{max}=1.5	10.6%	6.4%	39.6%	Yes
α_{min}=0.8	10.4%	6.8%	34.0%	Yes
α_{min}=0.4	10.4%	5.9%	42.8%	No
ε_{min}=0.65	7.5%	5.7%	23.8%	Yes
ε_{min}=0.5	13.2%	6.8%	48.6%	No
γ=0.26	10.5%	4.5%	57.8%	No
γ=0.4	10.5%	7.4%	29.2%	Yes
k=0.35	10.6%	7.3%	31.1%	Yes
k=0.2	10.6%	4.4%	58.9%	No
r=0.02	9.9%	6.3%	36.8%	Yes
r=0	11.2%	6.3%	43.5%	No
δ=0.02	11.4%	6.7%	41.1%	No
δ=0.01	10.1%	6.0%	40.4%	No
η=0.5	10.6%	6.0%	43.5%	No
η=0.3	10.5%	6.6%	37.6%	Yes
λ=0.12	9.5%	7.1%	25.7%	Yes
λ=0.08	10.6%	5.4%	49.0%	No
b=0.4	12.9%	7.8%	39.4%	No
b=0.25	9.1%	5.1%	43.7%	No
b=0	5.5%	3.6%*	34.5%*	No
β=0.7	10.1%	9.0%	11.4%	Yes
β=0.55	8.2%	4.0%**	50.1%**	No

* $\overline{\psi} = 0.09$; ** $\overline{\psi} = 0.14$

Sensitivity

It is important to test how sensitive our findings are to our choice of parameter values. Table 4.3 shows the effect of variations in each of the parameters on the initial unemployment rate, and on the impact of policy. The underlying unemployment rate is relatively insensitive to the choice of parameters, with most variations leaving the initial unemployment rate between 9.5% and 11.5%. The main exception is $\varepsilon_{\min}$ which has a much larger effect on the underlying unemployment rate. However, this may in part reflect the choice of a uniform

distribution for $F(\varepsilon)$ so that the extremes of the distribution are as important as the centre.

The effect of policy varies somewhat more, but unemployment is always reduced at an optimally targeted subsidy of $\overline{\psi} = 0.18$. It is also always optimal to target some proportion, but less than half, of resources onto the short-term unemployed at higher levels of subsidy. However, in about one-third of the cases considered, unemployment rises at low levels of subsidy, before falling as the policy stance increases.

In most cases, where the impact of policy is significantly reduced, this is associated with a fall in the initial (ie zero subsidy) unemployment rate, so that policy is less effective when it is less needed. The principal exception is that as β rises, policy becomes less effective without an offsetting fall in initial unemployment. However, our baseline value is relatively high already: Millard and Mortensen (1997) set $\beta = 0.584$, Mortensen (1996) has $\beta = 0.44$. These reflect a high value of leisure in their parameter choices, which offsets the need for a high worker's share in generating the initial unemployment rate. Table 4.3 suggests that policy would be even more effective in our model if we had a lower value of β and a higher value of b.

Overall, our basic findings that policy is effective and that targeting on the long-term unemployed should be less than total are robust to variations in our choice of calibration.

The effect of μ

All our simulations so far have been presented on the basis of μ equal to one-half, as if workers flowed out at a constant rate throughout each period. We consider this to be the best basis for estimation. However, it is important to test whether our results are robust to changes in μ, in particular to the assumptions that μ=1 or μ=0. Only the unemployment rate (Figures 4.4 and 4.11), and hence also the short- and long-term unemployment rates (Figure 4.6) are affected by μ, since none of the equations that determine the model include it. The effect of increasing μ is simply to weight the inflow more heavily in calculating the unemployment rate.

Figure 4.15 shows the unemployment rate that would obtain with μ=1 in the model without taxes (with taxes the plot is much the same shape but somewhat higher, as

with Figures 4.4 and 4.11). We can see that the basic shape of the unemployment plot is sustained, but that subsidies are now initially harmful at low levels, and the subsequent downward slope is less steep. Hence larger levels of subsidy would be required for any given reduction in unemployment, but nonetheless policy remains effective. Figure 4.16 shows the effect with μ=0. Again the shape is basically unchanged, but subsidies are correspondingly more effective.

4.5 Welfare

Simply reducing unemployment may not be our sole policy objective. Given that there are real resource costs involved, especially with distortionary taxation, we need also to consider the welfare effects of policy. At an aggregate level, we can measure welfare by total consumption. Total output is given by:

$$(4.33)\ Y = n(\varepsilon_u)(p+\varepsilon_u) + \int_{\varepsilon_d}^{\varepsilon_u} n(x)(p+x)dx$$

We can then evaluate total consumption as output less the cost of training new hires and of holding open vacancies:

$$(4.34)\ C = Y - u_0\left\{\theta q(\theta)\sigma k + G(\alpha_r)\theta q(\theta)(1-\sigma)E(\alpha|\alpha<\alpha_r) + \theta\gamma\right\}$$

Where u_0 is the pre-matching pool of searchers, ie the number of people unemployed after inflows but before any outflows have occured (see technical appendix, equation 4.A3). Figure 4.17 shows total consumption, which can be seen to rise as unemployment falls, although by less than the increase in total output, since the costs of hiring also rise. Much of this increase is driven by our assumption that job creation occurs at the highest productivity whilst job destruction occurs at the lowest. Hence increased churning tends also to increase aggregate productivity. In Figure 4.18, we show what aggregate consumption would be at the initial productivity distribution. Of course this is not an equilibrium, but it allows us to see the relative contributions to increased consumption made by increasing employment and by shifting the productivity distribution. It is clear that most of the rise in aggregate consumption within the model is due to the assumptions regarding productivity. Indeed over much of the surface, aggregate consumption would otherwise fall. Nonetheless, at high levels of $\overline{\psi}$, the unemployment effects of the policy are sufficient to increase aggregate consumption.

Even if a wage subsidy increases aggregate welfare, we may also be interested in distributional issues, in particular the welfare effects on those whose jobs are lost because of the policy. Saint-Paul (1995) argues that wage subsidies may not be enacted, even though they would reduce unemployment, because of opposition from the employed. From equations (4.7), (4.12), (4.14) and (4.16), we have (in the absence of taxes – see technical appendix for equivalents with taxes):

$$(4.35)\ U_{ST} = \frac{b}{r} + \frac{\beta\theta q(\theta)\left[r + G(\alpha_r)\right](\varepsilon_u - \varepsilon_d)}{r(r+\delta+\lambda)\left[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)\right]}$$

$$(4.36)\ W(\varepsilon) = \frac{\beta(\varepsilon-\varepsilon_d)}{r+\delta+\lambda} + U_{ST}$$

$$(4.37)\ U_{LT} = \frac{b+G(\alpha_r)\theta q(\theta)W(\varepsilon_u)}{r+G(\alpha_r)\theta q(\theta)}$$

We can see from Figures 4.19 and 4.20 that wage subsidies generally increase the welfare of the unemployed (NB these, and the following figures, are plotted for the model with taxes). However, subsidies targeted predominantly on the short-term unemployed tend to reduce the welfare of the long-term unemployed. Equally, it is notable that the welfare of the short-term unemployed is higher if subsidies are targeted to some extent onto the long-term unemployed. The short-term unemployed gain both from the effects of the positive externalities, and because they face a risk of becoming long-term unemployed, and these gains are sufficient for the short-term unemployed to prefer policies targeted somewhat onto the long-term unemployed.

However, of more interest is the effect on the employed. Employed workers gain because their outside option improves, but they also lose because the surplus value of a match, of which they obtain a share, declines. In some cases this decline is sufficient to render the match no longer viable, and some workers who would be employed in the absence of policy become unemployed. Figure 4.21 is illustrative. The upper surface is the asset value of employment for a worker in a match with idiosyncratic component ε=0.8. The lower surface is the asset value of short-term unemployment, so that where the surfaces meet, the job is being destroyed. We can

see that the rise in value of the worker's outside option is more than sufficient to offset the reduction in the surplus value of their existing match. The implication is that the welfare of the employed rises, even if they are at risk of losing their jobs.

Even if this result holds for all ε, it is not quite sufficient to imply that the policy is Pareto-improving. The asset value to the firm of a filled post falls as unemployment falls, and hence the owners of existing firms make a loss. Hence distributional welfare will depend also on the ownership structure of firms, which is beyond the scope of this paper.

Optimal targeting

Welfare analysis raises the question of what we mean by 'optimal' targeting. So far, we have used the term to imply minimising the level of unemployment for any given level of subsidy, $\overline{\psi}$. However, from Figure 4.22, we can see that the desired extent of targeting on the long-term unemployed depends on our objective.

In general, maximising consumption requires rather less targeting onto the long-term unemployed than minimising unemployment. The long-term unemployed are more expensive to train, and hence the real resources that have to be allocated to training are higher, the higher the outflow rate of the long-term unemployed. In addition, output is determined both by the level of employment, and by the distribution of productivities, and hence by the inflow rate. Although the inflow and outflow rates broadly shift together, the maximum inflow rate arises at a somewhat lower degree of targeting on the long-term unemployed than that which minimises unemployment. The discounting effect which lowers wage pressure when subsidies are targeted on the long-term unemployed also lowers the job destruction rate. Whilst this tends to reduce unemployment, it also tends to reduce output, and hence consumption, by altering the distribution of productivities within the economy.

The remaining two curves on Figure 4.22 show the paths that maximise the welfare of employees in maximum productivity jobs, and of the long-term unemployed. The path for the short-term unemployed is not shown, because it is virtually identical to that for the employed. Unsurprisingly, each group prefers somewhat greater targeting towards itself (or the immediate outside option for the employed), than policies which optimise aggregates. However, with the exception of the long-term

unemployed, who always prefer substantially greater help targeted on themselves, the paths of optimum targeting for the various outcomes converge substantially as the overall subsidy increases.

4.6 Conclusion

In a world of endogenous job creation and job destruction, wage subsidies will generally increase both the inflows and the outflows from unemployment. We have extended the Mortensen-Pissarides (1994) framework to analyse these effects within a model with both short-term and long-term unemployed. This allows us to assess the calls by Layard, Snower and others for wage subsidies targeted onto the long-term unemployed. By using this general equilibrium framework, the oft-cited issues of deadweight, displacement and substitution can all be treated endogenously, rather than on the basis of frequently *ad hoc* estimates of their magnitude, often derived from partial equilibrium analysis. Furthermore the suggested advantages of targeting the long-term unemployed arise endogenously so that we obtain a basis for rigorous comparison of their likely magnitudes compared to those of displacement and substitution.

Our findings are broadly encouraging for advocates of active labour market policies. We find that unemployment can be reduced, even accounting for the increase in inflows. However, small subsidies may be worse than none, increasing unemployment.

Furthermore, targeting policy towards the long-term unemployed is desirable, and generates a further reduction in unemployment, not merely a churning of the existing pool. However, the justified emphasis on the long-term unemployed should not be to the complete exclusion of the short-term unemployed. Because of diminishing returns, as subsidies increase it becomes more effective at the margin to target resources towards the short-term unemployed than to target the long-term unemployed still further.

This appears to have been a problem with *Working Nation* in Australia, where an extensive redirection of policy towards the long-term unemployed was undermined by a consequent rise in the inflow into long-term unemployment. Furthermore, long-term unemployment generally falls even when subsidies are targeted exclusively on the short-term unemployed, because of the consequent fall in the inflow into long-term unemployment.

With access to multiple policy instruments, there may be more effective alternatives to job subsidies for the short-term unemployed, such as job search assistance. But the clear policy implication is that, if there is a substantial commitment to active labour market policy, some resources should be reserved for the short-term unemployed.

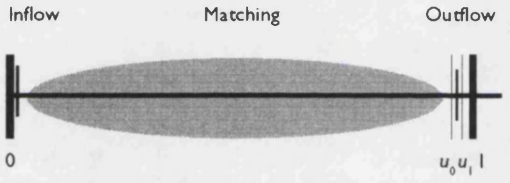
1. Strictly, $\overline{\psi}$ is the subsidy per member of the pool of job searchers, ie the pool of unemployed after inflows have occurred but before any outflows have occurred.

Technical Appendix

A) The unemployment rate

Conventionally, we solve for the unemployment rate, in steady state, by equating the flows into and out of each state. However, this approach leaves an ambiguity as to whether we should measure the unemployment rate before or after outflows have occurred. Rather than make an essentially arbitrary choice, we wish to extend this dichotomy into a continuous choice, allowing us more accurately to simulate what we actually measure in the unemployment statistics.

Consider the time-line for a single period in stationary equilibrium:



From the value functions (4.10) – (4.12), we assume that workers flow into unemployment at the beginning of the period, and if matched, flow out at the end of the period. We suppose that the matching process takes place at some point within the period. If we measure unemployment immediately before workers flow out, ie at u_0, the flow equilibrium conditions are:

$$(4.A1)\quad \left[\lambda F(\varepsilon_d)+\delta\right](1-u_0)=u_{S0}$$

$$(4.A2)\quad u_{S0}\left[1-\theta q(\theta)\right]=G(\alpha_r)\theta q(\theta)u_{L0}$$

Giving:

$$(4.A3)\quad u_0=\frac{\left[\lambda F(\varepsilon_d)+\delta\right]\left\{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right\}}{G(\alpha_r)\theta q(\theta)+\left[\lambda F(\varepsilon_d)+\delta\right]\left\{1-\theta q(\theta)+G(\alpha_r)\theta q(\theta)\right\}}$$

Whereas, if we measure unemployment immediately after the outflow, at u_1, the flow conditions are:

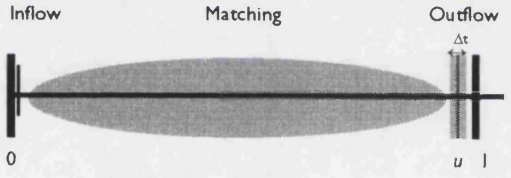
(4.A4) $\left[\lambda F(\varepsilon_d)+\delta\right](1-u_1)\left[1-\theta q(\theta)\right]=u_{S1}$

(4.A5) $u_{S1}\left[1-G(\alpha_r)\theta q(\theta)\right]=G(\alpha_r)\theta q(\theta)u_{L1}$

Giving:

(4.A6) $u_1=\dfrac{\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)\right]}{G(\alpha_r)\theta q(\theta)+\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)\right]}$

In practice, however, when we measure unemployment, we capture some fraction of those of who will exit during the period, not all as in (4.A3) nor none as in (4.A6). Suppose that workers flow out of unemployment over some interval, Δt. We might then measure unemployment within that interval.



The value functions for unemployment (4.11) and (4.12), and hence the job destruction condition (4.17) should now be treated as approximations, since the appropriate degree of discounting will vary slightly between workers.

Let μ be the proportion of the outflow remaining at the point where we measure unemployment, u. The flow equilibrium conditions are now given by:

(4.A7) $\left[\lambda F(\varepsilon_d)+\delta\right](1-u)\left[1-(1-\mu)\theta q(\theta)\right]=u_S$

(4.A8) $\left[u_S-\mu\theta q(\theta)\left[\lambda F(\varepsilon_d)+\delta\right](1-u)\right]\left[1-(1-\mu)G(\alpha_r)\theta q(\theta)\right]=G(\alpha_r)\theta q(\theta)u_L$

Which solve to give equation 4.21. In the limit as $\Delta t\to 0$, the value functions (4.10) and (4.11) will become exact provided r is finite. Moreover, in this limit there is no transition state between unemployment and employment.

A fraction $1-\mu$ of those who will flow out during the period do so before we count the unemployed, and thus are not counted, whilst the remainder, μ, do so afterwards, and are thus counted as having a full period of unemployment. Hence, for the purposes of calculating u, this is equivalent to assuming that workers flow out across the entire period, with an average incremental duration equal to $(1-\mu).0+\mu.1=\mu$.

B) Targeting

Consider the impact of an increase in ϕ, so that subsidies are targeted more heavily onto the long-term unemployed. Subsidies for the long-term unemployed, ψ_L, will tend to rise, whilst those for the short-term unemployed, ψ_S, will tend to fall. If both subsidies are effective in reducing unemployment, we would expect to obtain offsetting effects. Formally, we have:

$$(4.B1)\quad \frac{du}{d\phi}=\frac{\partial u}{\partial \psi_L}\frac{d\psi_L}{d\phi}+\frac{\partial u}{\partial \psi_S}\frac{d\psi_S}{d\phi}$$

Differentiating (4.5), (4.17) and (4.18) and substituting into the differential of (4.21), gives:

(4.B2)

$$\frac{\partial u}{\partial \psi_L}=-\Delta\left\{\begin{array}{l}\left[\lambda F(\varepsilon_d)+\delta\right]\left[G(\alpha_r)(1-\sigma)AG(\alpha_r)q(\theta)(1-\eta)+r\omega_1\omega_2+A\eta\gamma G'(\alpha_r)\left[1-\theta q(\theta)\right]\right] \\ -B\left[G(\alpha_r)(1-\sigma)\left[r+G(\alpha_r)\right]q(\theta)(1-\eta)+r\zeta\frac{\partial\sigma}{\partial\alpha_r}+\eta\gamma G'(\alpha_r)\left[1-\theta q(\theta)\right]\right]\end{array}\right\}$$

(4.B3)

$$\frac{\partial u}{\partial \psi_S}=-\Delta\left\{\left[\lambda F(\varepsilon_d)+\delta\right]\left[\sigma AG(\alpha_r)q(\theta)(1-\eta)-r\omega_1\omega_2\right]-B\sigma\left[r+G(\alpha_r)\right]q(\theta)(1-\eta)\right\}$$

where:

$$\Delta=\frac{1}{D\left\{G(\alpha_r)\theta q(\theta)+\left[\lambda F(\varepsilon_d)+\delta\right]\left[1-\theta q(\theta)+\mu G(\alpha_r)\theta q(\theta)\right]\right\}^2}>0$$

$$A = \left[r + \delta + \lambda F(\varepsilon_d)\right]\left[1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)\right] + \beta\theta q(\theta)\left[r + G(\alpha_r)\right] > 0$$

$$B = \lambda F'(\varepsilon_d)G(\alpha_r)\theta q(\theta)\omega_1\left[1 - \theta q(\theta) + G(\alpha_r)\theta q(\theta)\right] > 0$$

$$\omega_1 = \frac{\beta(\varepsilon_u - \varepsilon_d)(1+r)}{\left[1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)\right]} > 0$$

$$\omega_2 = \frac{(1-\beta)}{(r+\delta+\lambda)}\frac{G'(\alpha_r)\theta q(\theta)\left[1 - \theta q(\theta)\right]q(\theta)(1-\eta)}{\left[1 - \theta q(\theta) + r + G(\alpha_r)\theta q(\theta)\right]} > 0$$

$$\zeta = (\alpha_r - k + \psi_S - \psi_L) - G(\alpha_r)\left(\alpha_r - E(\alpha|\alpha \le \alpha_r)\right) > 0$$

$$D = \left\{\begin{array}{l}\left[\sigma + (1-\sigma)G(\alpha_r) + \zeta\frac{\partial\sigma}{\partial\alpha_r}\right]\frac{(1-\beta)}{(r+\delta+\lambda)}\omega_1\left[r + G(\alpha_r)\right]q(\theta)(1-\eta) + \\ \left[\frac{\eta\gamma}{\theta q(\theta)} - \zeta\frac{\partial\sigma}{\partial\theta}\right]\left[\frac{(1-\beta)}{(r+\delta+\lambda)}\omega_1 G'(\alpha_r)\theta q(\theta)\left[1 - \theta q(\theta)\right] + A\right]\end{array}\right\} > 0$$

Note that strictly $\zeta>0$ requires that ψ_L is not so great that *ex ante* firms would prefer to contact a long-term unemployed worker rather than a short-term unemployed one. Equally, $D>0$ implies a lower bound for η to prevent changes in σ from reducing the expected cost of hiring as the labour market tightens, because more of the unemployed are cheaper short-term unemployed. We impose both of these assumptions, which seem certain to hold for empirical estimates of η and realistic subsidy levels.

The first sets of terms in 4.B2 and 4.B3 are the outflow effects, and the second sets of terms (those in *B*) are the inflow effects. Targeting is only an interesting issue if both subsidies reduce unemployment, since otherwise we should always target the whole of the subsidy where it is effective, or have no subsidy at all if neither is effective. Hence, we can assume that the outflow effects dominate in the case we are interested in.

There are three effects on the outflow in 4.B2. The first is the direct effect of a reduced cost of hiring on labour demand – the availability of subsidies reduces the

expected cost of opening vacancies, and hence more vacancies are opened. This effect is also present when subsidies are targeted on the short-term unemployed (ie 4.B3). The second effect ($r\omega_1\omega_2$) is the wage pressure effect. When subsidies are targeted on the long-term unemployed, the utility gain for the long-term unemployed is discounted relative to the utility cost for the short-term unemployed (from substitution), which tends to reduce wage pressure (see Chapter 2). This effect operates in reverse when subsidies are targeted on the short-term unemployed. The final effect arises because subsidising the long-term unemployed increases the probability that contact with a long-term unemployed worker will lead to hiring. The 'employability' of the long-term unemployed increases, which reduces the expected duration of all vacancies, hence lowering their cost.

We can broadly consider the first effect as the direct effect and the second and third as positive externalities to targeting the long-term unemployed. From 4.B2 and 4.B3 we can see that an increase in ψ_L combined with a decrease in ψ_S in the same proportions as the long- and short-term unemployed's share of the total unemployment outflow (ie $G(\alpha_r)(1-\sigma)d\psi_L = -\sigma d\psi_S$) would leave only these externality effects (and their corresponding effects on the inflow).

However, a change in the extent of targeting will also change the outflow rates of the short- and long-term unemployed, and hence the aggregate outflow rate. This, in turn, will alter the total cost of subsidies. Given a fixed total cost of subsidies (per unemployed worker here), any increase in outflows will imply a corresponding reduction in the level of subsidy per hire. Since it is the (expected) level of subsidy per hire that firms respond to, this introduces an offsetting effect. As the outflow rate of a group rises, so the cost of increasing the subsidy to that group also rises and hence there are diminishing returns.

Let $a_S = \theta q(\theta)$, the outflow rate from short-term unemployment, and $a_L = G(\alpha_r)\theta q(\theta)$, the outflow rate from long-term unemployment. From (4.31) and (4.32) we have:

(4.B4)

$$G(\alpha_r)(1-\sigma)\frac{d\psi_L}{d\phi} = -\sigma\frac{d\psi_S}{d\phi} - \frac{1}{\theta q(\theta)}\left\{\psi_S\sigma\frac{da_S}{d\phi} + \psi_L(1-\sigma)\frac{da_L}{d\phi} + [\psi_S a_S - \psi_L a_L]\frac{d\sigma}{d\phi}\right\}$$

Where the term in parentheses is the marginal cost of subsidising the additional outflow arising from a change in targeting. Finally, combining (4.B1) to (4.B4), we obtain:

$$\frac{du}{d\phi} = \frac{-1}{\left[(1-\phi)\sigma a_S + \phi(1-\sigma)a_L\right]} \times$$

$$\text{(4.B5)} \quad \left\{ \frac{\Delta\psi_L}{\phi} \left(\begin{array}{l} \left[\lambda F(\varepsilon_d) + \delta\right]\left[r\omega_1\omega_2 + A\eta\gamma G'(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]\right] \\ -B\left[r\theta q(\theta)\zeta\dfrac{\partial\sigma}{\partial\alpha_r} + \eta\gamma G'(\alpha_r)\theta q(\theta)\left[1-\theta q(\theta)\right]\right] \end{array} \right) + \right.$$

$$\left. \left((1-\phi)\sigma\frac{da_S}{d\phi} + \phi(1-\sigma)\frac{da_L}{d\phi} + \left[(1-\phi)a_S - \phi a_L\right]\frac{d\sigma}{d\phi} \right) \left(\psi_S\frac{\partial u}{\partial\psi_S} + \psi_L\frac{\partial u}{\partial\psi_L} \right) \right\}$$

Where the first term is the net effect of the externalities and the second term is the marginal loss in subsidy per head multiplied by the unemployment impact of a reduction in subsidy. If we assume that the outflow effect dominates the inflow effect, then the net externality effect tends to reduce unemployment as we target subsidies increasingly onto the long-term unemployed. However, we are assuming that both $\frac{\partial u}{\partial\psi_S}$ and $\frac{\partial u}{\partial\psi_L}$ are negative. Hence, at high levels of ϕ, the externalities can be offset by the reduction in subsidy per head required to finance further targeting.

What we can show is that, provided:

i) outflow effects dominate inflow effects; and

ii) shifting subsidies towards the long-term unemployed increases their outflow rate, a_L;

then it is always optimal to target subsidies more onto the long-term unemployed than the short-term unemployed. Suppose this were not the case, so that $\frac{du}{d\phi} > 0$ for some $\phi \leq \frac{1}{2}$. If outflow effects dominate, then an increase in unemployment with increasing ϕ implies a decrease in the aggregate outflow rate $\sigma a_S + (1-\sigma)a_L$. Hence, we would have:

$$\sigma\frac{da_S}{d\phi} + (1-\sigma)\frac{da_L}{d\phi} + (a_S - a_L)\frac{d\sigma}{d\phi} < 0$$

From (4.20) and (4.21), it follows that if the aggregate outflow rate is falling, leading to an increase in unemployment, $\frac{d\sigma}{d\phi}$ must be negative. Since, by definition, $a_S \geq a_L$, and by assumption, $1-\phi \geq \phi$, it follows that:

$$(1-\phi)\sigma\frac{da_S}{d\phi}+\phi(1-\sigma)\frac{da_L}{d\phi}+\left[(1-\phi)a_S-\phi a_L\right]\frac{d\sigma}{d\phi}<0$$

In which case, from (4.B5), we would have $\frac{du}{d\phi}<0$ contradicting our initial assumption. Hence at least some preference for subsidising the long-term unemployed is always optimal.

C) Taxation

We extend the model here to include a proportional wage tax, τ, used to finance both the subsidy and benefit payments. Taxes do not affect the job creation condition, (4.5) nor the reservation training cost condition (4.18), in line with the neutrality of taxes in the previous chapter. However, they do affect the job destruction condition. If we let $w(\varepsilon)$ be the post-tax wage, then the value functions for firms and workers of filled jobs become:

$$(4.9')\ rJ(\varepsilon)=p+\varepsilon-w(\varepsilon)(1+\tau)+\lambda\left[\int_{\varepsilon_d}^{\varepsilon_u}J(x)dF(x)-J(\varepsilon)\right]-\delta J(\varepsilon)$$

$$(4.10')\ rW(\varepsilon)=w(\varepsilon)+\lambda\left[\int_{\varepsilon_d}^{\varepsilon_u}W(x)dF(x)+F(\varepsilon_d)U_{ST}-W(\varepsilon)\right]+\delta\left[U_{ST}-W(\varepsilon)\right]$$

The value functions for unemployment will not be affected, since we assume that unemployment benefit is untaxed. Hence, adding up the value functions will give:

$$(4.13')\ (r+\delta+\lambda)S(\varepsilon)=p+\varepsilon-w(\varepsilon)\tau+\lambda\int_{\varepsilon_d}^{\varepsilon_u}S(x)dF(x)-rU_{ST}$$

The presence of taxes will also affect the sharing rule arising from Nash bargaining. An increase in the worker's return will now impose an additional cost on both parties by increasing the share of total surplus that goes in tax. Hence, the worker's share will be lower the greater is the tax rate. In particular, Nash bargaining will yield a solution of the form:

(4.C1) $$W(\varepsilon)-U_{ST}=\frac{\beta}{(1-\beta)(1+\tau)}J(\varepsilon)$$

and hence:

(4.7') $$W(\varepsilon)-U_{ST}=\frac{\beta}{1+(1-\beta)\tau}S(\varepsilon)$$

(4.8') $$J(\varepsilon)=\frac{(1-\beta)(1+\tau)}{1+(1-\beta)\tau}S(\varepsilon)$$

We can then substitute (4.8') into (4.9') to give:

(4.C2) $$w(\varepsilon)=\frac{p+\varepsilon}{1+\tau}-\frac{(r+\delta+\lambda)(1-\beta)}{1+(1-\beta)\tau}S(\varepsilon)+\frac{\lambda(1-\beta)}{1+(1-\beta)\tau}\int_{\varepsilon_d}^{\varepsilon_u}S(x)dF(x)$$

which we can substitute in turn into (4.13') to give:

(4.C3) $$\frac{(r+\delta+\lambda)}{1+(1-\beta)\tau}S(\varepsilon)=\frac{p+\varepsilon}{1+\tau}+\frac{\lambda}{1+(1-\beta)\tau}\int_{\varepsilon_d}^{\varepsilon_u}S(x)dF(x)-rU_{ST}$$

Hence, we have:

$$S'(\varepsilon)=\frac{1+(1-\beta)\tau}{(1+\tau)(r+\delta+\lambda)}$$

and thus:

(4.15') $$\frac{(r+\delta+\lambda)}{1+(1-\beta)\tau}S(\varepsilon)=\frac{p+\varepsilon}{1+\tau}-b+\frac{\lambda}{(r+\delta+\lambda)(1+\tau)}\int_{\varepsilon_d}^{\varepsilon_u}[1-F(x)]dx-\frac{\beta\theta q(\theta)[r+G(\alpha_r)]S(\varepsilon_u)}{1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)}$$

Which, together with the condition that $S(\varepsilon_d)=0$ gives:

$$(4.16') \quad S(\varepsilon) = S(\varepsilon) - S(\varepsilon_d) = \frac{(\varepsilon - \varepsilon_d)[1+(1-\beta)\tau]}{(1+\tau)(r+\delta+\lambda)}$$

and:

$$(4.17') \quad p + \varepsilon_d = b(1+\tau) + \frac{\beta\theta q(\theta)[r+G(\alpha_r)](\varepsilon_u - \varepsilon_d)[1+(1-\beta)\tau]}{(r+\delta+\lambda)[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)]} - \frac{\lambda}{r+\delta+\lambda}\int_{\varepsilon_d}^{\varepsilon_u}[1-F(x)]dx$$

Which is the new job destruction condition. Note that an increase in the tax rate increases the job destruction rate, because taxes reduce the surplus available from filled jobs, making them less valuable to the firm and the worker, and hence more prone to destruction.

We can then obtain the new wage equation by substituting (4.15') into (4.C2) to give:

$$(4.24') \quad w(\varepsilon) = \beta\left(\frac{p+\varepsilon}{1+\tau}\right) + (1-\beta)\left[b + \frac{\beta\theta q(\theta)[r+G(\alpha_r)](\varepsilon_u - \varepsilon_d)}{(r+\delta+\lambda)[1-\theta q(\theta)+r+G(\alpha_r)\theta q(\theta)]}\right]$$

Finally, to close the model, we need to impose a balanced budget condition. From the value functions (4.11) and (4.12), we can see that all those who become unemployed, even if they flow out again in the same period, receive benefits. Hence, total benefit payments per period are bu_0 where u_0 is given by (4.A3). Similarly, we assume in (4.30) that $\overline{\psi}$ is the subsidy per person searching, so that the total cost of subsidies per period is $\overline{\psi}u_0$. The balanced budget condition is then given by:

$$(4.C4) \quad \overline{w}\tau(1-u_0) = (b+\overline{\psi})u_0$$

Where the mean wage, $\overline{w}$, is given by equations (4.24') and (4.25). Hence the model is determined by the original job creation and reservation training cost conditions, (4.5) and (4.18), together with the new job destruction condition (4.17'), the wage equations (4.24') and (4.25), the balanced budget constraint (4.C4) and the Beveridge curve (4.A3). As before, we can address the problem of the appropriate point to measure unemployment using equation (4.21) and an appropriate choice of μ.

Figure 4.1a

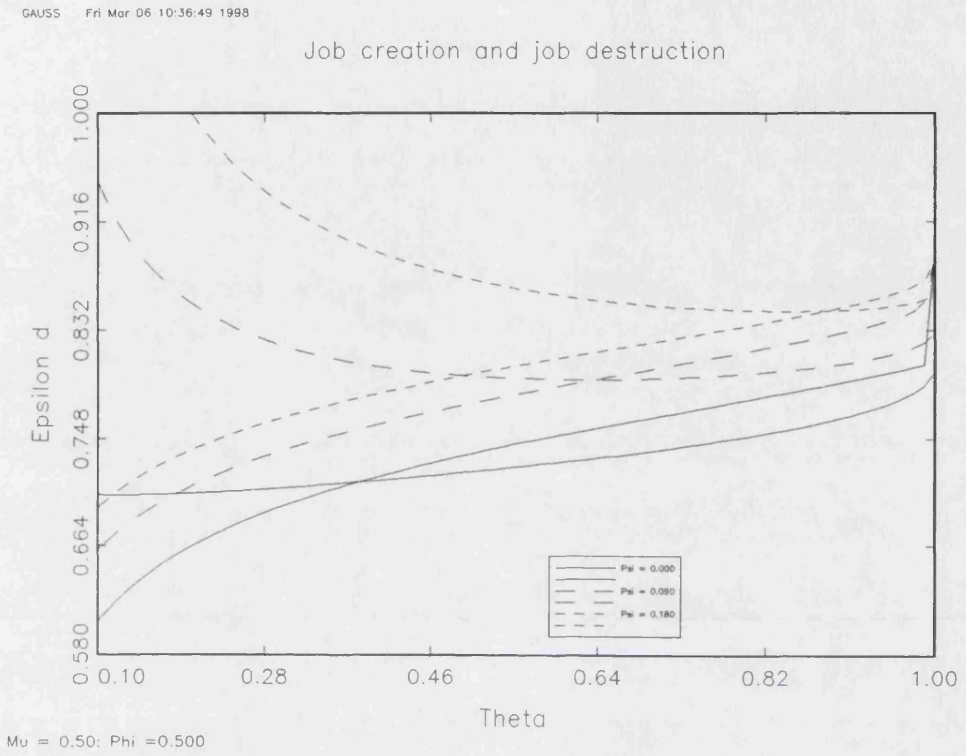


Figure 4.1b

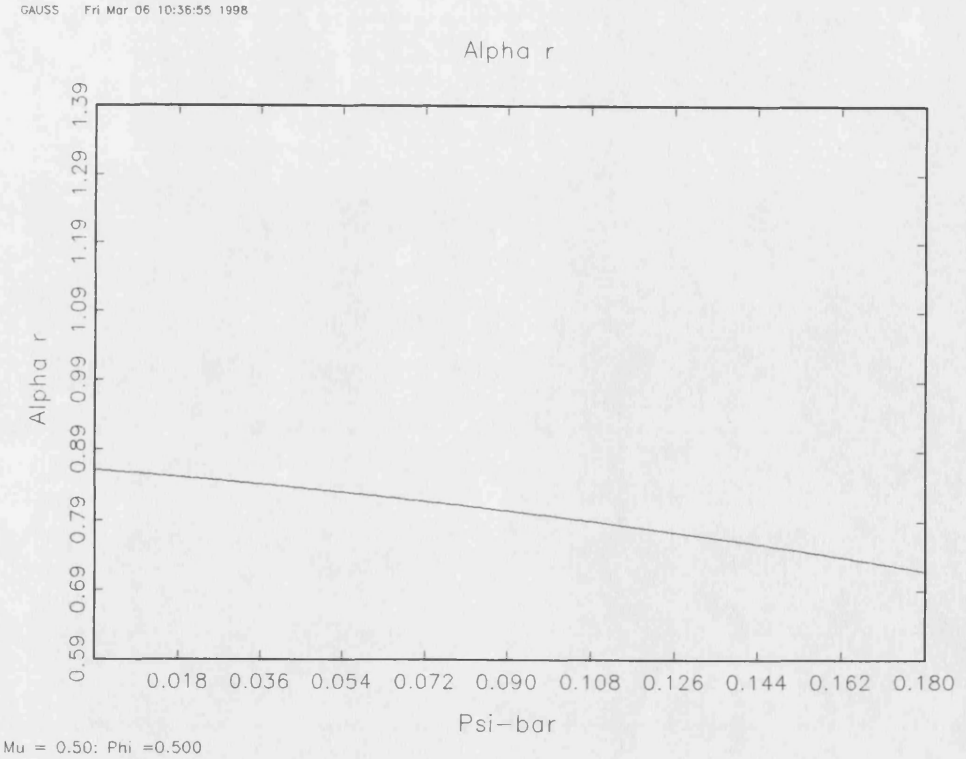


Figure 4.2a

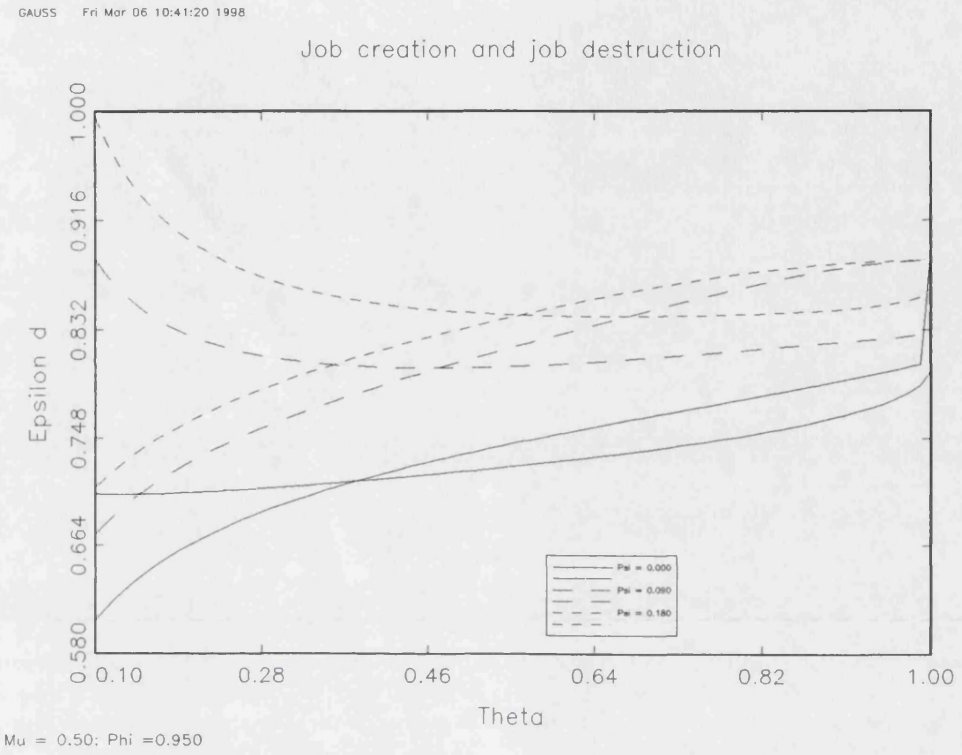


Figure 4.2b

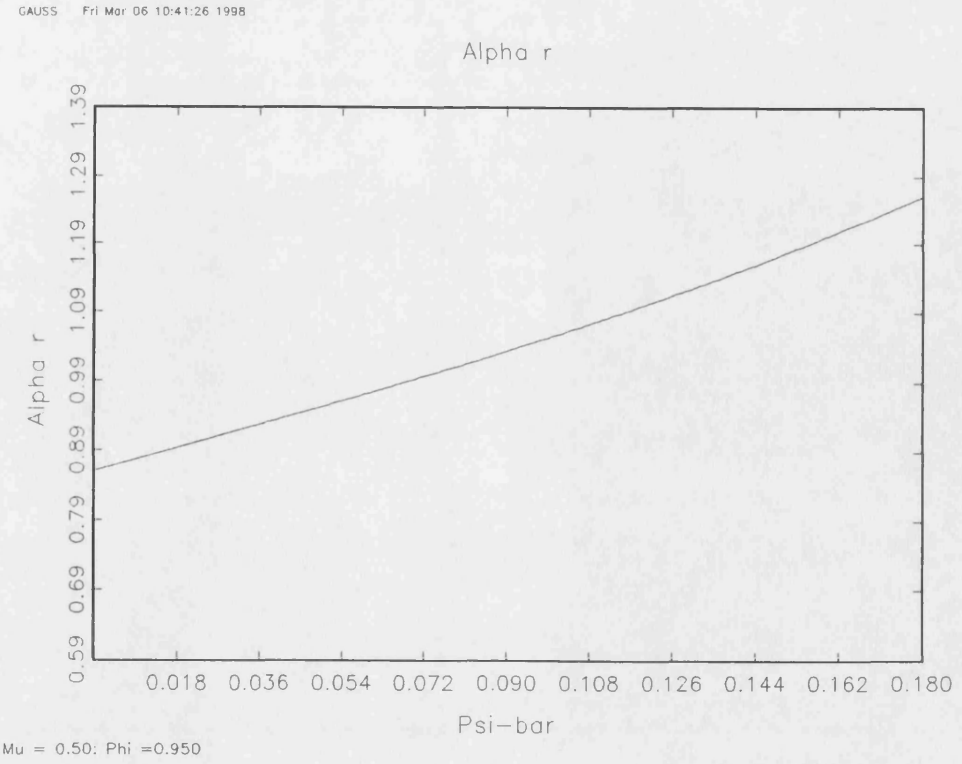


Figure 4.3a

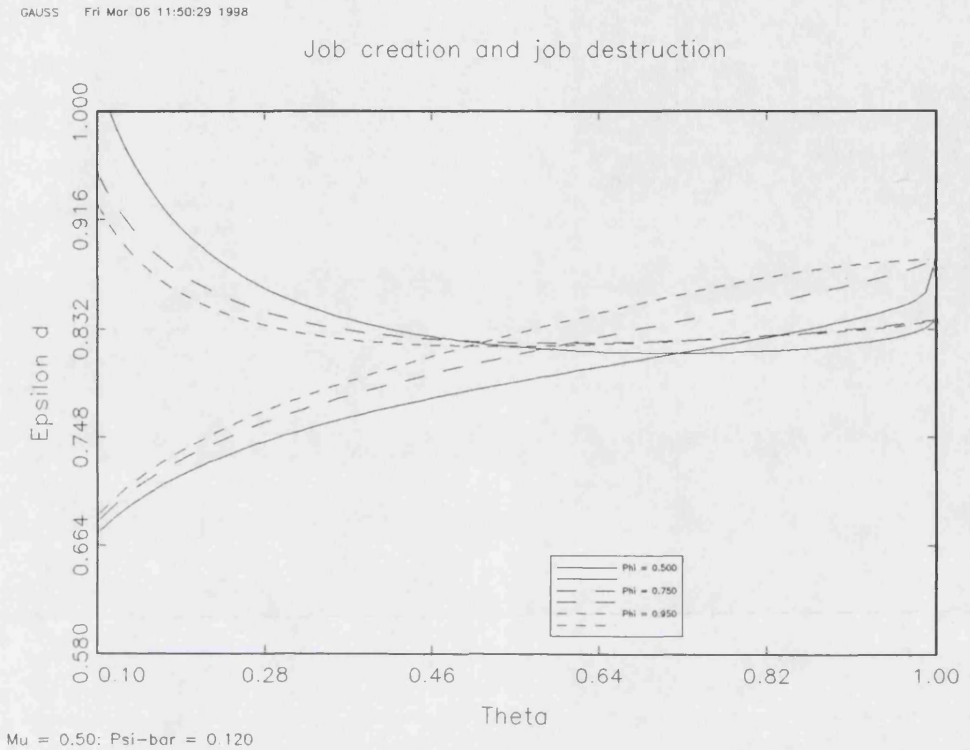


Figure 4.3b

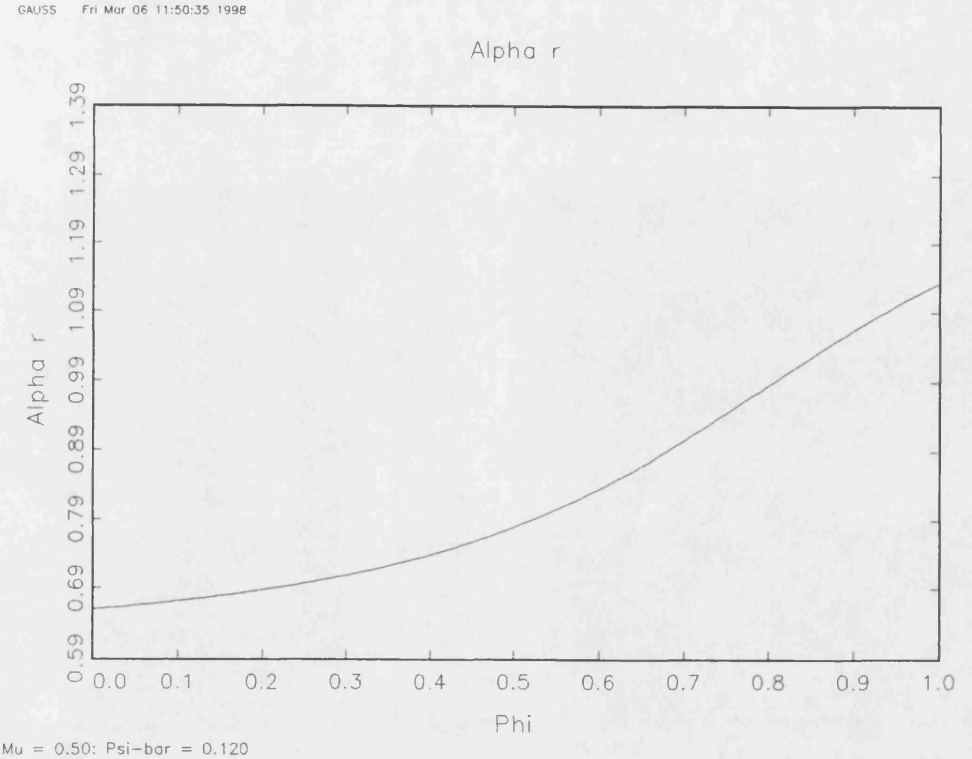


Figure 4.4

Figure 4.5

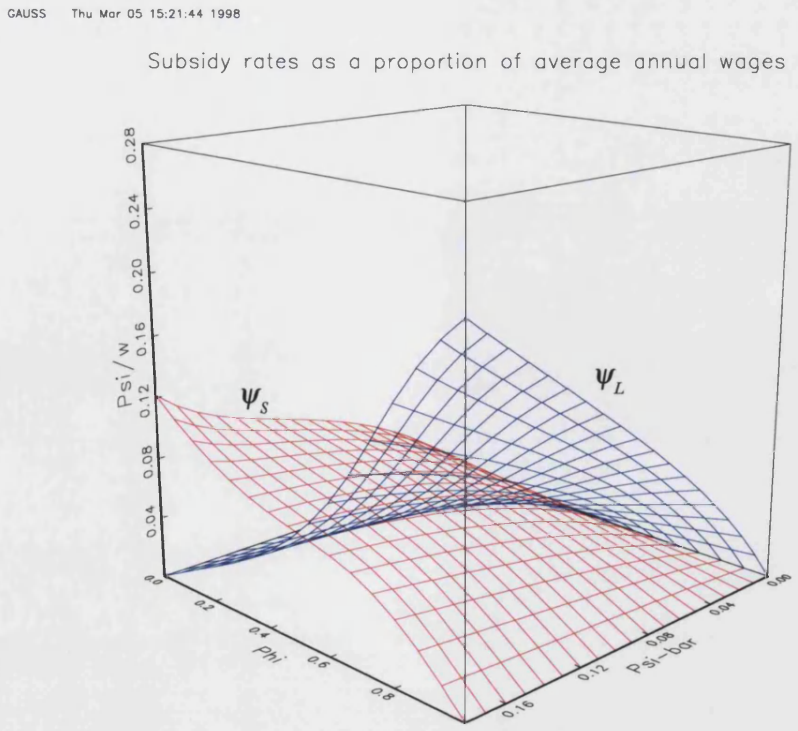


Figure 4.6

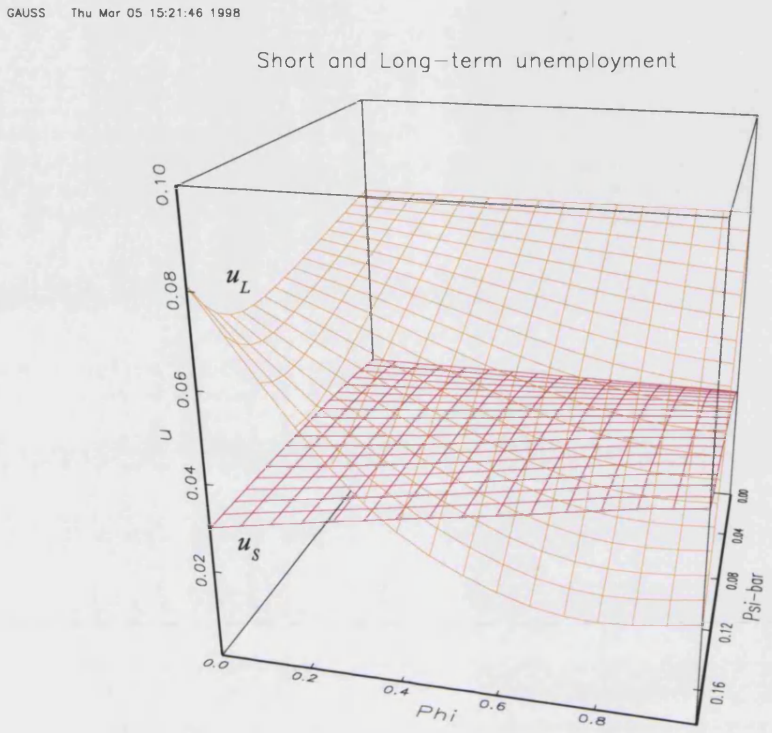


Figure 4.7

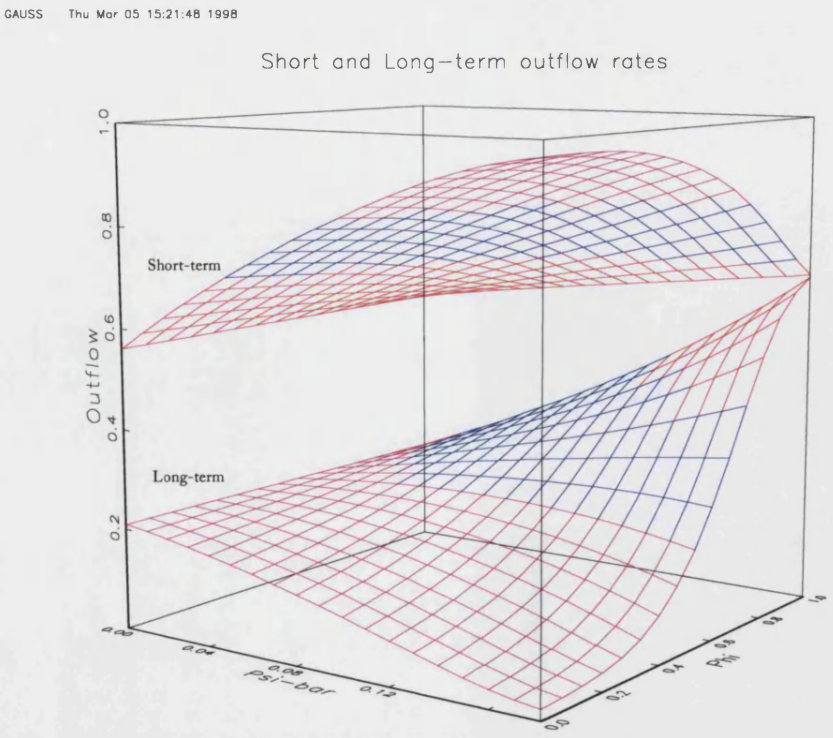


Figure 4.8

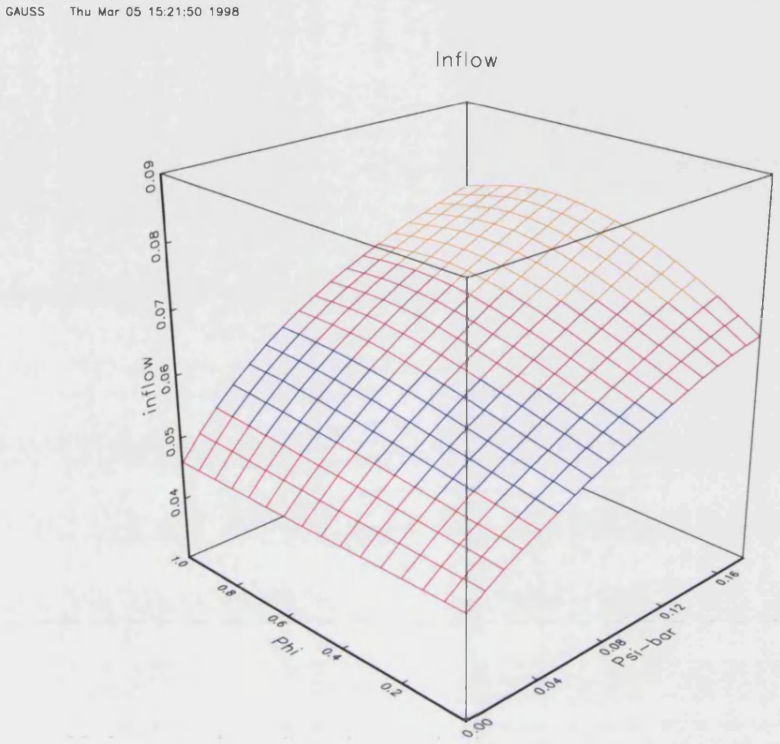


Figure 4.9

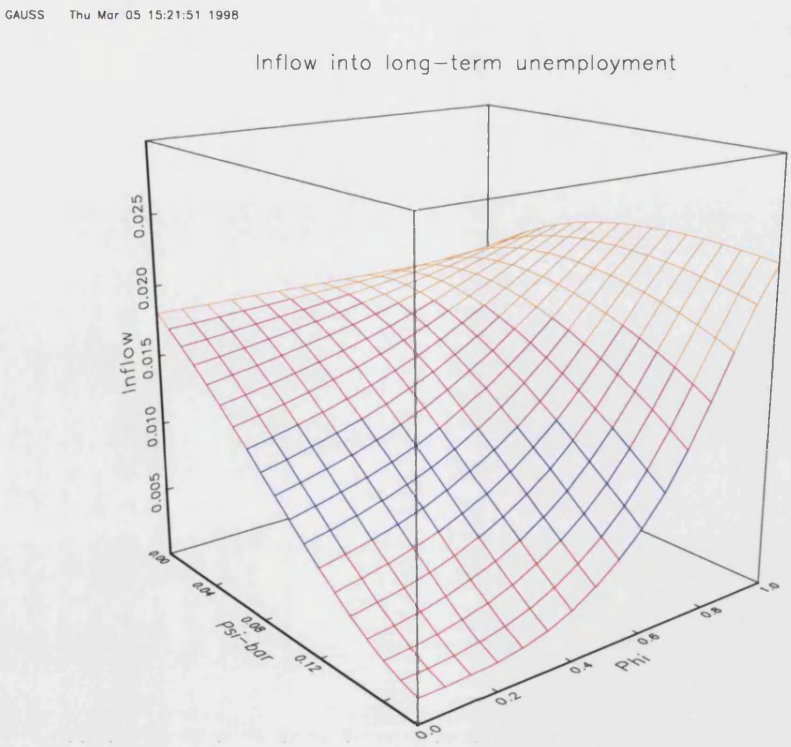


Figure 4.10

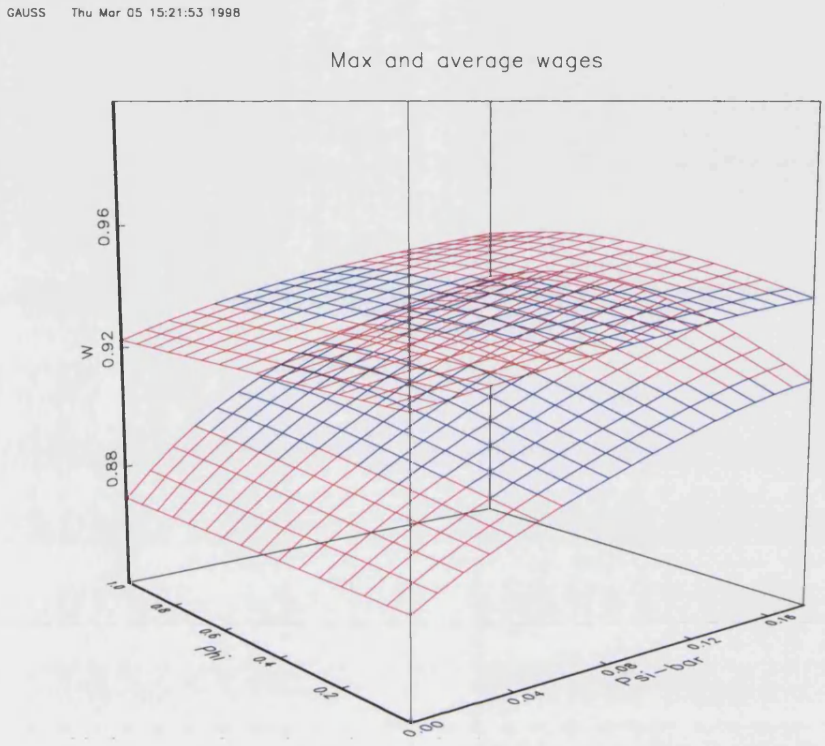


Figure 4.11

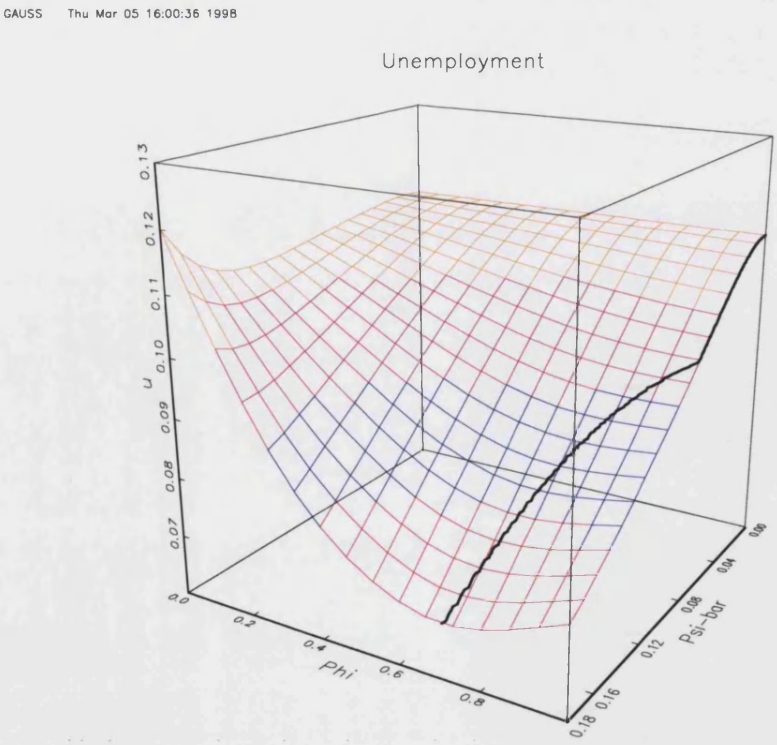


Figure 4.12

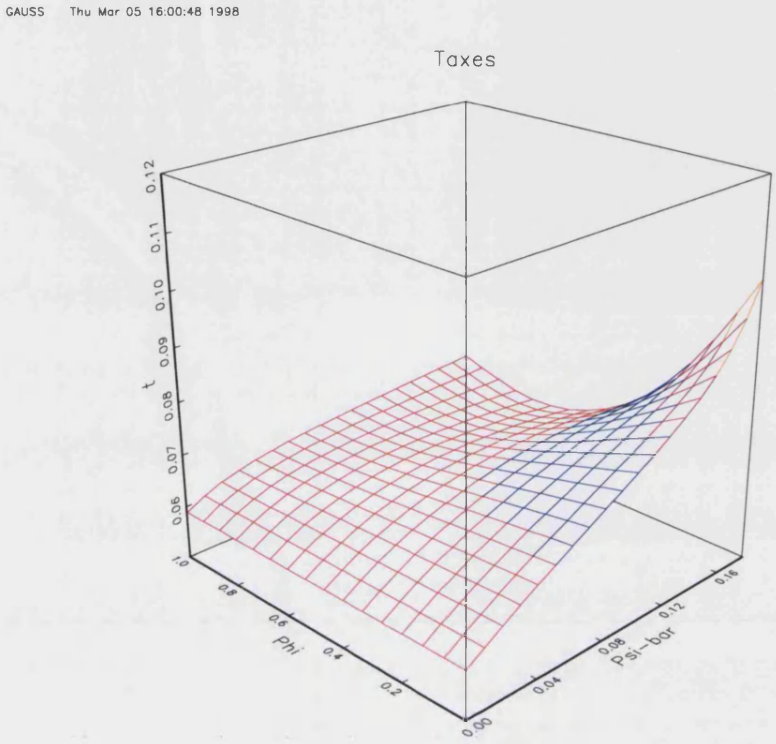


Figure 4.13

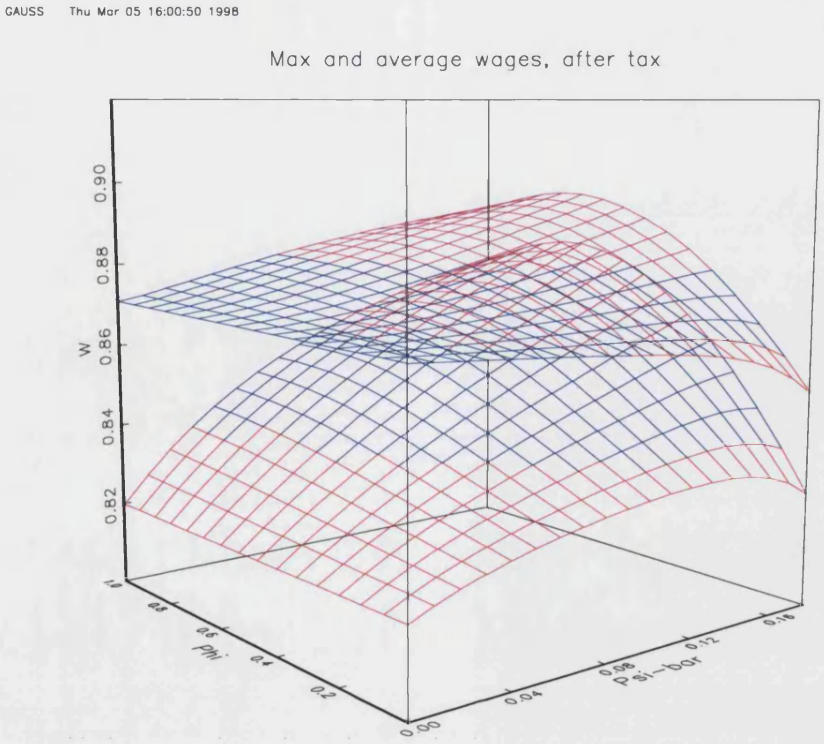


Figure 4.14

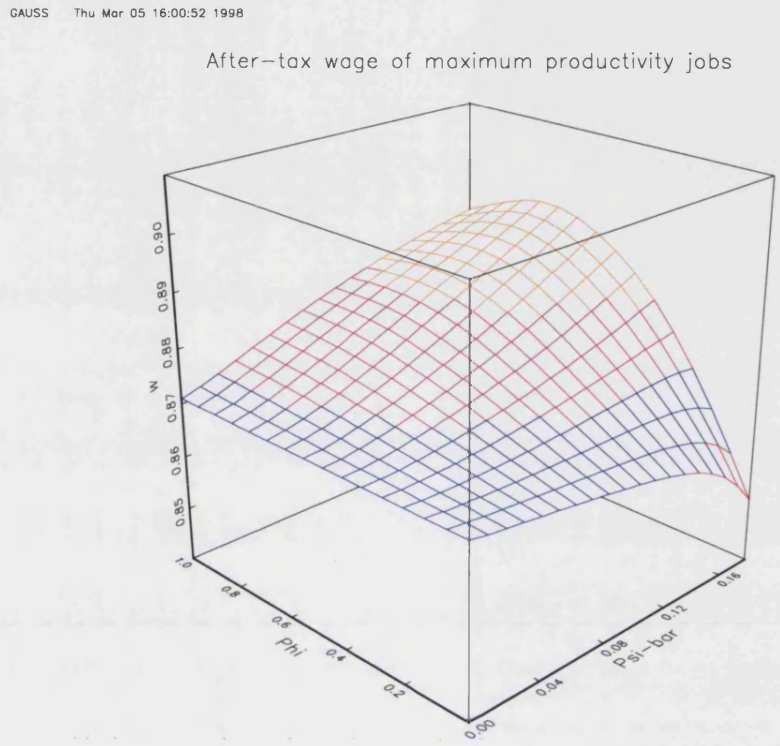


Figure 4.15

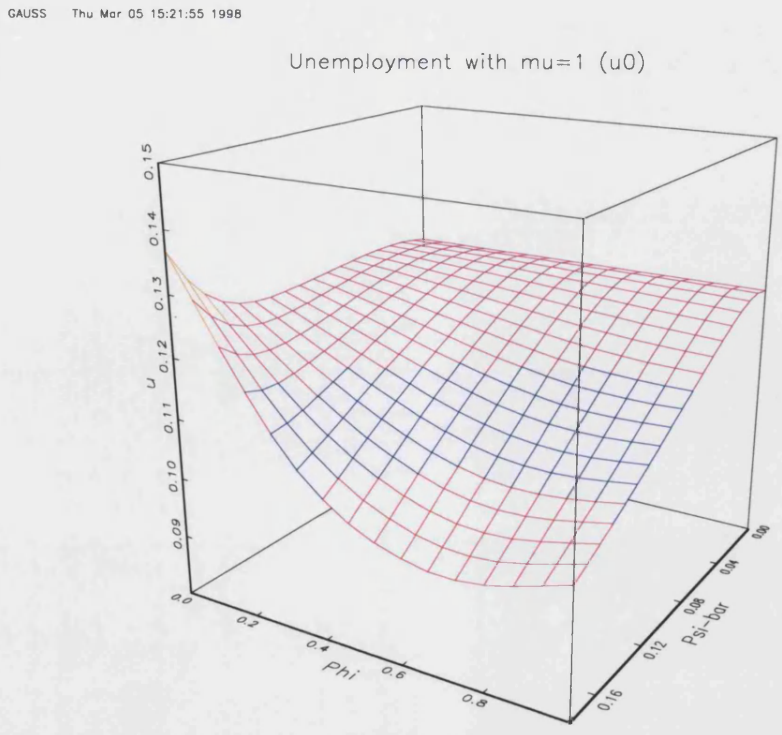


Figure 4.16

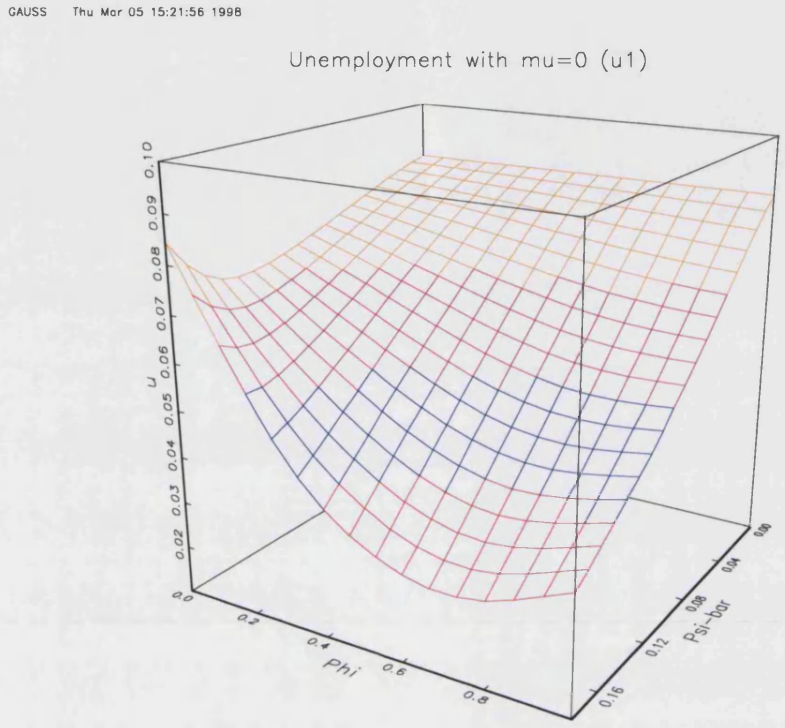


Figure 4.17

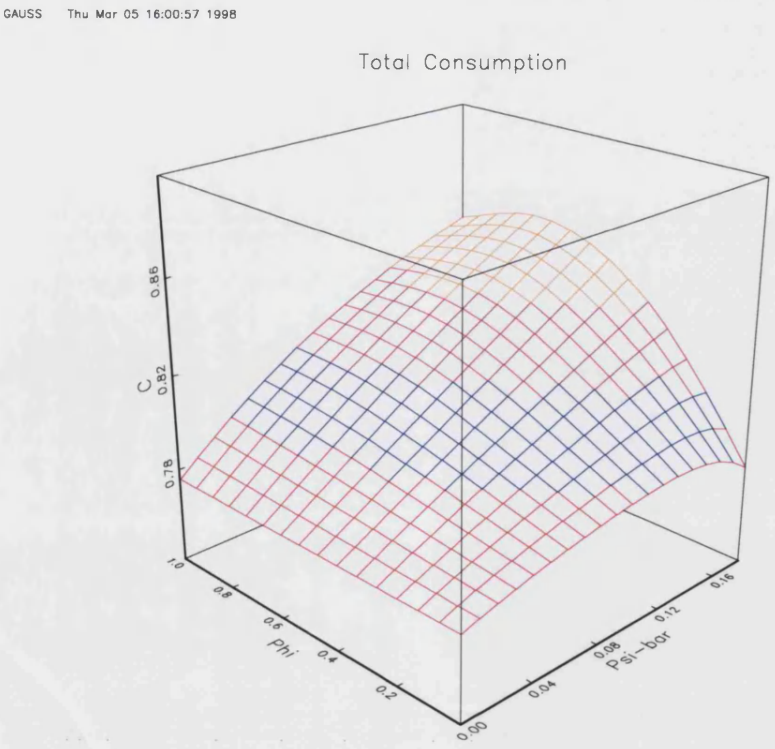


Figure 4.18

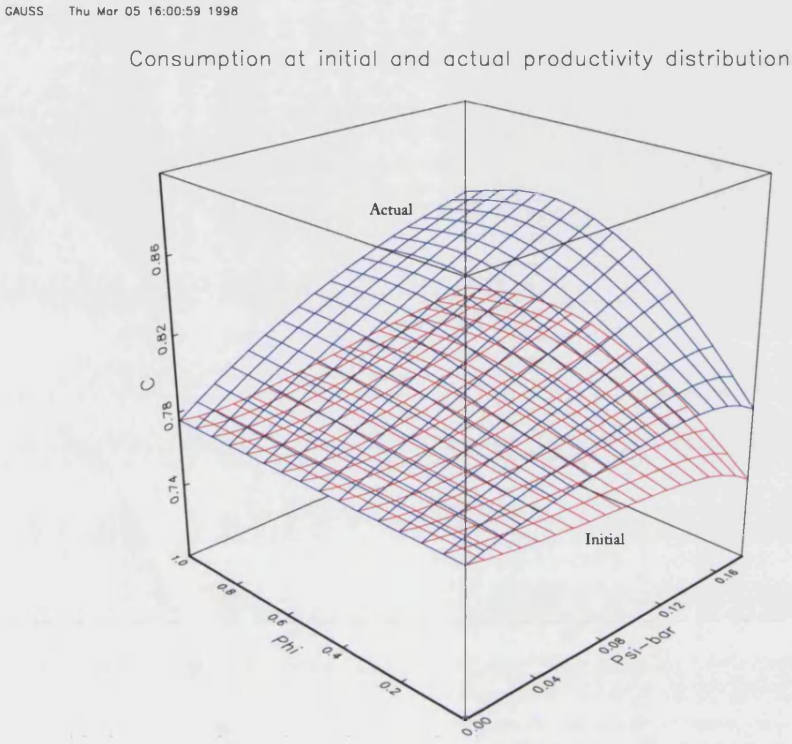


Figure 4.19

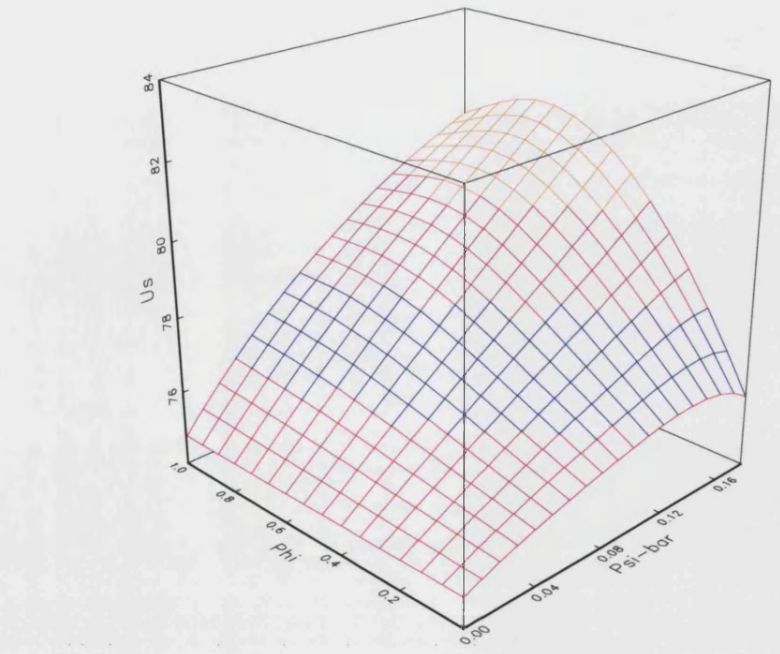


Figure 4.20

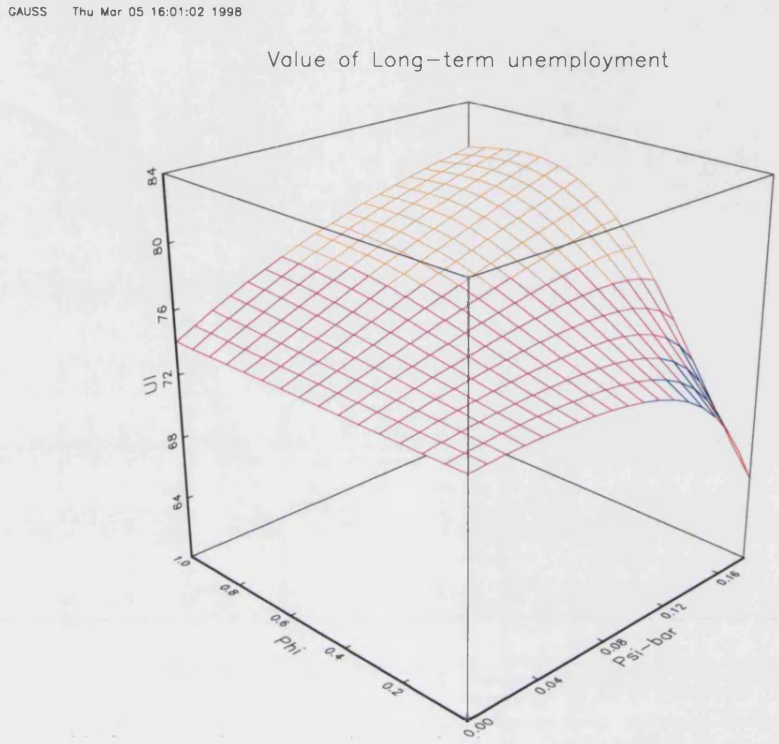


Figure 4.21

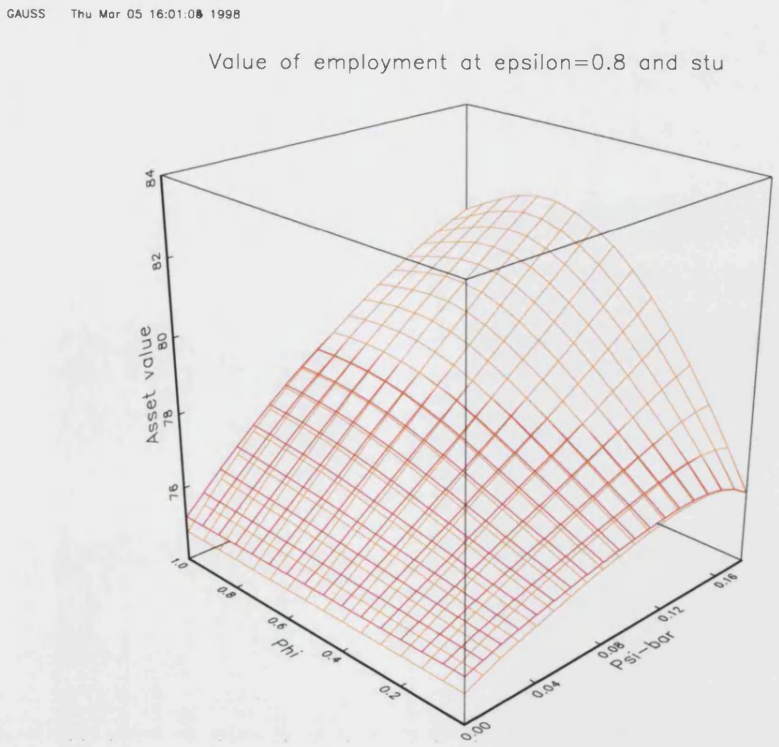
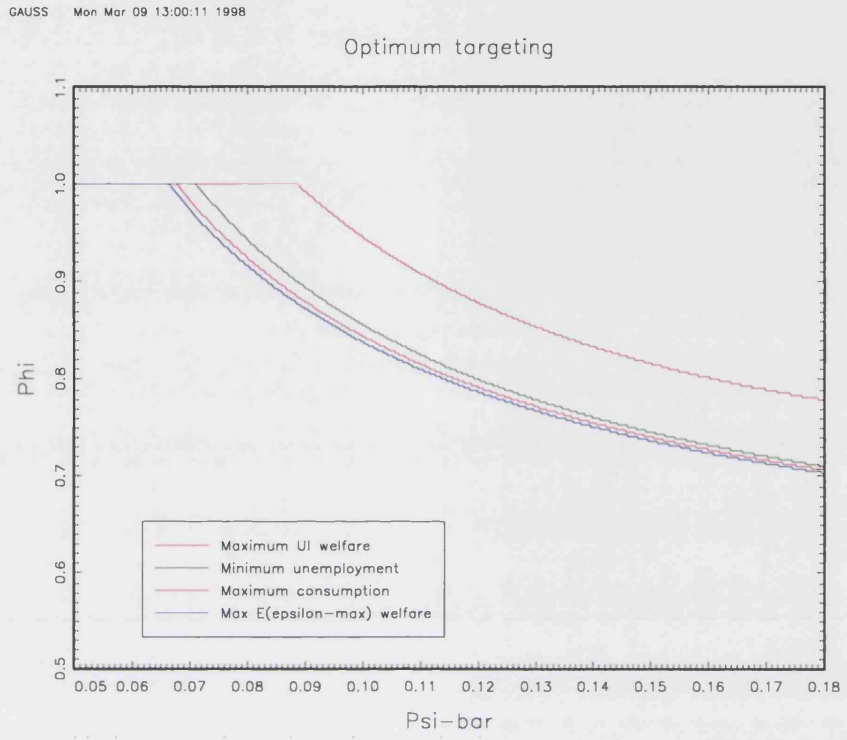


Figure 4.22


GAUSS Mon Mar 09 13:00:11 1998
Optimum targeting
Phi
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18
Psi-bar
Maximum UI welfare
Minimum unemployment
Maximum consumption
Max E(epsilon-max) welfare

5. Do Wage Subsidies Enhance Employability? Evidence from Australian Youth

We examine a panel of unemployed Australian youth to investigate whether participation in a wage subsidy programme offers merely a temporary respite from unemployment, or whether there are longer-lasting positive employability effects. Controlling for selection bias using a bivariate probit analysis, we estimate the effect of participation in the Special Youth Employment Training Program on the probability of being employed in subsequent waves of the data, up to an average of 26 months after subsidy expiry. We find that far from breaking up when support expires, subsidies extend short duration jobs. Furthermore, we find large and significant effects of participation on subsequent employability. Much of this arises from retention of subsidised jobs, but even excluding this we find evidence of longer-term positive effects.

5.1 Introduction

Most of the existing empirical literature on the effects of wage subsidies has focused on short-term effects – whether eligibility for subsidies increases the individual's probability of getting a job, and, if so, to what extent this is at the expense of other job-seekers. However, it is increasingly being argued, in both policy and academic circles, that the main effect of wage subsidies is to enhance the longer-term prospects of participants. The claim is that subsidised workers will not merely enjoy a brief period of employment, but a permanent increase in their employability. Layard, for example, states that 'the main justification for [a wage subsidy] is not that it employs people on a subsidised basis, but that, by doing so, it restores them to the universe of employable people. This is an investment in human capital.' (1997, p. 336).

This claim is almost completely untested. Few studies have tracked participants even until subsidy expiry, and those that have have often suffered from selection bias: those who go on the programme are not a random sample of the eligible population. Any difference in outcomes between participants and non-participants may simply reflect pre-existing, but unobserved, differences between the two groups.

We use a sample of unemployed Australian youth to examine the impact of participation in a subsidy programme, the Special Youth Employment Training Program (SYETP), for slightly over two years after subsidy expiry. By using bivariate probit analysis, we are able to control for selection bias. We find evidence of large and significant positive impacts on the probability of being employed in subsequent years. Much of this effect seems to stem from retention of jobs after subsidy expiry, contradicting the concern that firms will simply lay off participants as soon as the subsidy finishes. We find very little evidence of such lay offs. Instead subsidies appear to extend the duration of jobs that would otherwise have lasted for less time than the subsidy. We also find some evidence that participation helps workers to obtain other jobs, not merely to retain their initially subsidised positions.

The rest of this paper is set out as follows. Section 2 briefly reviews the existing evidence on the long-term effects of wage subsidies. Section 3 looks at the SYETP and the potential sources of selection bias. Section 4 discusses the data. Section 5 sets out the methodology that we adopt to estimate the employability effects of wage subsidy participation. Results are presented in Section 6, whilst Section 7 concludes.

5.2 Long-term Effects of Wage Subsidies

Long-term unemployed workers may lose skills, become demotivated, or suffer discrimination from potential employers. This will reduce their chances of getting a job, and hence the outflow rate of the long-term unemployed, but it may also lead to an increase in overall unemployment. If the economy is hit by a shock and long-term unemployment rises, then, on average, unemployed workers become less attractive to employers. Firms then find it harder to find suitable workers, increasing the cost of hiring and leading them to offer fewer vacancies. This, in turn, can perpetuate the high long-term unemployment and consequent loss of skills or motivation, locking in the higher rate of unemployment (Pissarides, 1992).

At the same time, workers with poor or outdated skills are disproportionately likely to become long-term unemployed. If unemployed workers are credit-constrained they may find it hard to update their skills, whilst at the same time they are denied the opportunity of learning on the job. Higher mismatch between the skills demanded

by employers and those available in the pool of unemployed workers will also lead to higher aggregate unemployment.

But if skill atrophy or other negative employability effects arise from a period of unemployment, then they may be reversed by a period of employment. Hence even a temporary subsidy may have permanent effects, both for the individual worker, who may be retained or who will find it easier to obtain a subsequent job, and potentially for the aggregate unemployment level. If active labour market policies lead firms to hire and train workers with poor skills, then mismatch may be reduced, shifting the Beveridge curve inwards and reducing aggregate unemployment (Calmfors, 1994).

These effects are potentially far more important than the short-term impact on labour demand. Subsidies could bring about a considerably larger reduction in unemployment than that measured simply by taking the number of people placed and netting off those who would have been hired anyway (deadweight) or who were hired at the expense of other workers (substitution and displacement). Furthermore, the fiscal cost-benefit analysis would be transformed if subsidised workers were not merely removed from unemployment for a temporary spell, but were less likely to claim unemployment benefits in future years. If positive effects were long-lasting, and especially if they were permanent, then the case for concentrating on younger workers, as in the UK's New Deal, would be stronger, since their lifetime gains would be greater.

However, little is known about the subsequent employment histories of those who go on wage subsidy programmes. This is despite the existence of a substantial literature tracking participants in training and job search assistance programmes (see for example, Lalonde, 1995; US Department of Labor, 1995; Friedlander and Burtless, 1995). Furthermore, where these studies have increasingly made use of either random assignment or statistical methods to control for selection bias, the same is not true for studies of wage subsidy participants.

Most studies of wage subsidies have surveyed employers currently using the subsidy, and therefore provide little or no evidence on post-subsidy experience. Breen and Halpin (1989) re-surveyed a sample of employers who had hired workers under the

Irish government's Employment Incentive Scheme (EIS), an average of 8 months after subsidy expiry. They found that 54% of EIS employees remained with the firm, whilst in a further 11% of cases the job, but not the specific worker, remained. However, they provide no counterfactual to compare these figures against. RSGB (1996) surveyed participants in the UK Workstart pilot projects, which provided a 12 month subsidy to firms hiring workers who had been unemployed for at least 2 years. They found that 40% were still with their Workstart employer 3 months after the subsidy expired, and a further 15% were employed elsewhere. Only 35% had returned to claiming unemployment benefit (a further 4% were unemployed but not claiming). Again no counterfactual is provided but the findings do compare favourably with the 51.8% of all unemployed workers exiting to employment who re-claim unemployment benefit within 12 months (Sweeney, 1996).

Stretton (1984) compares employment outcomes six months after the end of the programme for participants in five Australian active labour market programmes, including the SYETP. Hence the counterfactual is the outcome for participants in other programmes, rather than those who received no intervention. He finds that those who took part in wage subsidy programmes were significantly more likely to have been employed at the time of the survey, or to have had any full-time job since the end of the programme, than those who went on a training programme. However, this finding is likely to be heavily affected by selection bias. Wage subsidies require the involvement of employers, who are likely to seek to cream off the best available candidates, whereas training programmes can be expanded administratively, and may be used for those for whom a subsidised job could not be found. In this case, Stretton's results may reflect more on the different make-up of the participants than on the relative effectiveness of the programmes[1].

A more recent Australian evaluation, DEETYA (1997), uses administrative data on all participants in Jobstart, which replaced the SYETP. These were then compared against a matched control group. Three months after the subsidy expired, 50% of Jobstart participants were in unsubsidised work, compared with 22% of non-participants, suggesting a substantial impact of participation on short-term employment prospects. After 12 months the effect was smaller, mainly due to 'catch-up' by the controls, but still positive. However, the use of such matched control groups may give seriously misleading results if there are important unobserved

characteristics of the treatment group which are not controlled for in matching. If, for example, more motivated workers were more likely to take advantage of wage subsidies, and to be hired once eligible, then the programme effect would be over-estimated. Alternatively, if employment service staff sought to target programmes on more disadvantaged workers, then the estimated effect would understate the true impact.

The overall picture presented by these few studies is positive. The studies do suggest that an excessive concern with churning – that employers will simply lay off workers when subsidies expire – is misplaced. Retention rates are generally high. RSGB (1996) found that among Workstart participants who survived until subsidy expiry, 77% were still with their employer three months later. Where workers are laid off it appears to occur before subsidy expiry, presumably due to poor matches. Up to a year after subsidy expiry, programme participants appear to enjoy an advantage in their employment prospects. But all these studies are open to considerable criticism. In particular, they are all prone to potentially severe problems of selection bias. In addition, they only look at a relatively short post-subsidy period.

Two studies of US programmes avoid both these problems. They use random assignment to avoid the problem of selection bias, and by making use of administrative data are able to track participants over a much longer time period than either previous studies or, indeed, this study. However, the programmes they examine involved substantial elements of training and support in addition to subsidies, so that it is impossible to separate out the effect of subsidised employment alone. The use of administrative records also restricts their focus to earnings, rather than employment, which is our principal concern here. Both studies, however, reinforce the generally positive findings previously covered.

The National Supported Work Demonstration (Hollister *et al*, 1984) provided a highly structured environment over 12-18 months of subsidised employment. For women on Aid to Families with Dependent Children (AFDC, then the main benefit for single parents in the US), earnings gains were sustained for at least 8 years after participation (Couch, 1992). However, there were no positive effects for other target groups. A similar, but less intensive, approach was adopted in the Homemaker-Home Health Aide Demonstrations (Bell and Orr, 1994). These provided specific

training and support to lone mothers on AFDC, as well as subsidised employment, and again led to significant increases in earnings, for at least 5 years after the programme (US Department of Labor, 1995).

5.3 The Special Youth Employment Training Program

The Special Youth Employment Training Program was introduced in September 1976, following a rapid rise in teenage unemployment in the mid-1970s. This, together with the earlier failure of a large scale direct job creation programme (the Regional Employment Development Scheme, REDS), led the government to introduce what was Australia's first wage subsidy (Chapman, 1985). The SYETP continued until it was superseded in December 1985 by Jobstart, a wage subsidy for both youth and adults, which has continued until the present.

The SYETP was initially targeted at teenagers, unemployed for four months or more. Subsequently it was extended to cover 15-24 year olds. There was no requirement that jobs be 'additional', nor that the firm retain the worker after the subsidy period (Stretton and Chapman, 1990). Despite the scheme's name, there was little emphasis on training (Scherer, 1985).

Subsidies were paid at a flat rate, so that they were proportionately greater for low wage workers. In 1984, the main part of the scheme ('Standard SYETP') offered employers a subsidy of A$75 per week for 17 weeks, about half of average teenage wages (Smith, 1984). Standard SYETP was targeted on 15-24 year olds who had been unemployed and not in full-time education for at least 4 of the preceding 12 months. There were two other smaller components. Commonwealth SYETP fully reimbursed agencies of the Commonwealth government for the costs of employing eligible participants for 17 weeks. Extended SYETP offered a subsidy of A$100 for 17 weeks, and A$75 for a further 17 weeks to employers taking on 18-24 year olds who had been unemployed for at least 8 of the preceding 12 months. In practice, however, participants in both Standard and Extended SYETP often had much longer durations than those required for eligibility (Smith, 1985).

In order to obtain the subsidy, employers had to register their vacancies with the Commonwealth Employment Service (CES), and accept workers referred by the

CES (Department of Employment and Youth Affairs, 1982). Employers had to agree a 'training plan' with the CES for the individual worker, although in practice such plans could simply cover normal orientation (Smith, 1983). In 1979 the government issued guidelines that employers were expected to take people below their normal hiring standards in order to qualify (Chapman, 1985), although these were withdrawn in 1982.

Selection

Selection onto the SYETP required both referral by the Employment Service and acceptance by the employer. Either, or both, of these could have led to systematic, but unobserved, differences between those who went on the programme and those who did not. Failure to control for these differences would lead to biased estimates of the programme effect. For example, if employers creamed the best workers, then selection biases would lead to an overestimate of the effectiveness of SYETP. Conversely, if the Employment Service referred more disadvantaged workers, as they were required to between 1979 and 1982, then this would lead to a downward bias, and an underestimate of the programme effect.

In addition, individuals who were more likely to get employment anyway may have acted in such a way as to increase or decrease their chances of being referred. For example, if participation on SYETP was seen as advantageous, then more motivated, or better informed, individuals might have lobbied CES staff to refer them. Alternatively, if subsidised employment was seen as 'second best' then more employable people might have tried to avoid being referred, knowing that their chances of obtaining a regular job were high anyway.

A priori we cannot say which way these biases will work. However, assuming that participants were randomly drawn is unlikely to be satisfactory. Instead we need to control for the process by which unemployed youth, who were in the SYETP target group, were selected onto the programme. This can be done by estimating bivariate probits of the joint probability that an individual was both selected onto SYETP, and subsequently employed. We set out this methodology in Section 5 below. First we consider the data that we use.

5.4 The Data

Our sample is drawn from the list sample of the Australian Longitudinal Survey (ALS). The ALS contains two distinct datasets. The ALS 'area sample' consists of 8,995 youths, aged 15-26 in 1985, and is nationally representative of all Australian youths in 1985. Four waves were carried out by interview between 1985 and 1988 (subsequent waves were carried out using postal questionnaires, with a consequent sharp fall in response rates). The ALS 'list sample', which we use, is drawn from the records of the Commonwealth Employment Service and is a nationally representative sample of Australian youth, aged 15-24 on 1 September 1984, who had been registered as unemployed with the CES for at least 3 months in June 1984 (McRae *et al*, 1984–1987). The sample frame coincides almost exactly with the eligibility criteria for the SYETP. The sample were initially interviewed in September or October of 1984, and then re-interviewed annually until 1987, so that 4 waves of data are available. The ALS list sample was specifically designed to examine questions around long-term unemployment, and contains a wide range of individual and family background characteristics.

More details on the ALS can be found in the papers collected in Gregory and Karmel (1992), in particular Chapman and Smith (1992) and Junankar and Wood (1992) in this context. James (1989) finds negative duration dependence of unemployment using the ALS area sample in contrast to Chapman and Smith (1992), whilst Trevedi and Alexander (1989) find evidence of scarring in the list sample: duration of previous unemployment spells lowers the reemployment probability.

In each wave, respondents were asked to fill in a weekly job calendar for the period starting a week after the previous interview and finishing in the week of the current interview (the 'reference period'). The 1984 reference period started on 1 January 1984, or the week in which they entered the labour force if later. Subsequent reference periods typically started in September or October and ran until the following September or October.

The initial sample consisted of 2403 individuals. Of these, we excluded those who were over 25 at the first interview (ineligible for SYETP), who entered full-time education at any point, or who did not provide a full set of responses for at least the

first three waves. This left us with 1283 individuals whose employment status in the 1986 reference period could be established (the '1986 sample'). Table 5.1 gives some summary statistics for the 1986 sample. Of these, 1084 survive into the 1987 wave, and make up the '1987 sample'. Table 5.2 contains summary data for them.

The treatment group consists of all those who went on the SYETP between 3 June 1984 and their 1985 interview. Although this means that there were quite considerable differences in the elapsed time since programme participation between treatment group members, we had to use such a long period to obtain a large enough treatment group. Figure 5.1 shows the distribution of programme start times for treatment group members. Roughly half entered the programme in 1984 and half in 1985, with the mean start week beginning 13 January 1985.

The overall picture given by Tables 5.1 and 5.2 is unsurprising for a sample of unemployed youths. There were more males than females. Levels of human capital were relatively low, with over 10% having less than year 10, the school leaving age. More than half had never held a job for more than 1 year, and they spent an average of over 60% of the period from 1 January 1984 (or when they first entered the labour force if later) until 3 June 1984 in unemployment.

The observed characteristics of those lost through attrition are broadly similar to those of the sample. In particular the characteristics of the 1986 and 1987 samples are virtually identical. Those who are dropped from both samples were somewhat more likely to have less than year 10 education, but were more likely to have held a job for at least 1 year, and less likely never to have had a job. On the basis of observable characteristics attrition biases appear to be only a minor problem.

However, if unobserved characteristics vary systematically between those lost through attrition and those remaining, our sample may no longer be representative. Van den Berg, Lindeboom and Ridder (1994) examine the relationship between duration of employment or unemployment and duration within the panel, using Dutch data. They find that the duration of survey participation is independent of unemployment duration, but that there is a negative relation between job duration and survey duration. If this result generalises, then we may be under-representing those with a propensity to short job durations, and this should be borne in mind in interpreting the results.

More striking is the contrast between those who went on SYETP and the control group. On average, SYETP participants were less likely to have any post-school qualification (17.3% versus 27.9%) and correspondingly more likely to have year 11 or 12 as their highest qualification. In addition they were less likely to have had any job for 3 years or more, but more likely to have had a job of less than 1 year as their longest. SYETP participants were an average of one year younger, which may partly explain their poorer labour market experience. They spent slightly more of the pre-June period unemployed.

The summary statistics suggest that SYETP participants were younger and more disadvantaged than non-participants, which would be in line with the apparent targeting of the programme. The most disadvantaged, though, those with below year 10 education or who had never held a job, do not appear to be over-represented on the programme, perhaps because employers were unwilling to hire them even with a subsidy. Yet despite their generally poorer characteristics, SYETP participants were nearly 14 percentage points more likely to have been employed at some time in 1986 than non-participants. By 1987, with the economy growing, this difference had fallen to around 5 percentage points, but was still positive.

These findings are reinforced if we examine the durations of SYETP jobs compared with those of other jobs. Figure 5.2 shows the distribution of lengths of all regular jobs held after 3 June 1984[2], whilst Figure 5.3 shows the distribution of subsidised jobs. Since this includes all subsidised jobs in the four waves, some may have been obtained through Jobstart as well as through the SYETP. At this time Jobstart was available for 26 weeks. Two features are notable in these diagrams. Firstly, there is little or no evidence in Figure 5.3 of a peak in job durations at the length of the subsidy. There is a slight peak at 17 weeks (though none at 26 weeks), but certainly no evidence of widespread lay offs on subsidy expiry.

More noticeable though is the difference in the distributions between Figures 5.2 and 5.3. SYETP jobs are clearly less likely to be very short, with markedly lower densities below 13 weeks, and correspondingly higher densities between 13 and 33 weeks. The average length of SYETP jobs is 46.0 weeks, compared to 37.1 weeks for regular jobs. However, the averages for SYETP and regular jobs that last more than 13 weeks are 58.8 and 58.5 weeks respectively. From the raw data, the effect of

SYETP appears to be to extend very short duration jobs somewhat, perhaps up to the duration of the subsidy.

However, these plots will be affected by a number of biases. Any one person can have more short duration jobs over some given period than long duration jobs. Hence short duration jobs are 'over-represented'. The same effect could apply to SYETP jobs, since a short SYETP spell would not affect the individual's entitlement to go on the programme again. But it seems unlikely that the CES would continuously place the same individual into a series of short duration SYETP jobs, and we observe very few people going on SYETP more than once in any wave of the data.

Since we only have data until the 1987 interview, any jobs still held then will be right censored. Aggregate unemployment was falling over this period, so that we would expect a larger proportion of unsubsidised jobs to start towards the end of the period, whilst more of the subsidised jobs start towards the beginning of the period, when unemployment was higher. In Figure 5.4, we plot the distribution of all jobs that started immediately after a period of unemployment. This will compensate somewhat for right censoring bias, and also for the possibility that entry jobs are less stable, or less desirable, than subsequent jobs. The comparison with SYETP positions is even more marked here. Fully 40% of entry jobs last for less than 13 weeks, whereas fewer than 25% of SYETP jobs end by then. Again the effect of SYETP appears to be in extending otherwise very short duration jobs, rather than on the distribution at higher durations.

Figures 5.2–5.4 take no account of differences between participants and non-participants. We can control for this by looking at before-and-after experiences of SYETP participants. Figures 5.5 and 5.6 show the length of unemployment spells before going on SYETP and after participation, again including any subsidy participation in the sample period after 3 June 1984, and not just those counted as the treatment group. Figures 5.7 and 5.8 show the equivalent for employment spells (ie periods of continuous employment, which might include job-to-job switches). The pattern is clear: periods of unemployment are shorter, and periods of employment are longer, after going on SYETP.

Of course, we still have the problems of censoring and exogenous changes in the economic climate. Pre-SYETP periods are inevitably earlier, on average, than post-

SYETP periods, so that Figures 5.5–5.8 may simply reflect improvements in the macroeconomy. At the same time, most SYETP spells are earlier in the period, so that left censoring will tend to shorten pre-SYETP spells (spells starting before 3 June 1984 are excluded). This undermines the apparent increase in duration of post-SYETP employment spells, but strengthens the finding that post-SYETP unemployment spells are shorter. Right censoring leads to the opposite bias: post-SYETP spells will be shortened by right censoring, strengthening the apparent effect on the duration of employment spells post-SYETP, but weakening the findings for unemployment spells.

The overall picture from the data is highly supportive of a positive employability effect from SYETP. Subsidised jobs last longer than unsubsidised jobs, mainly because of a substantially lower probability of jobs terminating within the first quarter. There is at most weak evidence of a concentration of lay offs at the time of subsidy expiry, with two-thirds of participants retaining their subsidised job beyond 17 weeks[3]. Furthermore, unemployment spells are shorter, and employment spells are longer, after participating. Nonetheless, these findings may be affected by biases arising from differences between participants and non-participants, censoring, or changes in the economic environment.

5.5 Modelling Employability

We want to determine what happens to subsidised workers beyond the subsidy period. In particular, do they obtain a lasting improvement in their employability? We can control for biases arising from changes in the economy, and from censoring, by considering individual outcomes over the same time period. We can control for individual differences by including a wide range of background data available to us in the ALS. In addition, we can control for selection biases by using a bivariate probit, giving us an unbiased estimate of the effect of SYETP participation on subsequent employability.

Employability, of course, is not observed. What we observe instead is employment. Nor is there a precise definition of 'employability', despite the growing use of the term. We do not propose to enter the debate as to what exactly is meant by employability. Instead, we shall assume that there is a simple mapping between an individual's underlying, but unobserved, employability and the employment outcome

which we observe. We assume that employability is a latent variable, y^*, such that:

(5.1) $y_i^* = \alpha d_i + \beta' x_i + \varepsilon_i$

where d_i is a dummy variable taking the value 1 if the person goes on the wage subsidy programme, and 0 otherwise; x_i is a vector of individual characteristics; and ε_i is a disturbance or error term. We observe employment, y, where y=1 if the person is employed in some period, and y=0 otherwise. If $y = 1$ when $y^* > 0$ and $y = 0$ otherwise, then provided ε_i is distributed as a standard normal, we can estimate (5.1) using standard probit estimation.

The selection problem arises because programme participants are not randomly selected from the population. In particular, suppose that the likelihood of being selected onto the programme is represented by d^*, which is determined by:

(5.2) $d_i^* = \gamma' z_i + v_i$ such that: $d_i = 1$ if $d_i^* > 0$ and $d_i = 0$ otherwise.

where z_i is a vector of individual characteristics and v_i is an error term. Provided v_i is distributed as a standard normal, we could again estimate (5.2) by a univariate probit. However, if there are unobserved characteristics which affect both selection onto the programme and subsequent employability then ε_i and v_i will be correlated and univariate probit estimates will be biased.

Using a technique originating with Van de Ven and Van Praag (1981), we can address this problem by estimating a bivariate probit of the joint probabilities of selection and employment of the form:

$$y_i^* = \alpha d_i + \beta' x_i + \varepsilon_i$$

(5.3) $d_i^* = \gamma' z_i + v_i$ where: $E(\varepsilon_i v_i) = \rho$

$$\text{Prob}(y_i = 1, d_i = 1) = \Phi_2(\alpha d_i + \beta' x_i, \gamma' z_i, \rho)$$

Where Φ_2 is the cumulative distribution function for the standard bivariate normal. This is essentially an extension of the well-known Heckman (1979) two-stage

procedure, where the second stage here also has a discrete dependent variable. This approach has been applied to a number of economic problems which suffer from selection bias. In particular, O'Higgins (1994) uses it to examine the effect of participation in the UK Youth Training Scheme on subsequent employment, whilst Zweimüller and Winter-Ebmer (1996) use it to look at the effect of Austrian training programmes on employment stability. Both find that selection bias is important in their studies, with those who would otherwise be less likely to be employed tending to be selected onto these programmes.

Duration analysis

An obvious alternative to using a bivariate probit methodology would have been to use a hazard function approach, controlling for unobserved heterogeneity, along the lines of Gritz (1993), Thomas (1998) and Cockx, van der Linden and Karaa (1998). This would have advantages in handling censoring and attrition, provided we were prepared to assume that the process driving attrition was independent of that driving transitions between states (van den Berg, Lindeboom and Ridder, 1994). Duration methods would allow a more sophisticated treatment of multiple unemployment spells and the potential for scarring effects (Trivedi and Alexander, 1989). However, we do control for the duration of unemployment, and the longest previous job tenure, prior to 3 June 1984, which will control for general pre-SYETP scarring effects. Clearly, any impact of multiple spells post-SYETP participation are part of the effect we are estimating: one intention of such policies is precisely to reduce scarring effects of the type investigated by Trevedi and Alexander (1989).

In addition, duration models allow selection to be modelled without requiring parametric or *ad hoc* exclusion restrictions: Gritz (1993) and Thomas (1998) both use a discrete distribution of individual types with a finite number of mass points, the location and density of which are estimated parameters. However, the appropriate number of individual types cannot be formally tested, requiring the use of informal approaches (Gritz, 1993). Furthermore, a log-logistic baseline hazard of the type used by both Gritz (1993) and Thomas (1993) would not accommodate any possible spike in exits from SYETP jobs when the subsidy expired. The alternatives of fully flexible or piecewise constant baselines would have been considerably more demanding on a dataset with relatively few observations of SYETP participation. We considered carefully using an approach similar to that of Gritz (1993), but in the end concluded

that limitations arising from the small number of observations of SYETP would require us to invoke parametric assumptions possibly as restrictive as those implied by a bivariate probit approach, and could lead to considerable computational difficulties[4].

The dependent variables

For the selection equations, the dependent variable is whether the person went onto the SYETP at any time between 3 June 1984 and the end of the 1985 reference period. For the 1986 sample, the dependent variable for the employment equation is whether the person held any regular, unsubsidised, job during the 1986 reference period, but excluding the first 17 weeks. Retained jobs that were previously subsidised in 1984/85 are included, but any subsequent SYETP/Jobstart jobs are excluded. Jobs obtained through other government programmes are also excluded. We exclude the first 17 weeks after the 1985 interview, since anyone entering SYETP in the week of their 1985 interview would still be being subsidised for those 17 weeks. Hence the relevant period starts four months later, at the end of January 1986.

In principle, some of our treatment group might have gone onto Extended SYETP, in which case they would be subsidised for up to 34 weeks. Unfortunately, we cannot distinguish between the two types of SYETP in our data. Of the treatment group, 23 people started their subsidy in the last 17 weeks of the 1985 reference period, and hence might still have been on Extended SYETP 18 or more weeks into their 1986 reference period. However, of these, 21 were either ineligible for Extended SYETP or had already lost their subsidised job before the 17 week cut-off period. Both the remaining people were employed for the entire 1986 reference period, and hence were clearly employed after subsidies had expired. Therefore, we believe that we can safely ignore any problems arising from Extended SYETP.

For the 1987 sample, our dependent variable in the employment equation is whether the person held any unsubsidised job, excluding those obtained through another government programme, at any time in the 1987 reference period (October 1986 – September 1987). Again we include any previously subsidised jobs retained from 1984/85, but exclude any obtained with subsequent subsidies, even if they are retained beyond the subsidy period. Thus we are looking at the effect on subsequent regular employment, and not simply any propensity for participants to cycle between government programmes and periods of unemployment.

On average, for the 1986 sample, we look at employment in the period starting 1 year after participants entered SYETP (8 months after subsidy expiry), and ending 17 months after programme entry. The 1987 reference period starts 18 months after entry, and ends 30 months after entry (26 months after expiry).

Identification

Our model is identified provided there is at least one variable in z_i which is not in x_i (Maddala, 1983). Hence, we need at least one variable which affected the probability of selection, but not the subsequent probability of being employed. Selection onto SYETP required both that the individual was hired by an employer, and that they were referred by the employment service. Any variables that affected the employer's decision are also likely to have affected subsequent employment prospects, and should be in both the selection and the employment equations.

To identify the model, therefore, we need a variable that affected the individual's probability of being referred by the CES. We only observe SYETP referrals if they lead to employment, but we do observe how many times an individual was referred, in 1984, to another programme, the Community Employment Programme (CEP), whether or not they went on the CEP. If employment service staff pushed the same individuals towards a range of available programmes, then we would expect this to be correlated with selection onto the SYETP. Given an element of discretion in the referral decisions of employment service staff, and that we control in the employment equation for whether the person actually went on the CEP, it seems reasonable to assume that referrals onto the CEP would not affect subsequent employment prospects.

However, if employment staff pushed those who went onto the SYETP, but returned to unemployment, onto the CEP, then the CEP referrals variable might be endogenous. We minimise the risk of this by using only CEP referrals in 1984. For endogeneity to arise would require that an individual went on SYETP after 3 June 1984, returned to unemployment, and was then referred to the CEP, before the end of their 1984 reference period (in September or October 1984). Since the CEP was targeted at the long-term unemployed (Stretton and Chapman, 1990), and those re-entering unemployment after going on SYETP would be short-term unemployed, there should be no possibility of this having happened. In addition, only four people

started on SYETP after 3 June 1984 and returned to unemployment before the end of the 1984 reference period, two of whom were never referred to the CEP. Hence we do not consider that endogeneity of the CEP referral variable is likely to be a problem.

Furthermore, our model is also identified in two other ways. Formally, the model will always be identified, since time varying characteristics, such as human capital and marital status, are 1984 dated in the selection equation, but 1985 or 1986 dated in the employment equations. Presumably because of the age group of the sample, there is considerable variation in a number of personal characteristics, even over such a relatively short time period. Since the model will remain identified, formally at least, if the employment and selection equations differ only in time varying characteristics, we can test our identifying assumption. We always find that CEP referrals are insignificant in the employment equation, but significant in the selection equation, and so we conclude that excluding CEP referrals from x_i and including it in z_i is a valid identifying assumption.

Furthermore, SYETP places were predominantly taken up by teenagers (Stretton and Chapman, 1990), and we find that age has a negative and strongly significant coefficient in all our selection equations. However, age is never significant in the employment equation. This seems surprising at first sight, although the narrow age range of the sample may provide an explanation. Using the area sample of the ALS, James (1989) finds age does not affect duration of unemployment, whilst Trivedi and Alexander (1989) drop age from their duration analysis of re-employment probabilities using the ALS list sample. Hui (1986a,b) also finds age insignificant in determining unemployment duration in the ALS list sample.

Given the consistency of these findings, it seems reasonable to use age as an alternative to CEP referrals in identifying our model, at least to test the robustness of our identification. We find that our results are virtually unchanged if we include CEP referrals in the employment equation, and identify the model using age (and time varying characteristics) alone.

5.6 Results

Table 5.3 gives the results of univariate probit estimates of the probabilities of being employed in 1986 and 1987. We can see that SYETP participation has a positive effect on employability in both years, although it is only significant in 1986. The magnitudes of the marginal effects of participation in both years are similar to raw differences in the summary statistics. Most other coefficients are much as we would expect. Women are less likely to be employed than men, women with children overwhelmingly so. Marriage has no significant effect, but having an employed spouse is significantly positive in 1986. Employment prospects are worse in South Australia and the Northern Territories. More human capital or past work experience increases the probability of being employed, whilst health problems reduce it.

Participation in a government employment programme, other than SYETP, between June 1984 and the 1985 interview, has a strongly negative effect on employment. The main other programmes at the time were the Community Employment Programme and the Wage Pause Programme, both direct job creation schemes targeted specifically at those with particular labour market disadvantages (Stretton and Chapman, 1990). Thus this may reflect these disadvantages rather than any negative effects of the programmes themselves.

Controlling for selection

If selection biases are a significant problem, then the results in Table 5.3 may be misleading. We present the bivariate probit results for the employment equation, controlling for selection, in Table 5.4. Columns 1 and 2 are the 1986 results, and columns 3 and 4 those for 1987. The corresponding selection equations are given in Table 5.5.

The results in Table 5.4 are coefficients from the bivariate probit. We report marginal effects below. However, the pattern of signs and significant coefficients is almost identical to the univariate probits, except that now the effect of SYETP is positive and significant in both years, falling just below 5% significance in 1987, but easily significant at 10%.

In both cases the correlation coefficient, ρ, is negative, implying that those most likely to be selected onto the programme have unobserved characteristics that make

it less likely that they would otherwise be employed. Wald tests on ρ reject the hypothesis that the errors are uncorrelated. This shows the importance of allowing for selection biases. Failing to control for selection would underestimate the impact of SYETP participation on subsequent employment prospects. In particular, the univariate probits imply an insignificant effect in 1987, whereas the effect is significant when we allow for the selection process. A negative value of ρ is consistent with employment service staff targeting programmes on those who are more disadvantaged.

Marginal effects

Table 5.6 gives the marginal effects. The first part shows the marginal effect of the SYETP, averaged across the whole sample and across various sub-samples. For example, the marginal effect of SYETP for females is the result of calculating the individual marginal effect for each of the females in the sample, and then averaging[5]. This method takes account of any systematic differences in other characteristics between females and males, as well as the effect of being female *per se*. The bottom half of the table gives the marginal effects (averaged across the whole sample) of various other characteristics, which are all fairly similar to those in the univariate probits.

The effect of SYETP participation on subsequent employability is found to be not only significant, but also large. After controlling for selection biases, the effects are substantially greater than those reported in the univariate probits, consistent with our finding that more disadvantaged workers were selected onto the programme (ρ negative). Going on SYETP increases the average probability of having a job at some time between 8 and 13 months after subsidy expiry by 26%. Between 14 and 26 months after subsidy expiry, the effect is still nearly 20%.

Looking at the various sub-sample effects it is clear that participation in SYETP is most useful for those with greater disadvantage: females, those with lower human capital or poorer work records and from more disadvantaged families[6] all gain more than the average, as do those living in South Australia or the Northern Territories. The effect is also stronger for younger people. By contrast, the effect is roughly halved for those who went to private school, have an apprenticeship or have had a previous job for 3 or more years.

The pattern of effects across the different sub-samples is very similar in the two years, with the same groups gaining more or less than the average in every case. The effects are always smaller in 1987. This fall-off probably reflects a combination of 'catch-up' by the control group, against a background of falling unemployment, and depreciation of the advantage of participation, especially as retained jobs break up. Although there is no particular reason to suppose that this fall-off was linear, a simple extrapolation would imply that SYETP participants had an employability advantage for 4 years after subsidy expiry.

Comparing the marginal effect of SYETP with those for other variables reinforces our conclusion that programme participation has a very large impact. Only the negative effect for women with children is larger in magnitude than the average SYETP effect, even in 1987.

Job retention and subsequent employability

Much of the positive effect arising from SYETP participation probably arose from retention of subsidised jobs after subsidy expiry. This was clearly part of the point of the programme, to get disadvantaged workers into jobs and support them for long enough that they could remain profitably employed in those jobs subsequently, without the need for a subsidy. However, we are also interested in what happened to participants after they left their initially subsidised job: did they then find it easier to obtain another job than they would otherwise have done?

Ideally, we would want to measure employment outcomes after all the retained jobs have terminated, but this is not possible given the data. Hence we have to restrict the sample in such a way as to exclude those who retained their subsidised jobs throughout the period. We do this by excluding all people who were continuously employed from the time when they first got a job, or went on SYETP, until the end of the 1986 reference period. Since we only consider SYETP participants who entered the programme between June 1984 and the end of the 1985 reference period, we similarly only exclude people whose jobs started within that period and were continuously employed until the end of the 1986 reference period.

By restricting the sample in this way, we are excluding the most employable workers. Implicitly, we are assuming that they would have obtained, and kept, jobs with or

without the subsidy. Amongst those whom we exclude, exactly the same proportion (79%) of those who went on the SYETP, and those who did not, remain continuously employed until the end of the 1987 reference period. The proportion of SYETP participants remaining in the restricted sub-sample is virtually unchanged from the full 1987 sample (7.6% vs 8.0%). In addition, we saw in Section 4 that at long durations the distribution of job tenure was broadly the same for SYETP and regular jobs. Hence we believe that it is reasonable to assume that restricting the sample in this way will not introduce any biases.

Table 5.7 shows the employment equation, from the bivariate probit, for the probability of being employed at some point in 1987 for the sub-sample of less employable workers. The dependent variable is now employment in a job that has never been subsidised, nor obtained through any other government programme. The coefficient on SYETP is positive and significant, suggesting that participation in the SYETP had a positive employability effect even for those who lost their initially subsidised job. The correlation coefficient, ρ, is again negative and significant, implying that, within the restricted sub-sample as well as the whole sample, those selected onto the programme were less likely to have been employed otherwise. The marginal effect of participation, averaged over the sub-sample, of SYETP participation on the probability of being employed in 1987 is 23.7%. However, this is not comparable with the whole sample effect, since we saw in Table 5.6 that the effect of SYETP participation was highest among those with initially greater disadvantage.

Participation in the SYETP therefore appears to have had a positive employability effect beyond just the advantage from retaining initially subsidised jobs. Even those who lose their initially subsidised job are more likely to be employed at some time in 1987 than if they had never been on the programme. Hence the evidence implies that a period of subsidised employment can mitigate the damaging effects of unemployment, even for those who return to unemployment after going on the programme.

5.7 Conclusion

The impact of wage subsidies on subsequent employability has been much discussed but little researched. Despite the copious equivalent literature for training programmes, and job search assistance, we know surprisingly little about what happens to participants in wage subsidies after the subsidy runs out. Using a panel of Australian youth, we have attempted to answer two main questions. Firstly, do subsidised jobs break up when the subsidy expires, so that they only offer a temporary respite from unemployment? And secondly, are there longer-term benefits for participants, in the form of higher future employability?

We find little evidence that subsidised jobs break up when the subsidy expires. Instead, subsidies appear to extend the life of very short duration jobs, that would otherwise have broken up before the subsidy expired. For jobs lasting longer than 13 weeks, subsidised and unsubsidised jobs have almost identical average durations. This finding is consistent with subsidies being used to overcome fixed costs of hiring and training, after which subsidised workers become sufficiently productive that the job is viable even without the subsidy (as in Chapters 3 and 4).

Furthermore, we find a large and significant positive effect on subsequent employment prospects. Controlling for both a wide range of individual and family background characteristics, and for selection biases, we estimate that participants in the Special Youth Employment Training Program were 26% more likely to have a job at some point between January and September 1986, and 20% more likely to have a job at some point between October 1986 and September 1987. The effects are larger still for more disadvantaged and younger workers.

A large part of this effect, particularly in 1986, stems from retention of the initially subsidised job. Nonetheless, by 1987 there was also a positive and significant effect on the probability of obtaining a subsequent, never subsidised, job.

These findings suggest that wage subsidies do far more than provide a brief period of employment. Instead they appear to offer a lasting improvement in employment prospects, both through retention of initially subsidised jobs, and through improved employability once the initial job breaks up. However, further research is needed to

establish how long these effects last for, and how quickly they die away. This would make possible a proper cost-benefit analysis of policies that are all too often evaluated only on their immediate effects. Data covering a longer period would also allow an investigation of the kinds of jobs subsequently obtained by participants.

---

1. In an earlier version of this paper (Stretton, 1982), Stretton notes the availability of techniques to correct for sample selection, but states that their use was ruled out through lack of time.
2. To minimise problems from right censoring, Figures 5.2–5.8 are plotted for the 1987 sample.
3. The effect is slightly stronger, if we exclude those jobs which might have come under the longer Jobstart subsidy, with 69.1% exceeding 17 weeks duration against 65.5% for all subsidised jobs in the data. Of these, 45.4% last beyond the 34 week maximum subsidy for Extended SYETP.
4. I am grateful to Mark Gritz for his advice not to pursue the hazard function approach.
5. Greene (1997, p. 876) states that current practice favours this approach over the alternative of evaluating at the sample mean.
6. The pattern of coefficients for mother's status is similar to that for father's.

Table 5.1: Summary Statistics, 1986 Sample

Variable	Whole sample	SYETP	Non SYETP	Attrition
Personal characteristics				
Male	58.8%	56.7%	59.0%	61.6%
Female	41.2%	43.3%	41.0%	38.4%
Average age, 1984	20.0	19.0	20.1	20.2
Aboriginal/TSI	3.0%	1.0%	3.1%	3.2%
Other ethnic minority	7.9%	7.7%	7.9%	8.3%
Married, 1984	11.7%	2.9%	12.5%	11.0%
Spouse employed	5.9%	1.9%	6.3%	4.0%
Children, 1984	5.5%	1.9%	5.8%	3.4%
Human capital, 1984				
Degree/diploma	11.9%	7.7%	12.2%	11.0%
Apprenticeship	8.1%	2.9%	8.6%	7.4%
Other post-school qualification	7.1%	6.7%	7.1%	6.6%
Year 12	14.7%	23.1%	13.9%	13.2%
Year 11	13.9%	17.3%	13.6%	11.9%
Year 10	31.5%	31.7%	31.5%	32.3%
Year 9 or below	12.5%	10.6%	12.6%	17.0%
Parental background at age 14				
Father post-school qualification[1]	33.9%	26.0%	34.6%	31.9%
Mother post-school qualification[1]	18.3%	20.2%	18.2%	19.1%
Father manager, (para-) professional[1]	25.7%	25.0%	25.8%	23.7%
Father not-employed[1]	5.5%	3.8%	5.6%	4.1%
Father not present	15.7%	19.2%	15.4%	19.1%
Mother manager, (para-) professional[1]	9.6%	6.7%	9.8%	8.7%
Mother not-employed[1]	54.7%	48.1%	55.3%	54.4%
Mother not present	5.3%	8.7%	5.0%	6.7%
Longest ever job by 1984				
Never held a job	11.6%	11.5%	11.6%	8.7%
<1 year	42.1%	55.8%	40.1%	42.1%
1 year	13.5%	13.5%	13.5%	19.4%
2 years	14.1%	13.5%	14.1%	11.2%
3 years +	18.7%	5.8%	19.8%	18.5%
Average pre-June unemployment[2]	61.6%	68.5%	61.0%	66.4%
Employment				
Ever employed 1986[3]	74.0%	86.5%	72.9%	n/a
N	1283	104	1179	645

Notes:
1. Only asked if that parent was present when the respondent was aged 14.
2. Proportion of 1984 reference period up to 3 June spent unemployed.
3. Ever held any non-subsidised, non-government programme job in the 1986 reference period, after the first 17 weeks.

Table 5.2: Summary Statistics, 1987 Sample

Variable	Whole sample	SYETP	Non SYETP	Attrition
Personal characteristics				
Male	57.8%	54.0%	58.1%	62.2%
Female	42.2%	46.0%	41.9%	37.8%
Average age, 1984	20	19	20.1	20.1
Aboriginal/TSI	2.3%	1.1%	2.4%	4.0%
Other ethnic minority	7.2%	9.2%	7.0%	9.0%
Married, 1984	12.3%	3.4%	13.0%	10.4%
Spouse employed	6.5%	2.3%	6.9%	3.6%
Children, 1984	5.6%	2.3%	5.9%	3.6%
Human capital, 1984				
Degree/diploma	12.0%	6.9%	12.4%	11.0%
Apprenticeship	7.9%	3.4%	8.3%	7.7%
Other post-school qualification	7.4%	6.9%	7.4%	6.3%
Year 12	15.0%	24.1%	14.2%	13.0%
Year 11	13.9%	19.5%	13.4%	12.3%
Year 10	31.6%	29.9%	31.8%	31.9%
Year 9 or below	11.5%	9.2%	11.7%	17.1%
Parental background at age 14				
Father post-school qualification[1]	34.3%	27.6%	34.9%	31.8%
Mother post-school qualification[1]	18.7%	19.5%	18.7%	18.4%
Father manager, (para-) professional[1]	26.2%	25.3%	26.3%	23.6%
Father not-employed[1]	5.4%	4.6%	5.4%	4.6%
Father not present	15.0%	20.7%	14.5%	19.2%
Mother manager, (para-) professional[1]	9.5%	6.9%	9.7%	9.0%
Mother not-employed[1]	54.8%	50.6%	55.2%	54.3%
Mother not present @14	4.7%	6.9%	4.5%	7.2%
Longest ever job by 1984				
Never held a job	12.0%	12.6%	11.9%	8.9%
<1 year	42.0%	56.3%	40.7%	42.3%
1 year	12.7%	12.6%	12.7%	19.0%
2 years	14.2%	11.5%	14.4%	11.7%
3 years +	19.1%	6.9%	20.2%	18.1%
Average pre-June unemployment[2]	62.2%	68.0%	61.7%	64.5%
Employment				
Ever employed 1987[3]	77.1%	82.8%	77.9%	n/a
Ever employed 1986	74.3%	86.2%	73.2%	n/a
N	1084	87	997	852

Notes:
1. Only asked if that parent was present when the respondent was aged 14.
2. Proportion of 1984 reference period up to 3 June spent unemployed.
3. Ever held any non-subsidised, non-government programme job in the 1987 reference period.

Table 5.3: Univariate Probits

Dependent variable: ever employed in regular, unsubsidised job	*Univariate Probit 1986*		*Univariate Probit 1987*	
	dF/dx[1]	*t*	dF/dx[1]	*t*
SYETP	0.1338***	3.26	0.0424	0.96
Female	-0.1188***	-4.15	-0.0950***	-3.14
Married	-0.0301	-0.51	0.0366	0.68
Children	-0.0771	-1.00	-0.0476	-0.68
Children x female	-0.4549***	-3.84	-0.2963***	-2.94
Spouse employed	0.1329**	2.48	0.0134	0.23
Aboriginal/TS Islander	-0.1077	-1.48	-0.1655*	-1.85
Other ethnic minority	-0.1033*	-1.66	-0.0421	-0.67
State initially interviewed in				
Victoria	-0.0158	-0.44	0.0401	1.14
Queensland	-0.0020	-0.05	-0.0723*	-1.71
S.Aus/NT	-0.1098**	-2.33	-0.1152**	-2.38
W. Aus/Tas	-0.0091	-0.22	0.0578	1.45
Education				
School overseas	-0.0134	-0.16	-0.1538	-1.46
RC school	-0.0186	-0.37	-0.0146	-0.29
Private school	0.1198*	1.79	0.1173*	1.75
Degree/diploma	0.1274***	3.41	0.1280***	3.68
Apprenticeship	0.1015**	1.97	0.0816	1.57
Other post-school	0.0157	0.35	0.0550	1.37
Year 12	-0.0003	-0.01	0.1066***	2.71
Year 11	0.1011***	2.62	0.0840**	2.17
Year 9 or less	-0.0763*	-1.79	-0.0778*	-1.71
Initial labour market experience				
Longest job by 1984: None	0.0054	0.11	-0.0516	-1.01
<1 year	0.0651*	1.79	0.0542	1.42
2 years	0.0721*	1.70	0.0852**	2.04
3 years +	0.1488***	3.71	0.1269***	3.12
Other government programme[2]	-0.2223***	-5.55	-0.1680***	-4.12
Pre-June unemployment %	-0.1281***	-3.87	-0.0723**	-2.13
Work restricted by health	-0.1120***	-3.07	-0.1995***	-4.89
Family background				
Other city before 14	-0.0818**	-2.15	-0.0352	-0.95
Country town before 14	-0.0209	-0.63	-0.0396	-1.15
Rural area before 14	-0.0690	-1.25	-0.0877	-1.58
Overseas before 14	0.0968	1.09	0.0839	0.82
No. of siblings	-0.0091*	-1.64	-0.0105	-1.61
English good	0.0951*	1.77	0.0554	0.95
English poor	0.1732**	2.44	0.0704	0.74
Sexist[3]	-0.1369**	-2.19	-0.0198	-0.32
Sexist x female	0.0922	1.02	0.0429	0.44

Dependent variable: ever employed in regular, unsubsidised job	*Univariate Probit 1986*		*Univariate Probit 1987*	
	dF/dx[1]	*t*	dF/dx[1]	*t*
Father's occupation @14				
Father not present @14[4]	–0.0651	–0.94	–0.0268	–0.41
Labourer	0.0325	0.48	0.0787	1.31
Plant operative	0.0127	0.19	0.0667	1.14
Sales	–0.0219	–0.27	0.0224	0.29
Tradesperson	–0.0801	–1.18	–0.0146	–0.24
Manager, professional, para–prof.	0.0312	0.50	0.0485	0.84
Not employed	0.0269	0.36	0.0463	0.68
Father post–school qual. @14	0.0269	0.87	0.0327	1.04
Mother's occupation @14				
Mother not present @14[4]	–0.0782	–0.99	0.0014	0.02
Labourer	–0.0385	–0.53	0.0005	0.01
Plant operative	–0.1622*	–1.92	–0.1297	–1.56
Sales	–0.1203	–1.68	0.0029	0.04
Tradesperson	–0.0603	–0.59	0.0698	0.79
Manager, professional, para–prof.	0.0560	0.91	0.0094	0.15
Not employed	–0.0215	–0.41	–0.0173	–0.34
Mother post–school qual. @14	–0.0101	–0.27	–0.0399	–1.02
Religion brought up in				
Catholic	0.0955***	2.85	0.0642*	1.87
Presbyterian	0.1136**	2.35	0.0410	0.79
Methodist	0.0402	0.84	0.0416	0.87
Other Christian	–0.0236	–0.38	–0.0073	–0.12
Other Religion	–0.0073	–0.16	0.0235	0.50
No religion	0.0871**	2.11	0.0104	0.23
N	1283		1084	
Log likelihood	–569.76		–451.02	

Notes:
* Indicates significance at 10% level, ** at 5% and *** at 1%.
Omitted categories are: European (ethnic origin), New South Wales/Australian Capital Territory (state), government school, Year 10 (highest education qualification), longest job 1 year, lived mostly in (state) capital city till 14, English first language, Father clerical worker, Mother clerical worker, Anglican (religion brought up in).
1. Marginal effects are calculated at the sample mean.
2. Went on a government labour market programme, other than SYETP, between 3 June 1984 and their 1985 interview.
3. Respondents were asked 7 questions about women and work. *Sexist* equals one if they gave reactionary answers to more than 5 of the 7.
4. Questions about parental occupation and education at age 14 were only asked if that parent was present at 14.

Table 5.4: Bivariate probit employment equations

Bivariate probit analysis	*Ever employed 1986*		*Ever employed 1987*	
	coefficient	*t*	coefficient	*t*
SYETP	1.590**	2.45	1.133*	1.93
Female	-0.398***	-3.99	-0.359***	-3.20
Married	-0.055	-0.28	0.154	0.74
Children	-0.238	-0.98	-0.154	-0.62
Children x female	-1.212***	-3.79	-0.857***	-2.93
Spouse employed	0.542**	2.40	0.052	0.24
Aboriginal/TS Islander	-0.272	-1.17	-0.465	-1.63
Other ethnic minority	-0.318*	-1.66	-0.179	-0.81
State initially interviewed in				
Victoria	-0.061	-0.51	0.136	0.97
Queensland	0.027	0.19	-0.222	-1.45
S.Aus/NT	-0.306*	-1.94	-0.362**	-2.18
W. Aus/Tas	-0.101	-0.67	0.170	0.96
Education				
School overseas	-0.095	-0.33	-0.513	-1.56
RC school	-0.010	-0.06	-0.001	0.00
Private school	0.603**	2.07	0.681**	1.96
Degree/diploma	0.513***	3.22	0.585***	3.43
Apprenticeship	0.431**	2.10	0.365	1.60
Other post-school	0.049	0.32	0.210	1.27
Year 12	-0.063	-0.40	0.403**	1.98
Year 11	0.357**	2.18	0.319*	1.81
Year 9 or less	-0.222	-1.59	-0.251	-1.58
Initial labour market experience				
Longest job by 1984: None	0.042	0.25	-0.161	-0.88
<1 year	0.190	1.40	0.175	1.15
2 years	0.252	1.56	0.374**	2.05
3 years +	0.657***	4.00	0.615***	3.32
Other government programme[1]	-0.624***	-4.74	-0.537***	-4.12
Pre-June unemployment %	-0.473***	-4.19	-0.309**	-2.39
Work restricted by health	-0.306**	-2.43	-0.580***	-4.07
Family background				
Other city before 14	-0.218	-1.61	-0.118	-0.87
Country town before 14	-0.001	-0.01	-0.098	-0.74
Rural area before 14	-0.128	-0.65	-0.229	-1.14
Overseas before 14	0.494	1.36	0.446	0.96
No. of siblings	-0.028	-1.49	-0.038	-1.51
English good	0.403*	1.91	0.234	0.96
English poor	1.050***	2.75	0.442	1.05
Sexist[2]	-0.440**	-2.35	-0.108	-0.47
Sexist x female	0.463	1.25	0.187	0.47

Bivariate probit analysis	*Ever employed 1986*		*Ever employed 1987*	
	coefficient	*t*	coefficient	*t*
Father's occupation @14				
Father not present @14[3]	–0.180	–0.79	–0.070	–0.29
Labourer	0.134	0.55	0.392	1.49
Plant operative	0.058	0.25	0.325	1.33
Sales	–0.049	–0.18	0.145	0.48
Tradesperson	–0.214	–0.95	0.009	0.04
Manager, professional, para–prof.	0.114	0.52	0.220	0.96
Not employed	0.146	0.55	0.249	0.88
Father post–school qual. @14	0.141	1.26	0.158	1.29
Mother's occupation @14				
Mother not present @14[3]	–0.335	–1.33	–0.066	–0.22
Labourer	–0.151	–0.64	–0.005	–0.02
Plant operative	–0.576**	–2.30	–0.531*	–1.94
Sales	–0.392*	–1.80	–0.022	–0.09
Tradesperson	–0.229	–0.70	0.220	0.56
Manager, professional, para–prof.	0.217	0.97	0.031	0.13
Not employed	–0.087	–0.49	–0.091	–0.46
Mother post–school qual. @14	–0.067	–0.52	–0.161	–1.14
Religion brought up in				
Catholic	0.327**	2.52	0.249*	1.79
Presbyterian	0.413*	1.88	0.116	0.54
Methodist	0.133	0.77	0.164	0.84
Other Christian	–0.102	–0.50	–0.018	–0.08
Other Religion	–0.045	–0.28	0.077	0.42
No religion	0.280	1.58	–0.018	–0.10
ρ	–0.622**	2.17	–0.553**	2.24
N	1283		1084	
Log likelihood	–875.96		–711.58	

Notes:

* Indicates significance at 10% level, ** at 5% and *** at 1%.

Omitted categories are: European (ethnic origin), New South Wales/Australian Capital Territory (state), government school, Year 10 (highest education qualification), longest job 1 year, lived mostly in (state) capital city till 14, English first language, Father clerical worker, Mother clerical worker, Anglican (religion brought up in).

1. Went on a government labour market programme, other than SYETP, between 3 June 1984 and their 1985 interview.

2. Respondents were asked 7 questions about women and work. *Sexist* equals one if they gave reactionary answers to more than 5 of the 7.

3. Questions about parental occupation and education at age 14 were only asked if that parent was present at 14.

Table 5.5: Selection Equations

Bivariate probit analysis	*SYETP participation, 1986*		*SYETP participation, 1987*	
	coefficient	*t*	coefficient	*t*
Female	0.088	0.71	0.074	0.56
Age, 1984	-0.107***	-3.16	-0.100***	-2.73
Married, 1984	-0.855	-1.52	-0.779	-1.36
Children, 1984	0.465	0.78	0.439	0.71
Children x female	-0.296	-0.37	-0.168	-0.20
Spouse employed, 1984	0.498	0.81	0.365	0.57
Aboriginal/TS Islander	-0.451	-1.01	-0.238	-0.49
Other ethnic minority	0.081	0.33	0.121	0.46
State initially interviewed in				
Victoria	0.112	0.72	0.137	0.80
Queensland	-0.279	-1.30	-0.135	-0.62
S.Aus/NT	-0.157	-0.77	-0.071	-0.33
W. Aus/Tas	0.317*	1.78	0.337*	1.70
Education				
School overseas	0.078	0.22	0.251	0.64
RC school	-0.310	-1.30	-0.296	-1.11
Private school	-0.636	-1.38	-0.746	-1.42
Degree/diploma, 1984	0.120	0.51	0.014	0.05
Apprenticeship, 1984	-0.129	-0.42	0.027	0.08
Other post-school, 1984	-0.036	-0.14	0.110	0.42
Year 12, 1984	0.433**	2.46	0.441**	2.30
Year 11, 1984	0.101	0.53	0.285	1.49
Year 9 or less, 1984	-0.074	-0.35	-0.020	-0.09
Initial labour market experience				
Longest job by 1984: None	-0.348	-1.34	-0.377	-1.40
<1 year	-0.020	-0.11	0.000	0.00
2 years	0.173	0.80	0.035	0.14
3 years +	-0.326	-1.26	-0.344	-1.18
CEP referrals, 1984	0.144**	1.97	0.164**	2.27
Pre-June unemployment %	0.487***	2.92	0.387**	2.19
Work restricted by health, 1984	-0.633**	-2.53	-0.561**	-2.23
Family background				
Other city before 14	-0.244	-1.48	-0.140	-0.79
Country town before 14	-0.473***	-2.94	-0.379**	-2.23
Rural area before 14	-0.446*	-1.69	-0.340	-1.24
Overseas before 14	-0.757	-1.48	-0.556	-1.06
No. of siblings	-0.011	-0.70	-0.003	-0.08
English good	-0.185	-0.72	-0.001	0.00
English poor	-0.591	-1.13	-0.468	-0.89
Sexist	0.317	1.22	0.238	0.96
Sexist x female	-0.903	-1.38	-[1]	-[1]

Bivariate probit analysis	*SYETP participation, 1986*		*SYETP participation, 1987*	
	coefficient	*t*	coefficient	*t*
Father's occupation @14				
Father not present @14	–0.309	–1.11	–0.191	–0.66
Labourer	–0.263	–0.84	–0.332	–1.02
Plant operative	–0.267	–0.96	–0.343	–1.14
Sales	–0.086	–0.26	–0.277	–0.73
Tradesperson	–0.300	–1.10	–0.338	–1.17
Manager, professional, para-prof.	–0.153	–0.59	–0.201	–0.73
Not employed	–0.457	–1.29	–0.435	–1.15
Father post-school qual. @14	–0.315**	–2.14	–0.234	–1.45
Mother's occupation @14				
Mother not present @14	0.480	1.49	0.370	1.03
Labourer	0.176	0.57	0.041	0.12
Plant operative	0.697**	2.26	0.677**	2.05
Sales	0.190	0.66	0.085	0.26
Tradesperson	0.119	0.28	0.188	0.42
Manager, professional, para-prof.	–0.247	–0.85	–0.198	–0.60
Not employed	0.041	0.17	0.084	0.32
Mother post-school qual. @14	0.266*	1.66	0.178	0.99
Religion brought up in				
Catholic	0.061	0.38	0.006	0.03
Presbyterian	0.322	1.34	0.390	1.53
Methodist	0.017	0.06	0.018	0.06
Other Christian	0.075	0.27	0.001	0.01
Other Religion	0.176	0.80	0.151	0.63
No religion	0.138	0.66	0.205	0.95
N	1283		1084	

Notes:
* Indicates significance at 10% level, ** at 5% and *** at 1%.
Omitted categories are: European (ethnic origin), New South Wales/Australian Capital Territory (state), government school, Year 10 (highest education qualification), longest job 1 year, lived mostly in (state) capital city till 14, English first language, Father clerical worker, Mother clerical worker, Anglican (religion brought up in).
1. Dropped due to perfect collinearity with SYETP.

Table 5.6: Marginal Effects

Marginal effect of SYETP on probability of employment[1]	*1986*	*1987*
Whole sample average	0.264	0.197
Female	0.317	0.245
Married	0.246	0.192
Married, spouse employed	0.186	0.178
S. Aus/NT	0.324	0.255
Degree/diploma	0.162	0.135
Apprenticeship	0.105	0.081
Year 12	0.263	0.147
Year 10	0.316	0.256
Private school	0.127	0.098
No previous job	0.371	0.306
Longest job 1 year	0.327	0.241
Longest job 3 years+	0.133	0.101
Work restricted by health	0.358	0.307
Father not employed @14	0.317	0.258
Father plant operative @14	0.262	0.181
Father manager, (para-) professional @14	0.185	0.148
Father post-school qualification @14	0.213	0.161
Age 22+ in 1984	0.204	0.152
Age <21 in 1984	0.299	0.225
Age <19 in 1984	0.308	0.236
Marginal effect of selected other significant characteristics	*1986*	*1987*
Female	–0.108	–0.095
Child x female	–0.353	–0.237
S. Aus/N.T.	–0.082	–0.094
Private school	0.129	0.129
Degree/diploma	0.123	0.130
Apprenticeship	0.104	0.084
Longest job 3 years+	0.157	0.142
Work restricted by health	–0.079	–0.154

Notes:

1. $$\frac{\Phi_2(\alpha+\beta'x, q\gamma'z, q\rho)}{\Phi(q\gamma'z)} - \frac{\Phi_2(\beta'x, q\gamma'z, q\rho)}{\Phi(q\gamma'z)}$$

where Φ is the standard (univariate) normal cumulative distribution function, and q takes the value 1 if the person is selected onto the programme, and –1 otherwise.

Table 5.7: Subsequent, never-subsidised, jobs

Dependent variable: Ever employed in a never subsidised, non-programme job	*1987* coefficient	*t*
SYETP	1.049**	2.19
Female	-0.343***	-2.79
Married	0.185	0.87
Children	-0.119	-0.44
Children x female	-0.695**	-2.23
Spouse employed	-0.119	-0.53
Aboriginal/TS Islander	-0.574*	-1.84
Other ethnic minority	-0.207	-0.86
State initially interviewed in		
Victoria	0.097	0.61
Queensland	-0.149	-0.89
S.Aus/NT	-0.388**	-2.17
W. Aus/Tas	0.122	0.65
Education		
School overseas	-0.681*	-1.77
RC school	-0.052	-0.25
Private school	0.693*	1.90
Degree/diploma	0.603***	3.29
Apprenticeship	0.347	1.37
Other post-school	0.298*	1.67
Year 12	0.354*	1.72
Year 11	0.392**	2.11
Year 9 or less	-0.229	-1.32
Initial labour market experience		
Longest job by 1984: None	-0.213	-1.01
<1 year	0.211	1.26
2 years	0.391*	1.95
3 years +	0.559***	2.74
Other government programme[1]	-0.451***	-3.19
Pre-June unemployment %	-0.314**	-2.20
Work restricted by health	-0.497***	-3.56
Family background		
Other city before 14	-0.015	-0.10
Country town before 14	-0.105	-0.73
Rural area before 14	-0.148	-0.65
Overseas before 14	0.336	0.63
No. of siblings	-0.049*	-1.78
English good	0.181	0.64
English poor	0.462	0.98
Sexist[2]	-0.127	-0.51
Sexist x female	-0.006	-0.01

Dependent variable: Ever employed in a never subsidised, non-programme job	*1987* coefficient	*t*
Father's occupation @14		
Father not present @14[3]	0.004	0.02
Labourer	0.428	1.42
Plant operative	0.358	1.28
Sales	0.290	0.86
Tradesperson	0.105	0.39
Manager, professional, para-prof.	0.234	0.90
Not employed	0.382	1.22
Father post-school qual. @14	0.071	0.52
Mother's occupation @14		
Mother not present @14[3]	0.018	0.06
Labourer	0.036	0.12
Plant operative	–0.457	–1.55
Sales	–0.008	–0.03
Tradesperson	0.032	0.07
Manager, professional, para-prof.	0.031	0.12
Not employed	–0.070	–0.33
Mother post-school qual. @14	–0.087	–0.56
Religion brought up in		
Catholic	0.240	1.58
Presbyterian	0.193	0.81
Methodist	0.104	0.49
Other Christian	–0.220	–0.79
Other Religion	0.140	0.71
No religion	0.002	0.01
ρ	–0.631***	3.77
N	781	
Log likelihood	–552.23	

Notes:
* Indicates significance at 10% level, ** at 5% and *** at 1%.
Omitted categories are: European (ethnic origin), New South Wales/Australian Capital Territory (state), government school, Year 10 (highest education qualification), longest job 1 year, lived mostly in (state) capital city till 14, English first language, Father clerical worker, Mother clerical worker, Anglican (religion brought up in).
1. Went on a government labour market programme, other than SYETP, between 3 June 1984 and their 1985 interview.
2. Respondents were asked 7 questions about women and work. *Sexist* equals one if they gave reactionary answers to more than 5 of the 7.
3. Questions about parental occupation and education at age 14 were only asked if that parent was present at 14.

Figure 5.1: Start weeks of SYETP spells, treatment group

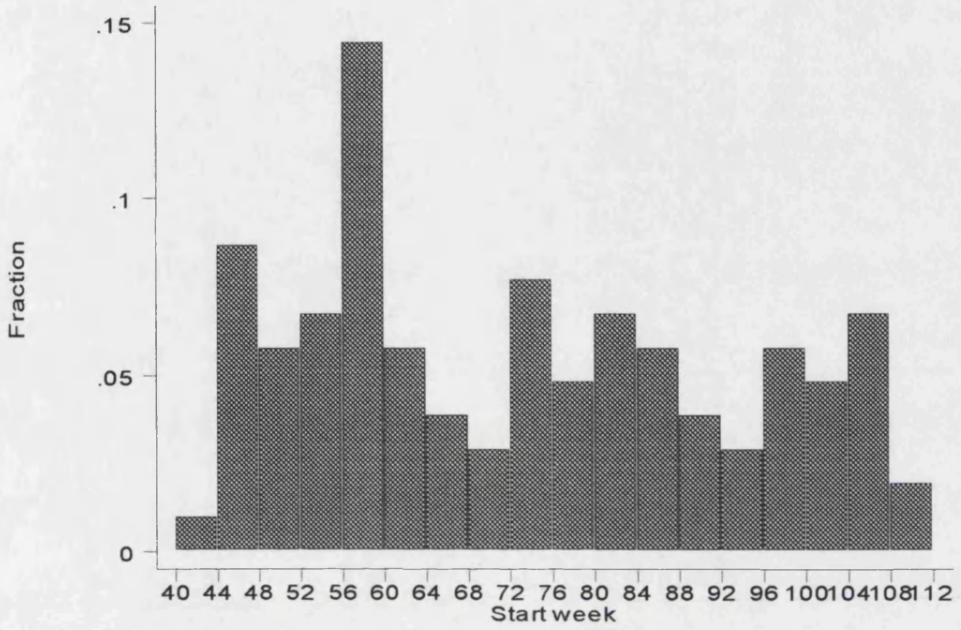


Figure 5.2: Length of regular jobs

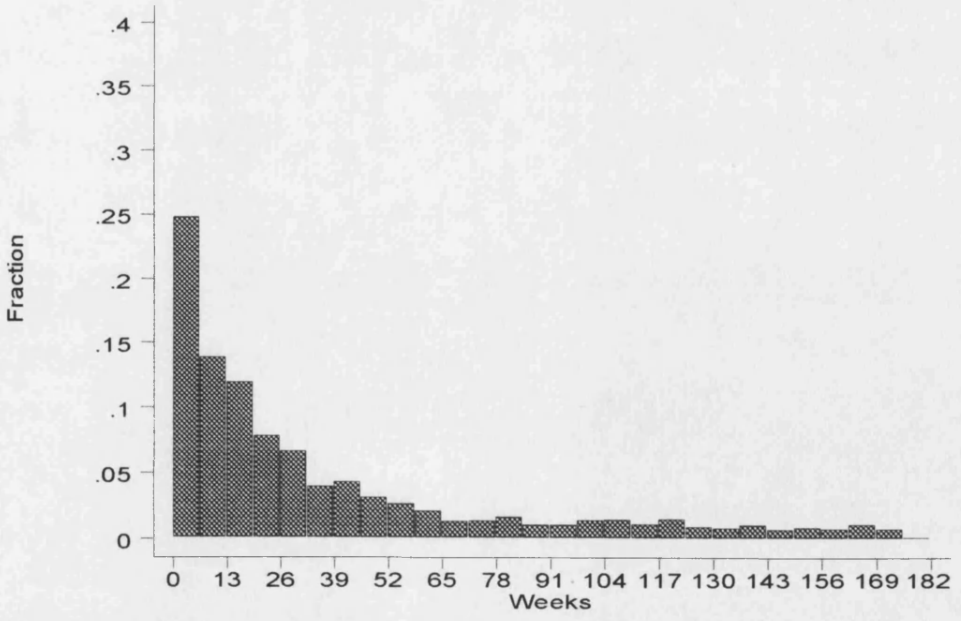


Figure 5.3: Length of SYETP jobs

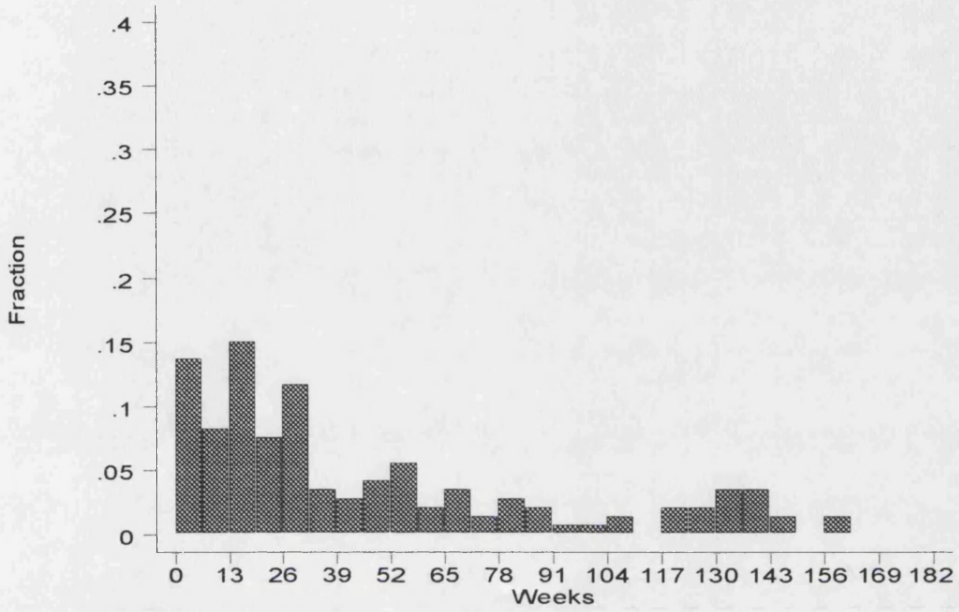


Figure 5.4: Length of post-unemployment jobs

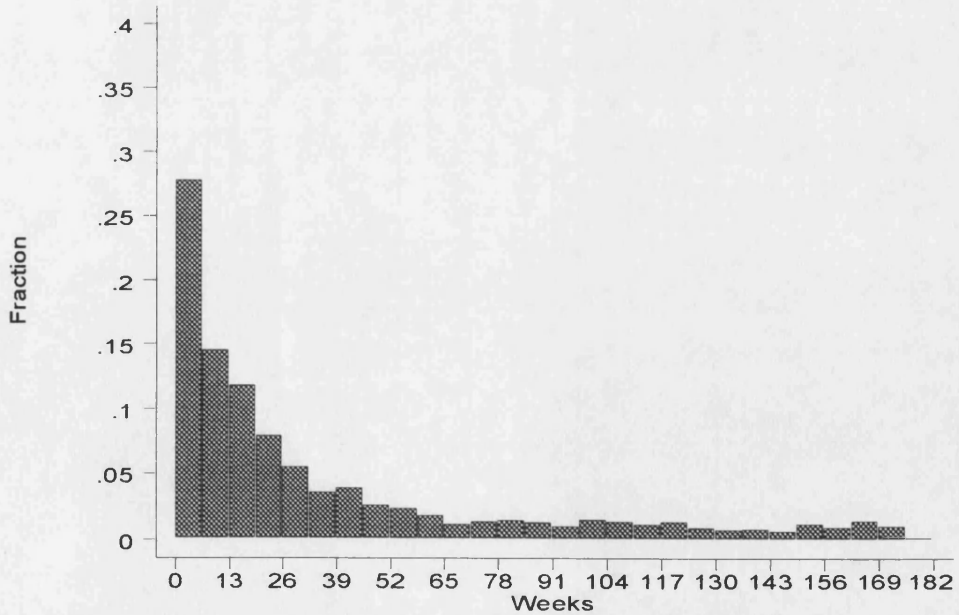


Figure 5.5: Length of pre-SYETP unemployment spells

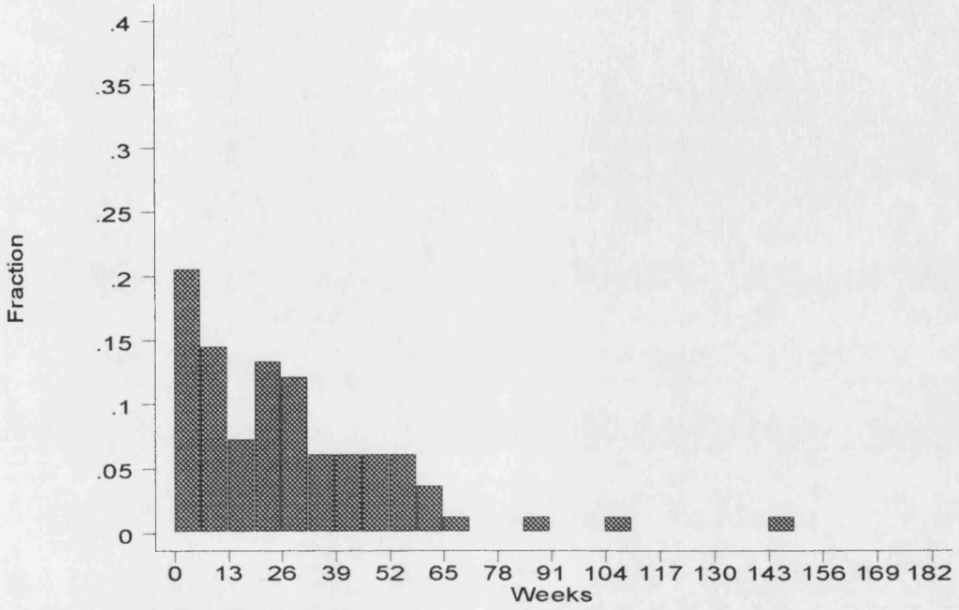


Figure 5.6: Length of post-SYETP unemployment spells

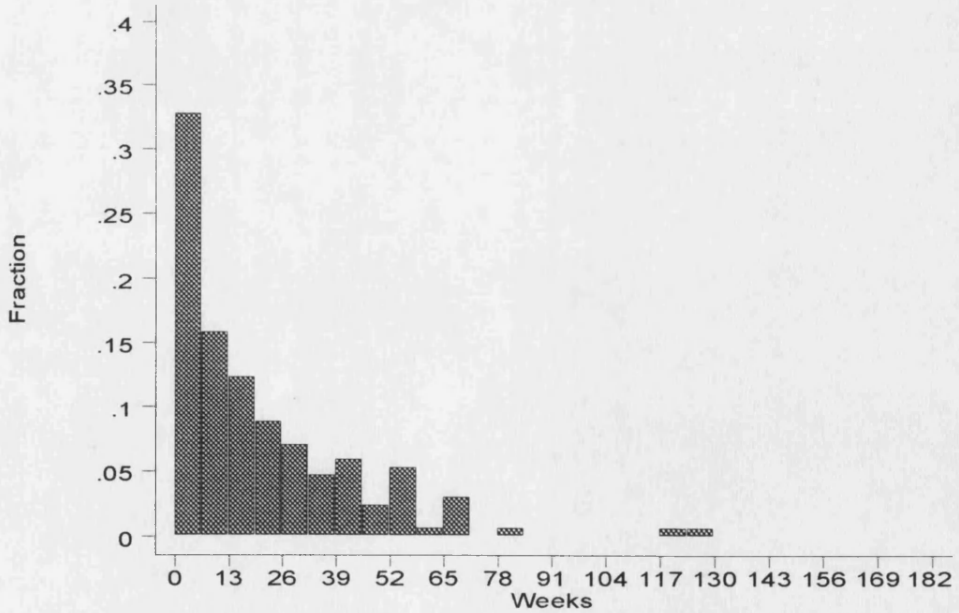


Figure 5.7: Length of pre-SYETP employment spells

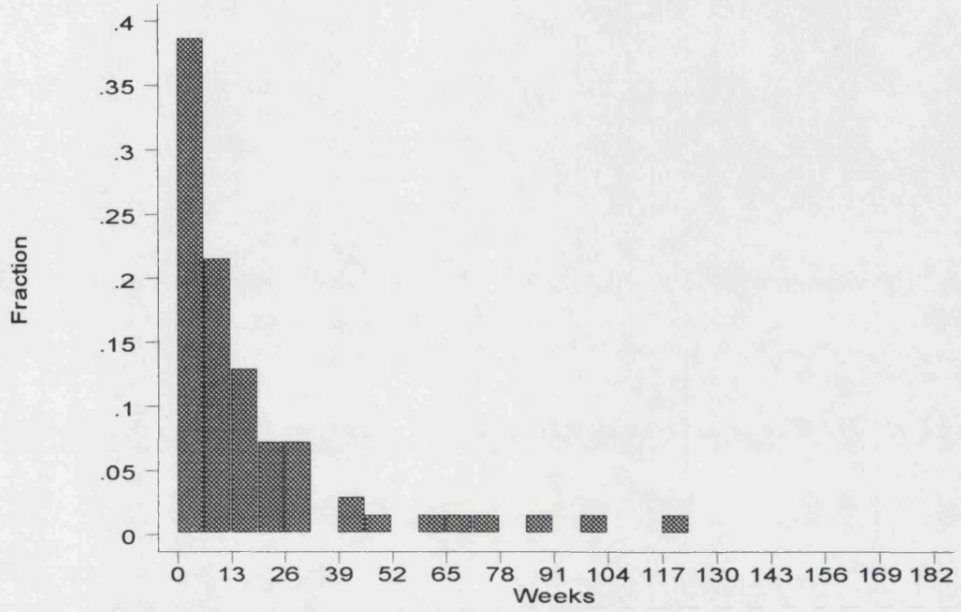
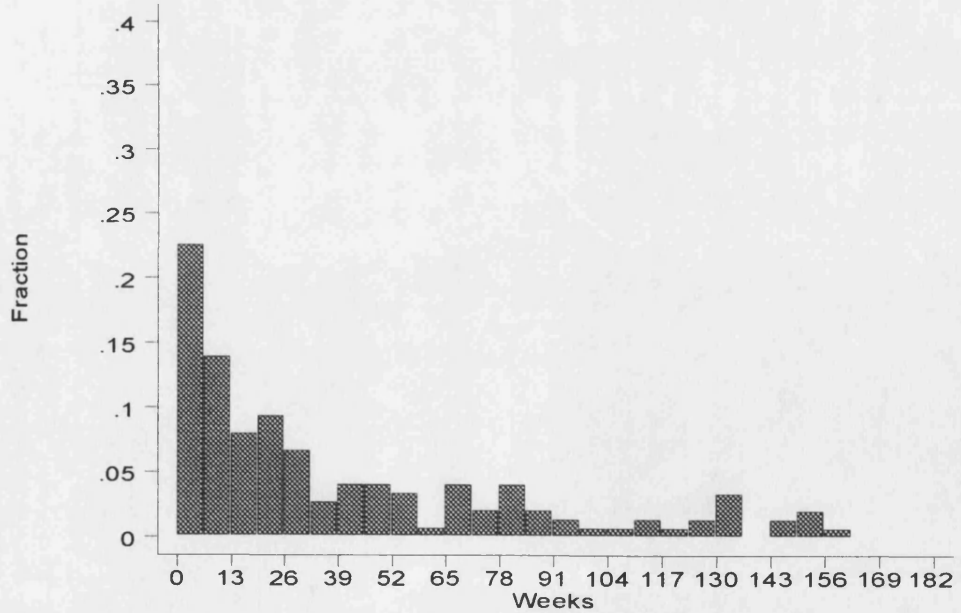


Figure 5.8: Length of post-SYETP employment spells



Conclusion

The UK's New Deal is the latest – and one of the most ambitious – attempts to tackle the problem of high and long-term unemployed that has afflicted many OECD countries since the 1970s. With a nice irony, the policy instrument at the heart of the New Deal, targeted wage subsidies for the long-term unemployed, was considered, but rejected, by Roosevelt in the original New Deal (Allen, 1977). We argue that today's policy-makers are wise to reconsider Roosevelt's decision.

Alongside the shifts of policy a substantial body of literature has developed, but little consensus. Most advocates of active labour market policy have concentrated on the effects of policy on labour demand, or on the outflow rate of those subject to the policy, and most models in these traditions have yielded positive predictions for the effects of ALMP. But these approaches ignore the possible effects of policy on wages. In particular, if the equilibrium rate of unemployment is determined by the interaction of wage setting with labour demand or price setting, then the effects of policy on wages will be crucial. Policies which improve the lot of the unemployed, by increasing their likelihood of getting a job, also reduce the cost of unemployment to the employed, leading them to bid up wages.

We argue that it is not sufficient simply to rule out this critique by setting wages exogenously, or using *ad hoc* formulations that ensure the independence of wages from policy. It is relevant to too many leading theories of wage setting to be ignored. Instead, we believe the effect on wages needs to be modelled explicitly, taking on board this critique, if a credible case for active labour market policy is to be made. At the same time, models of active labour market policy which do take account of the effect on wages have tended to treat ALMP as a state into which the unemployed are placed, and which may or may not lead to an exit into employment. This state-based approach is relevant only to policies of direct job creation and training.

Alternative active labour market policies, in particular job search assistance and subsidies to regular employment, do not constitute a separate state within the labour force. Instead, they act to increase the probability of making the transition from unemployment to employment. A growing body of evidence suggesting that

empirically, as well as theoretically, state-based policies have largely been unsuccessful, has shifted policy interest towards these transition-based policies.

Our twin starting points are thus to model policy as a transition, and to take full account of the critique that, by improving the chances of the unemployed, policy impacts adversely on wage-setting. We focus on policies that are targeted onto the long-term unemployed, in line with the near-universal targeting of active labour market policies in practice. We are able to show that it is always optimal to target resources disproportionately on the long-term unemployed, although not necessarily to the complete exclusion of the short-term unemployed.

We present a number of closely-related models of active labour market policy in a macroeconomic framework. We start with a simple framework, taking the possibility of programme effectiveness at micro-level (for the participants) for granted, instead asking what the macroeconomic effects of such policies would be. We then extend our framework to model both targeted wage subsidies and job search assistance explicitly.

We show that, in models where the inflow into unemployment is fixed, targeted wage subsidies for the long-term unemployed will unambiguously reduce equilibrium unemployment. There are three main effects. Firstly, provided both hiring costs and subsidy payments are outwith the wage bargain, subsidies will involve a transfer from taxpayers to hiring firms, which will straightforwardly push out labour demand. Secondly, provided subsidies are targeted on the long-term unemployed, the gains made by the long-term unemployed will be discounted more heavily by wage-setters than the losses to short-term unemployed workers who now face greater competition for jobs. Wage pressure will fall, allowing unemployment to fall. Finally, a targeted subsidy can overcome the externality arising because firms do not take account of the impact of their hiring decisions on other firms. If the short-term unemployed are more desirable, then hiring them reduces the average quality of the remaining unemployed pool faced by other firms with vacancies. A subsidy targeted at the hiring of long-term unemployed workers can overcome this externality, increasing the average quality of the pool of unemployed workers faced by other firms, which will respond by opening more vacancies.

Our findings for job search assistance are more ambiguous. If the unemployed have an unconstrained choice over the extent of their search intensity, then cutting the costs of search for the long-term unemployed has a similar effect to increasing their benefit levels. Although the long-term unemployed will search harder, they will also take some of the reduced cost of search as a reduced utility cost of unemployment. Hence, wage pressure rises and employers open fewer vacancies. This reduces the benefit of searching for the short-term unemployed since vacancies are a positive externality for them. Overall the effect is ambiguous.

The effect is very different when search intensity is mandated by the benefits system. Increasing search intensity requirements for the long-term unemployed, beyond their optimal private choice, leads both the short- and long-term unemployed to increase their search intensity. The combination of job search assistance and a job search mandate unambiguously reduces unemployment.

Both job search assistance and wage subsidies operate on the labour market in similar ways, and should not necessarily be seen as competing policy options. Instead, our findings suggest that both can be effective, and that the mix between them should be determined by their relative costs and marginal effects. It seems plausible, although we do not explicitly model it, that a combination of job search assistance and wage subsidies, such as in the UK's New Deal for 18-24s, would offer a more effective option than either individually.

Almost all active labour market policies in the 1980s and 1990s have been targeted, normally using duration of unemployment as the main criterion for eligibility, although some untargeted policies were enacted in the 1970s. The experience of *Working Nation* in Australia, however, suggests that exclusive targeting of policies onto the long-term unemployed may be counter-productive. A large scale shift in resources from the short-term unemployed to the long-term unemployed under *Working Nation* led to a substantial increase in the inflow into long-term unemployment, which in turn overwhelmed the programmes targeted on the long-term unemployed (DEETYA, 1996a).

We extend the Mortensen-Pissarides (1994) framework to analyse issues of optimal targeting within a model with endogenous job creation and job destruction. Wage

subsidies generally increase both the inflows and the outflows from unemployment, and we no longer have unambiguous effects on unemployment. We can show that, provided policy can reduce unemployment at all, targeting policy towards the long-term unemployed is always desirable, and generates a further reduction in unemployment, not merely a churning of the existing pool. However, the justified emphasis on the long-term unemployed should not be to the complete exclusion of the short-term unemployed. Because of diminishing returns, as subsidies increase it becomes more effective at the margin to target resources towards the short-term unemployed than to target the long-term unemployed still further.

By using simulations of this model, the oft-cited issues of deadweight, displacement and substitution can all be treated endogenously, rather than on the basis of frequently *ad hoc* estimates of their magnitude, often derived from partial equilibrium analysis. Our findings are broadly encouraging for advocates of active labour market policies. We find that unemployment can be reduced, even accounting for the increase in inflows. However, small subsidies may be worse than none, increasing unemployment. Our findings suggest, though, that it would be optimistic to expect policies to pay for themselves in terms of reduced benefit payments and increased tax revenues.

The impact of wage subsidies on subsequent employability has been much discussed but little researched. Despite the copious equivalent literature for training programmes, and job search assistance, we know surprisingly little about what happens to participants in wage subsidies after the subsidy runs out. We use data on a panel of Australian youth to explore subsequent employment histories for young Australians who went on the Special Youth Employment Training Program between June 1984 and October 1985.

We find little evidence that subsidised jobs break up when the subsidy expires. Furthermore, we find a large and significant positive effect on subsequent employment prospects. Controlling for both a wide range of individual and family background characteristics, and for selection biases, we estimate that participants were 26% more likely to have a job at some point between January and September 1986, and 20% more likely to have a job at some point between October 1986 and September 1987. The effects are larger still for more disadvantaged and younger workers.

Subsidies offer far more than a temporary respite from unemployment. Instead they appear to offer a lasting improvement in employment prospects, both through retention of initially subsidised jobs, and through improved employability once the initial job breaks up. Unfortunately, our panel does not provide sufficient data to examine longer-term effects. There is a growing body of evidence that long-term spells of unemployment have a persistent, and maybe even permanent, scarring effect on subsequent opportunities (Trivedi and Alexander, 1989, find this with the same data we use). Although far more data would be needed to establish it, our findings offer the tantalising prospect that a period of employment, obtained initially through subsidy but maintained subsequently, could have the opposite effect, propelling participants onto a lasting, better, life trajectory.

References

Aarnio, O. (1993) 'Temporary Active Labour Market Programmes – Potential Effects on Unemployment', *Finnish Economic Papers* 6 (1), pp 13-24.

Adnett, N. and Dawson, A. (1996) 'Wage Subsidies and European Unemployment: Theory and Evidence', *Economic Issues*, 1(1), pp 1-21.

Allen, W. (1977) 'Irving Fisher, F.D.R. and the Great Depression', *History of Political Economy* 9 (4), pp 560-587.

Artis, M. and Sinclair, C. (1996) 'Labour Subsidies: a new look', *Metroeconomica* 47 (2), pp 105-124.

Arulampalam, W. and Stewart, M. (1995) 'The Determinants of Individual Unemployment Durations in an Era of High Unemployment', *Economic Journal* 105, pp 321-332.

Arwady, J. (1988) *Wage Subsidies and Jobs for the Disadvantaged: applying the Targeted Jobs Tax Credit in an operating environment*, Manpower and Human Resources Studies No. 12, Industrial Research Unit, University of Pennsylvania.

Atkinson, A.B., Gomulka, J., Micklewright, J. and Rau, N. (1984) 'Unemployment Benefit, Duration and Incentives in Britain: how robust is the evidence?', *Journal of Public Economics* 23, pp 3-26.

Atkinson, A.B. and Micklewright, J. (1991) 'Unemployment Compensation and Labour Market Transitions: a critical review', *Journal of Economic Literature* 29, pp 1679-1727.

Atkinson, J. and Meager, N. (1994) *Evaluation of Workstart Pilots.* Institute for Employment Studies report 279.

Baily, M. and Tobin, J. (1977) 'Macroeconomic Effects of Selective Public Employment and Wage Subsidies', *Brookings Papers on Economic Activity*, pp 511-544.

Bean, C. (1994) 'European Employment: a survey' *Journal of Economic Literature* 32, pp 573-619.

Bean, C. (1997) 'The Role of Demand-Management Policies in Reducing Unemployment' in *Unemployment Policy: Government options for the labour market*, Snower, D. and de la Dehesa, G. (Eds) Cambridge University Press: Cambridge.

Bell, S. and Orr, L. (1994) 'Is Subsidized Employment Cost-Effective for Welfare Recipients?', *Journal of Human Resources* 29 (1), pp 42-61.

Bellmann, L. and Jackman, R. (1996) 'Aggregate Impact Analysis' in *International Handbook of Labour Market Policy and Evaluation*, Schmid, G., O'Reilly, J. and Schömann, K. (Eds) Edward Elgar: Cheltenham.

Bentolila, S. and Bertola, G. (1990) 'Firing Costs and Labour Demand in Europe: how bad is Eurosclerosis?', *Review of Economic Studies* 57, pp 381-402.

van den Berg, G., Lindeboom, M. and Ridder, G. (1994) 'Attrition in Longitudinal Panel Data and the Empirical Analysis of Dynamic Labour Market Behaviour', *Journal of Applied Econometrics* 9, pp 421-435.

Bertola, G. (1990) 'Job Security, Employment and Wages', *European Economic Review* 34 (4), pp 851-879.

Bingley, P. and Walker, I. (1997) 'The Labour Supply, Unemployment and Participation of Lone Mothers in In-work Transfer Programmes", *Economic Journal* 107, pp 1375-1390.

Bishop, J. and Haveman, R. (1979) 'Selective Employment Subsidies: Can Okun's Law be Repealed?' *American Economic Review* 62, pp 124-130.

Bishop, J. and Montgomery, M. (1993) 'Does the Targeted Jobs Tax Credit Create Jobs at Subsidized Firms?', *Industrial Relations* 32 (3), pp 289-306.

Björklund, A. (1993) 'The Swedish Experience' in *Measuring Labour Market Measures*, proceedings from the Danish Presidency Conference, Kolding 1993, Jensen, K. and Madsen, P. (Eds) Ministry of Labour: Copenhagen.

Björklund, A. and Regnér, H. (1996) 'Experimental Evaluation of European Labour Market Policy' in *International Handbook of Labour Market Policy and Evaluation*, Schmid, G., O'Reilly, J. and Schömann, K. (Eds) Edward Elgar: Cheltenham.

Blanchard, O. and Diamond, P. (1989) 'The Beveridge Curve', *Brookings Papers on Economic Activity*, pp 1-60.

Blanchard, O. and Diamond, P. (1994) 'Ranking, Employment Duration and Wages', *Review of Economic Studies* 61, pp 417-434.

Blanchard, O. and Summers, L. (1986) 'Hysteresis and the European Unemployment Problem', *NBER Macroeconomics Annual* 1, pp 15-77.

Blöndal, S. and Pearson, M. (1995) 'Unemployment and Other Non-employment Benefits', *Oxford Review of Economic Policy* 11 (1), pp 136-169.

Boeri, T. and Burda, M. (1996) 'Active Labor Market Policies, Job Matching and the Czech Miracle', *European Economic Review* 40, pp 805-817.

Breen, R. and Halpin, B. (1989) *Subsidising Jobs: An Evaluation of the Employment Incentive Scheme.* The Economic and Social Research Institute: Dublin.

Brock, T., Butler, D. and Long, D. (1993) *Unpaid Work Experience for Welfare Recipients: findings and lessons from MRDC Research.* Manpower Demonstration Research Corporation: New York.

Burtless, G. (1985) 'Are Targeted Wage Subsidies Harmful? Evidence from a Voucher Experiment'. *Industrial and Labour Relations Review* 39 (1), pp 105-114.

Burtless, G. (1995), 'The Case for Randomized Field Trials in Economic and Policy Research', *Journal of Economic Perspectives* 9 (2), pp 63-84.

Bushell, R. (1986) 'Evaluation of the Young Workers Scheme', *Employment Gazette* 92 (5), pp 145-152.

Byrne, A. and Buchanan, K. (1994) *Survey of Jobstart Employers.* Department of Employment, Education and Training, Australia.

Calmfors, L. (1993) 'Lessons from the Macroeconomic Performance of Sweden', *European Journal of Political Economy* 9, pp 25-72.

Calmfors, L. (1994) 'Active Labour Market Policy and Unemployment – A Framework for the Analysis of Crucial Design Features', *OECD Economic Studies* 22, pp 8-47.

Calmfors, L. and Forslund, A. (1990) 'Wage Formation in Sweden' in *Wage Formation and Macroeconomic Policy in the Nordic Countries,* Calmfors, L. (Ed) Oxford University Press: Oxford.

Calmfors, L. and Forslund, A. (1991) 'Real Wage Determination and Labour Market Policies: the Swedish Experience', *Economic Journal* 101, pp 1130-1148.

Calmfors, L. and Lang, H. (1993) *Macroeconomic Effects of Labour Market Programmes – the Basic Theory.* Institute for International Economic Studies seminar paper 541.

Calmfors, L. and Lang, H. (1995) 'Macroeconomic Effects of Active Labour Market Programmes in a Union Wage-Setting Model', *Economic Journal,* 105, pp 601-619.

Calmfors, L. and Nymoen, R. (1990) 'Nordic Employment', *Economic Policy*, pp 398-448.

Calmfors, L. and Skedinger, P. (1995) 'Does Active Labour Market Policy Increase Employment? Theoretical Considerations and Some Empirical Evidence from Sweden', *Oxford Review of Economic Policy* 11 (1), pp 91-109.

Casey, B. and Bruche, G. (1985) 'Active Labor Market Policy: An international overview', *Industrial Relations* 24 (1), pp 37-61.

Chapman, B. (1985) 'Continuity and Change: Labour Market Programs and Education Expenditure', *The Australian Economic Review* 71, pp 98-112.

Chapman, B. (1994) *The Job Compact: Reform in the Right Direction*, The Australian National University Centre for Economic Policy Research discussion paper no. 314.

Chapman, B. and Smith, P. (1992) 'Predicting the Long-term Unemployed: a primer for the Commonwealth Employment Service' in *Youth in the Eighties*, Gregory, R. and Karmel, T. (Eds). Centre for Economic Policy Research: Canberra.

Cockx, B., van der Linden, B., and Karaa, A. (1998) 'Active Labour Market Policies and Job Tenure', *Oxford Economic Papers*, 50, pp 685-708.

Coles, M and Smith, E. (1996) 'Cross-Section Estimation of the Matching Function: Evidence from England and Wales', *Economica* 63, pp 589-97.

Commonwealth of Australia (1994) *Working Nation: Policies and Programs*, Australian Government Publishing Service: Canberra.

Couch, K. (1992) 'New Evidence on the Long-term Effects of Employment Training Programs', *Journal of Labour Economics*, 10 (4), pp 380-388.

Davidson, C. and Woodbury, S. (1995) *Wage Subsidies for Dislocated Workers*, Upjohn Institute Staff Working Paper 95-31.

Deakin, B. (1996) *The Youth Labour Market in Britain: the role of intervention*, Cambridge University Press: Cambridge.

DEETYA (1996a) *Working Nation: Evaluation of the Employment, Eduation and Training Elements*, Department of Employment, Education, Training and Youth Affairs: Canberra.

DEETYA (1996b) *Annual Report 1995-96*, Department of Employment, Education, Training and Youth Affairs: Canberra.

DEETYA (1997) *The Net Impact of Labour Market Programmes: Improvements in the Employment Prospects of those Assisted.* Department of Employment, Education, Training and Youth Affairs: Canberra.

Department of Employment (1978) 'Small Firms Employment Subsidy – an evaluation of its effectiveness'. *Department of Employment Gazette* 86 (5), pp 549-554.

Department of Employment and Youth Affairs (1982) *Annual Report 1980–81.* Australian Government Publishing Service: Canberra.

Diamond, P. (1982) 'Aggregate Demand Management in Search Equilibrium', *Journal of Political Economy* 90 (5), pp 881-894.

Dicks, M. and Hatch, N. (1989) *The Relationship Between Employment and Unemployment,* Bank of England discussion paper 39.

Dolton, P. and O'Neill, D. (1995a) *The Restart Effect and the Return to Full-time Stable Employment,* University of Newcastle-upon-Tyne, mimeo.

Dolton, P. and O'Neill, D. (1995b) 'The Impact of Restart on Reservation Wages and Long-term Unemployment', *Oxford Bulletin of Economics and Statistics* 57 (4), pp 451-470.

Dolton, P. and O'Neill, D. (1996) *Restart and Roundabouts: Experimental evidence on the long-term effects of the Restart Unemployment Programme,* University of Newcastle-upon-Tyne, mimeo.

Doolittle, F. and Riccio, J. (1992) 'Case Management in Welfare Employment Programs' in *Evaluating Welfare and Training Programs,* Manski, C. and Garfinkel, I. (Eds). Harvard University Press: Cambridge.

Drèze, J. (1997) 'The Simple Economics of Benefit Transfers: Discussion' in *Unemployment Policy: Government options for the labour market,* Snower, D. and de la Dehesa, G. (Eds) Cambridge University Press: Cambridge.

DTI (1994) *Small Firms in Britain 1994,* HMSO: London.

Dubin, J. and Rivers, D. (1993) 'Experimental Estimates of the Impact of Wage Subsidies', *Journal of Econometrics* 56, pp 219-242.

Edin, P-A., Holmlund, B. and Östros, T. (1994) 'Wage Behaviour and Labour Market Programmes in Sweden: Evidence from Microdata' in *Labour Market and Economic Performance,* Tachibanaki, T. (Ed) St. Martin's Press: New York.

Eissa, N. and Liebman, J. (1996) 'Labor Supply Response to the Earned Income Tax Credit', *Quarterly Journal of Economics* 111, pp 605-637.

Eriksson, T., Suvanto, A. and Vartia, P. (1990) 'Wage Formation in Finland' in *Wage Formation and Macroeconomic Policy in the Nordic Countries*, Calmfors, L. (Ed) Oxford University Press: Oxford.

Fay, R. (1996) *Enhancing the Effectiveness of Active Labour Market Policies: evidence from programme evaluations in OECD Countries*, OECD Labour Market and Social Policy Occasional Papers No 18, OECD: Paris.

Felli, L. and Ichino, A. (1988) 'Do Marginal Employment Subsidies Increase Re-employment Probabilities', *Labour* 2, pp 63-89.

Forslund, A. and Kreuger, A. (1994) *An Evaluation of the Swedish Active Labour Market Policy: New and Received Wisdom*, NBER Working Paper 4802.

Freedman, S., Mitchell, M. and Navarro, D. (1998) *The Los Angeles Jobs-First GAIN evaluation: preliminary findings on participation patterns and first-year impacts*, Manpower Demonstration Research Corporation: New York.

Friedlander, D. and Burtless, G. (1995) *Five Years After*. Russell Sage Foundation: New York.

Gramlich, E. and Ysander, B-C. (1981) 'Relief Work and Grant Displacement in Sweden', in *Studies in Labor Market Behavior: Sweden and the United States*, Eliasson, G., Holmlund, B., and Stafford, F. (Eds), The Industrial Institute for Economic and Social Research: Stockholm.

Greene, W. (1997) *Econometric Analysis*, third edition. Prentice Hall: Upper Saddle River.

Gregg, P. (1990) 'The Evolution of Special Employment Measures', *National Institute Economic Review*, 90/2, pp 49-58.

Gregg, P. and Wadsworth, J. (1995) 'A Short History of Labour Turnover, Job Tenure and Job Security, 1975-93', *Oxford Review of Economic Policy* 11 (1), pp 73-90.

Gregory, R. and Karmel, T. (1992) *Youth in the Eighties*, Centre for Economic Policy Research: Canberra.

Gritz, R. M. (1993) 'The Impact of Training on the Frequency and Duration of Employment', *Journal of Econometrics*, 57, pp 21-51.

Grubb, D. (1994) 'Direct and Indirect Effects of Active Labour Market Policies in OECD countries', in *The UK Labour Market: Comparative Aspects and Institutional Developments*, Barrell, R. (Ed) Cambridge University Press: Cambridge.

Gueron, J. and Pauly, E. (1991) *From Welfare to Work*, Russell Sage Foundation: New York.

Hales, J., Shaw, A. and Roth, W. (1998) *Evaluation of the New Deal for Lone Parents: a preliminary assessment of the 'counterfactual'*, Social and Community Planning Research: London.

Haskel, J. and Jackman, R. (1988) 'Long-term Unemployment in Britain and the Effects of the Community Programme', *Oxford Bulletin of Economics and Statistics* 50 (4), pp 379-408.

Haveman, R. and Hollister, R. (1991) 'Direct Job Creation: Economic Evaluation and Lessons for the United States and Western Europe' in *Labour Market Policy and Unemployment Insurance*, Björklund, A., Haveman, R., Hollister, R. and Holmlund, B. (Eds) Oxford University Press: Oxford.

Haveman, R. and Saks, D. (1985) 'Transatlantic Lessons for Employment and Training Policy', *Industrial Relations* 24 (1), pp 20-36.

Heckman, J. (1979) 'Sample Selection Bias as a Specification Error', *Econometrica*, 47 (1), pp 153-161.

Heckman, J. (1991) 'Identifying the Hand of Past: Distinguishing State Dependence from Heterogeneity', *American Economic Review*, 81 (2), pp 75-79.

Heckman, J. (1992) 'Randomization and Social Policy Evaluation' in *Evaluating Welfare and Training Programs*, Manski, C. and Garfinkel, I. (Eds). Harvard University Press: Cambridge.

Heckman, J. (1993) *Assessing Clinton's Program on Job Training, Workfare and Education in the Workplace*, NBER working paper No. 4428.

Heckman, J. and Hotz, J. (1989) 'Choosing among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: the case of manpower training', *Journal of the American Statistical Association*, 84, pp 862-880.

Heckman, J., Ichimura, H., Smith, J. and Todd, P. (1998) 'Characterizing Selection Bias Using Experimental Data', *Econometrica* 66 (5), pp1017-1098.

Heckman, J., Ichimura, H. and Todd, P. (1997) 'Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme', *Review of Economic Studies* 64, pp 605-654.

Heckman, J. and Smith, J. (1995) 'Assessing the Case for Social Experiments', *Journal of Economic Perspectives* 9 (2), pp 85-110.

Heckman, J. and Smith, J. (1996) 'Experimental and Nonexperimental Evaluation' in *International Handbook of Labour Market Policy and Evaluation*, Schmid, G., O'Reilly, J. and Schömann, K. (Eds) Edward Elgar: Cheltenham.

Heylen, F. (1993) 'Labour Market Structures, Labour Market Policy and Wage Formation in the OECD', *Labour* 7 (2) , pp 25-51.

HM Treasury (1997) *The Modernisation of Britain's Tax and Benefit System: Number One, employment opportunity in a changing labour market.* HM Treasury: London.

Hollister, R., Kemper, P. and Maynard, R. (1984) *The National Supported Work Demonstration.* The University of Wisconsin Press: Madison, Wisconsin.

Holmlund, B. and Lindén, J. (1993) 'Job Matching, Temporary Public Employment and Equilibrium Unemployment', *Journal of Public Economics* 51, pp 329-343.

Hotz, V. J. (1992) 'Designing an Evaluation of the Job Training Partnership Act' in *Evaluating Welfare and Training Programs*, Manski, C. and Garfinkel, I. (Eds). Harvard University Press: Cambridge.

Hui, W. (1986a) *Modelling Multiple Spells Unemployment*, working paper in economics and econometrics No. 135, Australian National University.

Hui, W. (1986b) *State Dependence and Youth Unemployment in Australia: a survival analysis*, working paper in economics and econometrics No. 140, Australian National University.

Jackman, R. (1994) 'What Can Active Labour Market Policies Do?', *Swedish Economic Policy Review* 1 (1), pp 221-257.

Jackman, R. and Layard, R.(1991) 'Does Long-term Unemployment Reduce a Person's Chance of a Job? A time-series test', *Economica* 58, pp 93-106.

Jackman, R., Layard, R. and Nickell, S. (1996) *Combatting Unemployment: is flexibility enough?* Centre for Economic Performance discussion paper No. 293.

Jackman, R., Layard, R. and Pissarides, C. (1989) 'On Vacancies', *Oxford Bulletin of Economics and Statistics* 51 (4), pp 377-394.

Jackman, R., Pissarides, C. and Savouri, S. (1990) 'Labour Market Policies in OECD Countries' *Economic Policy,* 11, pp 449-490.

James, I. (1989) 'Unemployment Duration: modelling and estimation with particular reference to the Australian Longitudinal Survey', *Australian Journal of Statistics*, 31A, pp 197-212.

Janoski, T. (1996) 'Explaining State Intervention to Prevent Unemployment: the impact of institutions on active labour market policy expenditures in 18 countries' in *International Handbook of Labour Market Policy and Evaluation*, Schmid, G., O'Reilly, J. and Schömann, K. (Eds) Edward Elgar: Cheltenham.

Jensen, K. and Madsen, P. (Eds) (1993) *Measuring Labour Market Measures*, proceedings from the Danish Presidency Conference, Kolding 1993. Ministry of Labour: Copenhagen.

Johannesson, J. (1995) 'Microeconomic Evaluations of Labour Market Policy Measures in Sweden', in *Labour Market Policy at the Crossroads*, Johannesson, J. and Wadensjö, E. (Eds) Ministry of Labour: Stockholm.

Johnson, G. and Tomola, J. (1977) 'The Fiscal Substitution Effect of Alternative Approaches to Public Service Employment Policy', *Journal of Human Resources* 12 (1), pp 3-26.

Jongen, E. (1998) 'Reducing Long-term Unemployment by Employment Subsidies', *CPB Report*, 98/3, pp 42-48.

Junankar, R. and Wood, M. (1992) 'The Dynamics of Youth Unemployment: an analysis of recurrent unemployment' in *Youth in the Eighties*, Gregory, R. and Karmel, T. (Eds). Centre for Economic Policy Research: Canberra.

Kaldor, N. (1936) 'Wage Subsidies as a Remedy for Unemployment', *Journal of Political Economy*, 44 (6), pp 721-742.

Katz, L. (1996) *Wage Subisidies for the Disadvantaged*, NBER working paper No. 5679.

King, D. (1995) *Actively Seeking Work?*, University of Chicago Press: Chicago.

Kopits, G. (1978) 'Wage Subsidies and Employment: an analysis of the French experience', *IMF Staff Papers* 25, pp 494-527.

Korpi, T. (1995) 'Effects of Manpower Policies on Duration Dependence in Re-employment Rates: The Example of Sweden', *Economica* 62, pp 353-371.

Lalonde, R. (1995) 'The Promise of Public Sector-Sponsored Training Programs', *Journal of Economic Perspectives* 9 (2), pp 149-168.

Layard, R. (1979) 'The Costs and Benefits of Selective Employment Policies: the British Case', *British Journal of Industrial Relations* 17, pp 187-204.

Layard, R. (1996) *The Road Back to Full Employment*, Centre for Economic Performance occasional paper No. 10.

Layard, R. (1997) 'Preventing Long-term Unemployment: An Economic Analysis' in *Unemployment Policy: Government options for the labour market*, Snower, D. and de la Dehesa, G. (Eds) Cambridge University Press: Cambridge.

Layard, R. and Nickell, S. (1980) 'The Case for Subsidising Extra Jobs', *Economic Journal* 90, pp 51-73.

Layard, R. and Nickell, S. (1987) 'The Labour Market' in *The Performance of the British Economy*, Dornbusch, R. and Layard, R. (Eds) Clarendon Press: Oxford.

Layard, R., Nickell, S. and Jackman, R. (1991) *Unemployment: macroeconomic performance and the labour market*, Oxford University Press: Oxford.

Lehmann, H. (1993) *The Effectiveness of Restart and the Enterprise Allowance Scheme*, Centre for Economic Performance discussion paper No. 139.

Lindbeck, A. and Snower, D. (1988) *The Insider-Outsider Theory of Employment and Unemployment.* MIT Press: Cambridge, MA.

Machin, S. and Manning, A. (1998) *The Causes and Consequences of Long-term Unemployment in Europe*, Centre for Economic Performance discussion paper No. 400.

Maddala, G. (1983) *Limited Dependent and Qualitative Variables in Econometrics.* Cambridge University Press: Cambridge.

Manning, A. (1991) 'The Determinants of Wage Pressures: Some Implications of a Dynamic Model', *Economica* 58, pp 325-339.

Manning, A. (1993) 'Wage Bargaining and the Phillips Curve: The identification and specification of aggregate wage equations', *Economic Journal* 103, pp 98-118.

McRae, I. *et al* (1984–1987) *Australian Longitudinal Survey*, 1984–1987, Waves 1–4, Level 1. Principal investigators: Ian McRae, Geoff Parkinson, Lyn Woyzbun. Data collected by Roy Morgan Research Centre, Canberra. Ian McRae, Australian Council for Employment and Training (producer), 1984–1987. Canberra: Social Science Data Archive, The Australian National University (distributor).

Meager, N. and Metcalf, H. (1987) *Recruitment of the Long-term Unemployed*, Institute of Manpower Studies report 138.

Meyer, B. (1995) 'Lessons from the US Unemployment Insurance Experiments', *Journal of Economic Literature* 33, pp 91-131.

Millard, S. and Mortensen, D. (1997) 'The Unemployment and Welfare Effects of Labour Market Policy: a comparison of the USA and the UK', in *Unemployment Policy: Government options for the labour market*, Snower, D. and de la Dehesa, G. (Eds) Cambridge University Press: Cambridge.

Mortensen, D. (1996) 'The Unemployment and Income Effects of Active Labor Market Policy: A US-UK Comparison', in *More Competition, More Jobs – Is Full Employment an Illusion?*, von Christian Drager, H., Pissulla, P. and von Czege, A. (Eds) Nomos Verlagsgesellschaft: Baden-Baden.

Mortensen, D. and Pissarides, C. (1994) 'Job Creation and Job Destruction in the Theory of Unemployment', *Review of Economic Studies* 61 (July), pp 397-415.

NERA (1995) *OECD Wage Subsidy Evaluations: Lessons for Workstart*, National Economic Research Associates: London.

Newell, A. and Symons, J. (1987) 'Corporatism, Laissez-Faire and the Rise in Unemployment', *European Economic Review*, 31, pp 567-614.

Nickell, S. (1987) 'Why is Wage Inflation in Britain So High?', *Oxford Bulletin of Economics and Statistics*, 49 (1), pp 103-128.

O'Higgins, N. (1994) 'YTS, Employment, and Sample Selection Bias', *Oxford Economic Papers* 46, pp 605-628.

O'Neill, D. (1982) 'Employment Tax Credit Programs: The Effects of Socioeconomic Targeting Provisions', *Journal of Human Resources* 17 (3), pp 449-459.

OECD (1991) *Evaluating Labour Market and Social Programmes: the state of a complex art*, OECD: Paris.

OECD (1993) 'Active Labour Market Policies: Assessing Macroeconomic and Microeconomic Effects', *OECD Employment Outlook*, pp 39-80.

Orszag, J. M. and Snower, D. (1996) *A Macro Theory of Employment Vouchers*, Birkbeck College Discussion Paper in Economics, 5/96.

Piggott, J. and Chapman, B. (1995) 'Costing the Job Compact', *The Economic Record*, 71 (215), pp 313-328.

Pigou, A. (1933) *The Theory of Unemployment*, Macmillan & Co: London.

Pissarides, C. (1984) 'Search Intensity, Job Advertising, and Efficiency', *Journal of Labor Economics*, 2 (1), pp 128-143.

Pissarides, C. (1986) 'Unemployment and Vacancies in Britain', *Economic Policy* 3, pp 499-559.

Pissarides, C. (1990) *Equilibrium Unemployment Theory*. Basil Blackwell: Oxford.

Pissarides, C. (1992) 'Loss of Skill During Unemployment and the Persistence of Employment Shocks', *Quarterly Journal of Economics* pp 1371-1391.

Riccio, J., Friedlander, D., Freedman, S., Farrell, M., Fellerath, V., Fox, S. and Lehman, D. (1994) *GAIN: Benefits, Costs, and Three-Year Impacts of a Welfare-to-Work Program*, Manpower Demonstration Research Corporation: New York.

Riddell, C. (1991) 'Evaluation of Manpower and Training Programmes: The North American Experience' in *Evaluating Labour Market and Social Programmes: the state of a complex art.* OECD: Paris.

Robinson, P. (1995) *The Decline of the Swedish Model and the Limits of Active Labour Market Policy*, Centre for Economic Performance discussion paper No. 259.

RSGB (1996) *Follow Up of Workstart Participants 1996 Survey Report*, The Employment Service: Sheffield.

Saint-Paul, G. (1995) *A Framework for Analysing the Political Support for Active Labour Market Policy*, CEPR Discussion Paper No. 1205, CEPR: London.

Scherer, P. (1985) 'Are Targeted Employment and Training Programs in Australia Aimed at the Right Target: Comment' in *The Structure and Duration of Unemployment in Australia*, Volker, P. (Ed) Australian Government Publishing Service: Canberra.

Schmid, G. and Peters, A. (1982) 'The German Federal Employment Program for Regions with Special Employment Problems: An evaluation', *Regional Science and Urban Economics* 12, pp 99-119.

Scholz, J. (1996) 'In-work benefits in the United States: The Earned Income Tax Credit', *Economic Journal* 106, pp 156-169.

Schwanse, P. (1982) 'European Experience' in *Jobs for Disadvantaged Workers*, Haveman, R. and Palmer, J. (Eds) The Brookings Institution: Washington DC.

Shapiro, C. and Stiglitz, J. (1984) 'Equilibrium Unemployment as a Worker Discipline Device', *American Economic Review* 74 (3), pp 433-443.

Smith, R. (1983) *Employment Subsidies in Theory and Practice: The Special Youth Employment Training Program*, Australian National University Centre for Economic Policy Research discussion paper No. 69.

Smith, R. (1984) *Estimating the Impacts of Job Subsidies on the Distribution of Unemployment: Reshuffing the Queue?* Australian National University Centre for Economic Policy Research discussion paper No. 95.

Smith, R. (1985) 'Are Targeted Employment and Training Programs in Australia Aimed at the Right Target' in *The Structure and Duration of Unemployment in Australia*, Volker, P. (Ed) Australian Government Publishing Service: Canberra.

Snower, D. (1994) 'Converting Unemployment Benefits into Employment Subsidies', *The American Economic Review* 84 (2), pp 65-70.

Snower, D. (1997) 'The Simple Economics of Benefit Transfers' in *Unemployment Policy: Government options for the labour market*, Snower, D. and de la Dehesa, G. (Eds) Cambridge University Press: Cambridge.

Stretton, A. (1982) *The Short-term Impact on Participants of Selected Youth Employment and Training Programs*, Bureau of Labour Market Research working paper No. 15: Canberra.

Stretton, A. (1984) 'The Short-term Impact on Participants of Youth Employment and Training Programs', *The Journal of Industrial Relations* 26 (1), pp 76-90.

Stretton, A. and Chapman, B. (1990) *An Analysis of Australian Labour Market Programs*, Australian National University Centre for Economic Policy Research discussion paper No. 247.

Sweeney, K. (1996) 'Destination of Leavers from Claimant Unemployment', *Labour Market Trends*, pp 443-452.

Thomas, J. (1996) *Public Employment Agencies and Unemployment Spells: reconciling the experimental and nonexperimental evidence*, Institute for Fiscal Studies working paper W96/12.

Thomas, J. (1997) 'Public Employment Agencies and Unemployment Spells: reconciling the experimental and nonexperimental evidence', *Industrial and Labor Relations Review*, 50 (4), pp 667-683.

Thomas, J. (1998) 'The Role of Selective Job Search in UK Unemployment', *Economic Journal*, 108, pp 646-664.

Trivedi, P. and Alexander, J. (1989) 'Reemployment Probability and Multiple Unemployment Spells: a partial-likelihood approach', *Journal of Business and Economic Statistics*, 7 (3), pp 395-401.

US Department of Labor (1995) *What's Working and What's Not: a summary of research on the economic impacts of employment and training programs.* US Department of Labor: Washington DC.

Van de Ven, W. and Van Praag, B. (1981) 'The Demand for Deductibles in Private Health Insurance', *Journal of Econometrics* 17, pp 229-252.

Warr, P. and Jackson, P. (1987) 'Adapting to the Unemployed Role: A Longitudinal Investigation', *Social Science and Medicine* 25, pp 1219-1224.

Warr, P., Jackson, P. and Banks, M. (1988) 'Unemployment and Mental Health: Some British Studies', *Journal of Social Issues*, 44 (4), pp 47-68.

White, M. and Lakey, J. (1992) *The Restart Effect.* Policy Studies Institute: London.

Whitley, J. and Wilson, R. (1983) 'The Macroeconomic Merits of a Marginal Employment Subsidy', *Economic Journal* 93, pp 862-880.

Winefield, A. and Tiggemann, M. (1989) 'Unemployment duration and affective well-being in the young', *Journal of Occupational Psychology*, 62, pp 327-336.

Woodbury, S. and Spiegelman, R. (1987) 'Bonuses to Workers and Employers to Reduce Unemployment: Randomized Trials in Illinois', *The American Economic Review* 77(4), pp 513-530.

Zetterberg, J. (1995) 'Unemployment, Labour Market Policy and the Wage Bargaining System', in *Labour Market Policy at the Crossroads*, Johannesson, J. and Wadensjö, E. (Eds) Ministry of Labour: Stockholm.

Zweimüller, J. and Winter-Ebmer, R. (1996) 'Manpower Training Programmes and Employment Stability', *Economica* 63, pp 113-130.