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MACROECONOMIC EFFECTS OF ACTIVE LABOUR
MARKET PROGRAMMES –
THE BASIC THEORY

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Abstract
The recent Western European policy debate on unemployment has emphasised the benefits of active labour market programmes. We provide a basic theoretical framework to analyse the effects on wage pressure and equilibrium employment that has hitherto been missing. Programmes are wage-reducing to the extent that they help maintain effective labour-force participation. But they may also weaken insider incentives for wage restraint as the disutility of lay-offs becomes smaller. Targeting the long-term unemployed is crucial for the success of active labour market policy, since the welfare effects on the laid-off then are more heavily discounted and employment opportunities are redistributed from insiders to outsiders.

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The persistence of unemployment in Western Europe has increased interest in so-called active labour market policy. It is usually defined as including job brokering as well as labour market training and direct job creation for the unemployed. Such measures have come widely to be regarded as methods of reducing unemployment without the same risk of generating inflation as traditional demand policies (Layard et al., 1991; OECD, 1990; OECD Employment Outlook, 1991-93; Philpott, 1990).

This analysis deals with the macroeconomic consequences of labour market training and job creation. Although there is an abundance of micro studies of the effects on individuals, the extent of macroeconomic research has so far been small. Basically there are two strands of literature. The first originated with Baily and Tobin (1977), who saw job creation measures targeted directly on the unemployed as a way of "cheating the Phillips curve". More recently, e.g., Layard (1986, 1989, 1990) and Layard et al. (1991) have stressed the possibilities of maintaining the skills and the search efficiency of the unemployed. According to this argument, labour market programmes tend to increase the effective labour force and thus the competition for jobs, so that wage pressure is reduced. Some of the reasoning has centered upon the Beveridge curve (the vacancy/unemployment relation), which has been claimed to be more favourable in countries with active labour market policy (Jackman et al., 1990; Bourdet & Persson, 1991; Layard et al., 1991).

The other strand of literature has emphasized how labour market programmes may raise wages and thus crowd out regular employment. It is argued that programmes, by reducing the welfare loss of disemployed workers, may accommodate high wage demands and thus weaken the incentives
to wage restraint (Calmfors & Forslund, 1990, 1991; Holmlund, 1990; Calmfors & Nymoen 1990). These predictions seem to be borne out by several empirical studies of Sweden.¹

These differing conclusions are not surprising, since the two strands of literature stress different aspects. The Layard et al. approach emphasizes measures directed at outsiders (the long-term unemployed). The time series studies of Sweden, where long-term unemployment has been low, may instead reflect how wage-setting behaviour is affected when the unemployment risks of insiders are reduced (Calmfors, 1993a). Our aim is to integrate these various aspects into one framework. The closest counterpart is Holmlund & Lindén (1992), who incorporated the Beveridge curve in a wage-bargaining model with labour market policy, but without addressing the likely supply-raising effects of active labour market policy.

The paper is structured as follows. Section 1 gives the basic model, which employs a union wage-setting framework. Section 2 analyzes the wage and employment effects of various types of labour market policy. Section 3 introduces job matching consideration. In Section 4 the analysis is extended to an efficiency-wage framework, and in Section 5 the implications of tax repercussions are discussed briefly. Section 6 concludes.

1. **The basic model**

We assume an economy with a stationary population, but where there is a constant rate, a, of "births" which exactly matches the attrition rate due to "deaths". An individual at working age finds himself in one of four possible states: employment, open unemployment, a labour market programme, or outside the labour force. It is analytically convenient to
regard the latter state as synonymous with early retirement. It is
generated automatically to workers without regular employment that have
lost so much human capital that they have become unemployable.

1.1 Labour market flows

The various stocks and flows of labour are summarized in Figure 1.
They are all measured as shares of the population. Employment is n.
Each period a·n employed workers die off. qn workers quit their present
jobs. They cannot find a new job until they have been job seekers for at
least one period. A fraction $\gamma_n$ of the quitters are immediately placed
in a labour market programme, and a fraction $1 - \gamma_n$ become openly
unemployed.

The new entrants, a, too, have to pass through the pool of job
seekers before they can find a job. A fraction $\gamma_a$ of them are
immediately placed in a programme, and a fraction $1 - \gamma_a$ becomes openly
unemployed. The shares of the population in unemployment and programmes
are $u$ and $r$, respectively. An openly unemployed individual finds a
regular job with probability $s_u$, he drops out of the labour force and
receives early retirement with probability $m_u$, and he dies off with
probability $a$. Hence the probability is $1 - s_u - m_u - a$ that he
remains a job seeker in the next period. If so, he is transferred to a
labour market programme with probability $\gamma_u$ and remains openly
unemployed with probability $1 - \gamma_u$. Similarly, an individual in a
programme obtains a new job with probability $s_r$, he drops out of the
labour force and retires early with probability $m_r$, and he dies off with
probability $a$. His probability to remain a job seeker is $1 - s_r - m_r - a$. The conditional probability that he is placed in a new programme is
\( \gamma_r \), and that he becomes openly unemployed \( 1 - \gamma_r \). The probability of dropping out of the labour force is higher for an unemployed worker than for a programme participant, i.e. \( m_u > m_r \).

The share of the population in early retirement is \( p \). The only exit from this state is through "death", which for the individual occurs with probability \( a \) as elsewhere. The assumption that there is no way back to the labour market for a drop-out from the labour force simplifies the analysis considerably but does not affect the basic conclusions.

In a steady state, all stocks have to be constant. We can therefore write the following steady-state conditions, where (1) is the condition for constant employment, (2) for constant unemployment, (3) for constant participation in programmes, and (4) for constant early retirement:

1. \( (q+a)n = s_u n + s_r r \),

2. \[ (s_u + m_u + a + \gamma_u (1 - s_u - m_u - a)) u = (1 - \gamma_a) a + (1 - \gamma_n) q n + (1 - s_r - m_r - a) (1 - \gamma_r) r, \]

3. \[ (s_r + m_r + a + (1 - \gamma_r) (1 - s_r - m_r - a)) r = \gamma_a a + \gamma_n q n + (1 - s_u - m_u - a) \gamma_u u, \]

4. \( ap = m_r r + m_u u \).

We assume a constant ratio between the reemployment probabilities:

5. \( s_r = c s_u \).
where our presumption is that \( c > 1 \), i.e. that the re-employment probability is higher for a programme participant than for an openly unemployed worker.\(^2\)

1.2 Union behavior

Firms are perfectly competitive in the product market. The labour in each firm is organized by a firm-specific union, which has the monopoly power to set the wage. Like, e.g., Layard & Nickell (1987) and Manning (1988, 1989, 1991), we assume that each union attempts to maximize the rent from unionization, i.e.

\[
U^j_t = N^j_t (V^j_t - \bar{V}_t),
\]

where \( U^j_t \) is the utility of union \( j \), \( V^j_t \) the expected discounted value for a union member of employment in firm \( j \), \( \bar{V} \) the expected value for a union member of being laid off or quitting (which we assume to be equal), \( N^j_t \) employment in firm \( j \), and \( t \) a time subscript. The utility function captures three notions: (i) the union takes an intertemporal perspective; (ii) it cares both about the level of employment and the welfare of the employed workers; and (iii) it evaluates the welfare of its employed members against a comparison norm, which we take to reflect outside opportunities.\(^3\)

1.3 The value functions

The discounted value of being employed in firm \( j \) at time \( t \) is

\[
V^j_t = \frac{1}{1 + \lambda} \left[ \nu(\omega^j_t) + (q \bar{V}_{t+1} + (1-q) \bar{V}^j_{t+1}) \right],
\]
where in addition to the earlier symbols, \( i \) = the discount rate and \( v \) = the instantaneous utility of employment in firm \( j \), which depends on the wage in the firm \( w^j \). The term within brackets is the sum of the instantaneous utility of employment and the value of future employment discounted one period ahead. The latter is obtained as a weighted average of the values of quitting voluntarily, dying and staying on. The value of dying is normalized to zero.

The value of quitting (= the value of being laid off) is a weighted average of the values of participating in a labour market programme and of becoming openly unemployed (with the probabilities of the two states as weights), i.e.

\[
\bar{v}_{t+1} = \gamma_n \bar{v}^r_{t+1} + (1-\gamma_n)\bar{v}^u_{t+1},
\]

where \( \bar{v}^r \) = the value of participating in a programme, and \( \bar{v}^u \) = the value of being openly unemployed. These are in turn given by

\[
\bar{v}^r_{t+1} = \frac{1}{l+i} [v^r(b^r) + (s \bar{v}^n_{t+2} + m \bar{v}^p_{t+2} + (1 - s - m - a)
\]

\[
(\gamma_r \bar{v}^r_{t+2} + (1-\gamma_r)\bar{v}^u_{t+2})]
\]

and

\[
\bar{v}^u_{t+1} = \frac{1}{l+i} [v^u(b^u) + (s \bar{v}^n_{t+2} + m \bar{v}^p_{t+2} + (1 - s - m - a)
\]

\[
(\gamma_u \bar{v}^r_{t+2} + (1-\gamma_u)\bar{v}^u_{t+2})]
\]

where \( \bar{v}^r \) and \( \bar{v}^u \) are the instantaneous utilities of programme participation and open unemployment, respectively. These depend upon the compensation in programmes, \( b^r \), and the unemployment benefit, \( b^u \), respectively. The instantaneous utility from participating in a programme is assumed greater than from being openly unemployed, i.e. \( v^r > \)
\( v^u \) is the value of becoming employed elsewhere in the economy, and \( v^p \) the value of early retirement. (9) and (10) reflect the fact that a job seeker surviving into the next period has four possibilities: re-employment, early retirement, participation in a labour market programme, and open unemployment.

The value of re-employment is analogous to (7):

\[
(11) \quad v^n_{t+2} = \frac{1}{1+i} [v^n(w) + (q\overline{v}_{t+3}^\infty) (1-q-a)v^n_{t+3}],
\]

where \( v^n \) = the instantaneous utility of alternative employment, and \( w \) = the wage in alternative employment. Finally, the value of early retirement is

\[
(12) \quad v^p_{t+2} = \sum_{\tau=0}^{\infty} \frac{(1-a)^{\tau}}{(1+i)^{\tau+1}} v^p(b^p_t) = \frac{v^p(b^p)}{\rho}
\]

where \( \rho = i + a \), and \( v^p \) is the instantaneous utility of early retirement, which depends upon the early retirement pension \( b^p \).

Like Manning (1988) we assume that the wage is set for one period only.\(^4\) Hence the current wage, \( w^1 \), will not affect the value of future employment in the firm, \( v^1_{t+1} \), which therefore is exogenous to the individual union. As we shall be analyzing a steady state we can drop all time subscripts. Moreover, \( v^j = v^n \) in a symmetrical equilibrium.

From equations (6)-(12), we can then derive that:

\[
(13) \quad u^j = n^j(v^j - \overline{v}) = \frac{n^j}{1+i} [ v(w^j) - \overline{v} ],
\]

where \( \overline{v} \) is a weighted average of the instantaneous utilities in the various states. The expression for \( \overline{v} \) is quite complex in the general case (it covers more than one page), so we do not write it out.\(^5\)
The union sets the wage by maximizing (13). This is done subject to an employment constraint that can be derived from ordinary profit maximization, according to which

\[ w^j = f'(N^j), \]

where \( f' \) is the marginal product of labour. We obtain the first-order condition

\[ \phi = N^j v_1 + \frac{v - \bar{v}}{f^n} = 0. \]

In a symmetrical equilibrium \( w^j = w \) for all \( j \). Hence we can take (15) to represent an aggregate wage equation:

\[ \phi(w, \bar{v}) = 0. \]

Similarly, since \( N^j = N/F = nM/F \) in a symmetrical equilibrium, where \( N = \) aggregate employment, \( F = \) the numbers of firms (unions) and \( M = \) the population, we can derive an aggregate employment equation from (14):

\[ w = f'(nM/F). \]

The complete model is now given by equations (1)-(5), (14a), (16) and the equation for \( \bar{v} \), which has not been written out. There are eight endogenous variables to determine: \( w, n, u, r, p, s_r, s_u, \) and \( \bar{v} \). The exogenous variables are the labour-market policy parameters \( \gamma_n, \gamma_r, \gamma_u \) and \( \gamma_a \), the compensation levels \( b_u, b_r, \) and \( b_p \), the "technical" parameters \( q, a, c, m_r \) and \( m_u \), and the "scale" variables \( M \) and \( F \). Our treatment of the labour-market policy variables implies that government policy decisions concern the fractions of various categories of job
searches that are placed in programmes rather than the absolute size of programmes.6

2. The effects of labour market policy

We focus on the following cases.

(i) A non-targeted labour market policy, according to which everyone in the pool of job seekers stands an equal chance of programme placement. This case is useful as a benchmark. It bears some resemblance to the Swedish labour market policy of the late seventies and early eighties, when also workers threatened by lay-offs i.e. insiders, were placed in training programmes within firms.7

(ii) A targeted labour market policy, according to which job seekers are placed in labour market programmes only after they have spent a certain time as openly unemployed. This is more akin to the outsider-oriented policies advocated by, e.g., Philpott (1990), the OECD (1990) and Layard et al. (1991).

(iii) Programmes targeted on entrants in the labour market. The real-world counterpart is the extensive youth programmes that exist in most countries.

2.1 A non-targeted labour market policy

The non-targeted labour market policy is captured by letting 
\[ \gamma_a = \gamma_n = \gamma_u = \gamma_r = \gamma. \] Then the steady-state conditions (1)-(4) are simplified. Dividing (2) by (3), we obtain \( r/u = \gamma/(1-\gamma) \), and hence

\[ r = \gamma(r+u), \]

(17)

\[ u = (1-\gamma)(r+u). \]

(18)
Programmes and open unemployment thus make up constant fractions of the total pool of job seekers. To define the steady state, it is therefore enough to look at the condition for a constant total pool of job seekers: if \( r+u \) is constant, so are \( r \) and \( u \). Adding (2) and (3), we obtain

\[(m+a+s)(r+u) = qn+a\]

as the condition for a constant pool of job seekers, where \( s = \gamma s + (1-\gamma)s_u = s_u[(c-1)\gamma + 1] \) and \( m = \gamma m + (1-\gamma)m_u \) can be interpreted as the aggregate probabilities for a job seeker of finding a new job and of early retirement, respectively.

The equations for constant employment (1) and a constant stock of early retired (4) can be simplified to

\[(1a) \quad (q+a)n = s(r+u), \]

\[(4a) \quad ap = m(r+u). \]

(19) and (1a) give

\[(20) \quad s = \frac{n}{1-n} \left[ q + m + a + \frac{ma}{a} \right] = \frac{n}{1-n} (m+a)(1 + \frac{q}{a}) \]

The aggregate re-employment probability, \( s \), for a job seeker thus depends positively on aggregate employment and the quit rate, rises of which increase the number of job opening. It also depends positively on the outflow into early retirement, which - for given employment - reduces the number of competing job seekers. From (7)-(13) we obtain

\[(21) \quad \ddot{v} = \frac{1}{D} \left[ \rho(1+i)v^s + (m(q+a-1) + \rho(q+s+a-1))v^n + m(1+i)v^p \right], \]
where \( v^S - \gamma v^F + (1-\gamma)v^U \) can be interpreted as the expected instantaneous utility of being a job seeker, and \( D = m(p+q) + \rho(p+q+s) \). The weights of the various instantaneous utilities in \( \tilde{v} \) thus depend upon the various transition probabilities and the discount rate.

Following, e.g., Layard and Nickell (1986), Johnson and Layard (1986), Nickell (1990) and Layard et al. (1991), we can illustrate the general-equilibrium solution of the model by the intersection of an employment and a wage-setting schedule as in Figure 2. The negatively sloped employment schedule is given by (14a). The wage-setting schedule can be derived from (16), (20) and (21) and will be positively sloped under reasonable conditions.9

To study the effects of an increase in the proportion of job seekers in labour market programmes, we need only examine how the wage-setting schedule is affected. Hence (16) is differentiated, taking (20) and (21) into account and holding \( n \) constant:

\[
\left[ \frac{\partial \phi}{\partial w} + \frac{\partial \phi}{\partial \gamma} \cdot \frac{\partial \gamma}{\partial w} \right] dw - \frac{1}{F^*} \cdot \frac{\partial \gamma}{\partial \gamma} \cdot d\gamma = 0,
\]

where the term within brackets is negative if the wage-setting schedule is positively sloped.10 It follows that \( \text{sgn} \; dw/d\gamma = \text{sgn} \; \partial \gamma/\partial \gamma \). The wage-setting schedule shifts in the same direction as the weighted alternative utility \( \tilde{v} \). \( \partial \gamma/\partial \gamma \) is obtained from differentiation of (20) and (21):

\[
\frac{\partial \gamma}{\partial \gamma} = \frac{\partial \gamma}{\partial \gamma} \cdot \frac{\partial v^S}{\partial \gamma} + \frac{\partial \gamma}{\partial \gamma} \cdot \frac{\partial v^S}{\partial \gamma} + \frac{v^S}{\partial m} + \frac{\partial \gamma}{\partial \gamma} \cdot \frac{\partial m}{\partial \gamma}
\]

\[
- \frac{\rho(l+1)}{D} \left[ (v^F - v^U) + s \frac{m(v^n-v^P) + \rho(v^n-v^S)}{(a+m)D} (m_r - m_u) \right]
\]
\[
+ \frac{(\rho + q)(v^P - v^S) + s(v^P - v^R)}{D} (m_r - m_u) \]

The impact of non-targeted labour market policy on the wage-setting schedule can thus be decomposed into three separate effects (corresponding to the three terms in (23)). The first one arises because the instantaneous utility in a labour market programme is greater than the utility of open unemployment, i.e. \( v^F > v^U \). Hence an increase in \( \gamma \), raises the expected utility of being a job searcher. This tends unambiguously to raise the wage for the same reason as would an increase of unemployment compensation, as has been stressed by Calmfors & Forslund (1990, 1991), and Calmfors & Nymoen (1990).

A second effect works via the aggregate re-employment probability \( s \). If the proportion of job seekers in programmes increases, the flow out of the labour force is reduced since \( m_r < m_u \). For given employment, this tends to keep up the number of job seekers and hence to reduce the re-employment probability for the individual. If the instantaneous utility from alternative employment is larger than both the utility from early retirement (\( v^R > v^P \)), and the expected utility from being a job seeker (\( v^N > v^S \)), this effect tends unambiguously to reduce the wage. A sufficient condition for this to occur is that \( v^N > v^S > v^P \).

The above wage-reducing effect is similar to the competition effect that has been stressed by, e.g., Layard (1990) and Layard et al. (1991). Note, that it derives solely from the reduced outflow from the labour force. It has nothing to do with the fact that \( c > 1 \), i.e. that programme participants search more effectively than the openly unemployed. This is easily verified from (20), which gives \( ds/d\gamma = 0 \) when \( m_r = m_u = 0 \). The increase in \( s \) that would follow at a given \( s_u \) is thus exactly off-set by a reduction of \( s_u \). The reason is that the
numbers of job openings and job searchers are unchanged as long as aggregate employment is given. Hence, as the model has been formulated so far, the difference in search effectiveness plays no role (see, however, Sections 2.2.2 and 3 below).

The reduced risk of dropping out of the labour force in the case of a lay-off, however, also gives rise to a third effect. If the instantaneous utility from early retirement is smaller than both the expected utility from being a job seeker ($v^p < v^s$) and the utility from an alternative job ($v^p < v^n$), the wage tends to rise because the expected welfare reduction from loss of employment is reduced. Again, a sufficient condition for this is that $v^n > v^s > v^p$. This offset to the wage-depressing competition effect has been neglected by the proponents of more active labour market policies, such as Layard (1990) and Layard et al. (1990, 1991).

To judge the net effect on the wage setting schedule, we compare the competition and reduced-risk effects of a reduced outflow from the labour force. The latter wage-raising effect dominates the former wage-reducing effect if

$$v^s = \gamma v^r + (1 - \gamma)v^u > \frac{\text{si}v^n + (\rho a + \rho m + qa + qm + si + sa)v^p}{\rho a + \rho m + qa + qm + si + sa}.$$  \hspace{1cm} (24)

The condition is thus that $v^s$ is larger than a weighted average of $v^n$ and $v^p$. This may or may not hold. It will certainly hold in the extreme case when $\gamma = 1$ and $v^r = v^n$. The latter assumption means that the utility is the same in alternative employment and labour market programmes, which is reasonable if market wages are paid in programmes (as is the case in job-creation schemes in many countries). In the general case of $0 < \gamma < 1$ and $v^n > v^r > v^u > v^p$, the inequality is more
likely to hold the smaller is \( v^P \) in relation to \( v^r \) and \( v^u \), and the closer is \( v^r \) and \( v^u \) to \( v^n \).

If (24) is positive, the wage-setting schedule is certainly shifted upwards and hence the equilibrium wage is increased and regular employment reduced, as depicted in Figure 2. The necessary condition for this is, however, only that the reduced outflow from the labour force (the net of the second and third effects above) does not give such a large wage reduction that it offsets the wage increase following from the increased expected utility from being a job searcher (the first effect above). Hence it appears that non-targeted labour market policy may very well be counterproductive. The risks of this can, however, be counteracted to the extent that compensation (and thus also instantaneous welfare levels) can be held low in programmes.

It is easily verified from (1a) and (20) that a reduction of employment goes hand in hand with an increase in the total pool of job searchers since \( r + u = a(1 - n)/(a + m) \). This follows because \( m_r < m_u \), which means that the expansion of programmes reduces the aggregate outflow rate \( m \). But since \( p = m(r + u)/a \) according to equation (4a), the effect on the stock of early retired, \( p \), is ambiguous. On the one hand there is a tendency to a reduction, because the aggregate outflow rate to early retirement is reduced, on the other hand there is a tendency to a rise because the pool of job searchers increases.

2.2 A targeted labour market policy

The labour market policy above did not distinguish between short term and long-term unemployed. Laid-off insiders might be immediately placed in a programme. The standard recommendation is, however, to
target labour market policy only on already unemployed outsiders. We capture this by setting \( \gamma_n = \gamma_a = 0 \) and \( \gamma_r = \gamma_u = \hat{\gamma} \). The first assumption means that a job searcher has to spend at least one period as openly unemployed before he is placed in a programme. The second assumption implies that a job searcher stands an equal chance of participating in a labour market programme independently of whether he is openly unemployed or already in a programme. \( \hat{\gamma} \) can be interpreted as the probability for someone who was a job seeker in the preceding period and who is still looking for a job to be placed in a programme.

To facilitate comparisons with Section 2.1, we assume that policymakers decide on the fraction of the total stock of job searchers that are placed in programmes, i.e. on \( \gamma = r/(r + u) \). Then the \( \hat{\gamma} \) implied by the choice of \( \gamma \) can be derived from (2) or (3) as:

\[
\hat{\gamma} = \frac{\gamma}{1 - s - m - a}.
\]  

(15) shows that, if only those who have been job searchers for a time are placed in programmes, a larger fraction of them will be encompassed than the target for the total stock of job seekers. \( \hat{\gamma} \) is proportional to \( \gamma \), with the factor of proportionality being the inverse of the fraction of job seekers that continue to search for a job in the next period as well \((1 - s - m - a)\).

Since the expression for \( \hat{\gamma} \) becomes complex in this case, too, we confine the analysis below to a few special cases. As before, we derive the effects on the wage-setting schedule by investigating the impact on \( \hat{\nu} \).
2.2.1 The effect of different instantaneous utilities

First, we focus on the effects arising from different utilities in programmes and in open unemployment ($v^r > v^u$). We ignore all other effects by setting $c = 1$ and $a = m_r - m_u = 0$. The first assumption means that search effectiveness is the same in programmes and in open unemployment, the second means that we ignore outflows from the labour force. With these assumptions we obtain:

$\bar{v} = \frac{\gamma v^r + (1 + i - \gamma) v^u + (q + s - 1) v^n}{1 + q + s}$,

which we can compare with the corresponding expression in the non-targeted case, which we derive from (21) by letting $c = 1$ and $a = m_r - m_u = 0$ there as well:

$\bar{v} = \frac{\gamma (1 + i) v^r + (1 - \gamma)(1 + i) v^u + (q + s - 1) v^n}{1 + q + s}$.

The only difference between the two expressions is that the weights for $v^r$ and $v^u$ differ. In the targeted case, the relative weight for $v^r$ is smaller. This is to be expected, since a laid-off worker in this case has to be openly unemployed for at least one period until he is placed in a programme. Hence the benefits of programme placements are discounted. It follows that more ambitious labour market policies (a higher $\gamma$) has a smaller effect on $\bar{v}$, and thus shifts the wage-setting curve by less in the targeted case. This is immediately obvious from differentiation of (26) and (21a), which gives
\[
\frac{d\hat{\nu}}{d\gamma} = \frac{v^r - v^u}{i + q + s}
\]
and
\[
\frac{d\hat{\nu}}{d\gamma} = \frac{(1 + i)(v^r - v^u)}{i + q + s},
\]
respectively. The effects on \( \hat{\nu} \) thus differ with an interest factor.

In general it can be shown that the tendency to wage increases is weaker, the later that programme placements occur, since this implies more heavy discounting of the benefits.

Our conclusions in this respect differ from those of Holmlund & Lindén (1992), who find that programmes reducing the flow from employment to open unemployment (i.e. targeting on insiders) reduce wages by increasing the attractiveness of employment, whereas programmes targeted on those already in the pool of job searchers (outsiders) increase them. This result derives from an inappropriate specification of their model: they use the value of open unemployment rather than the value of being a job searcher (with a certain probability of immediate programme placement) as the norm of comparison (fall-back level of utility) for the union.

2.2.2 The effects of different search effectiveness

We also analyze a case where only the search effectiveness of the programme participants and the openly unemployed differ, i.e. where \( c > 1 \). All other effects are again ignored. We thus now set \( v^r = v^u \) and \( a = m_r - m_u = 0 \). In Section 2.1 we showed that no shift of the wage setting would occur with non-targeted policy in this case. With targeted policy
this conclusion no longer holds. To see this, we first compute \( \bar{\nu} \) under
the above assumptions:

\[
\begin{align*}
(29) \quad \bar{\nu} &= \frac{1}{E}[(1 + i)(\bar{\gamma}(s_r - s_u) + 1 + i)\nu^u \\
&\quad + (\gamma q(s_r - s_u) + (1 + i)(q + s_u - 1))\nu^n],
\end{align*}
\]

where \( E = \gamma(q + i + 1)(s_r - s_u) + (1 + i)(q + r + s_u) \). Differentiating
(29) with respect to \( \bar{\nu} \) and \( \gamma \), we obtain

\[
(30) \quad \frac{d\bar{\nu}}{d\gamma} = -\frac{1}{G}[s_i(s - 1)^2(1 + i)^2(c - 1)](\nu^n - \nu^u),
\]

where \( G = [\gamma q(i(s - 1) - 1) + (i(s - 1) - s)(i + 1) - \gamma q(i(s - 1) - \\
1) + (i(s - 1) - s)(i + 1) + (s - 1)(i + 1)(q + i + s)]^2 > 0. \) Thus
\( dv/d\gamma < 0 \) if \( \nu^n > \nu^u \). The search effectiveness effect tends to shift
the wage-setting schedule downwards and to raise employment (see Figure 2.). Although \( s - \gamma s_r + (1 + \gamma) s_u - s_u[\gamma(c - 1) + 1] \) must still remain
unchanged at a given \( n \), because a rise of \( \gamma \) causes a fall of \( s_u \), these
two changes no longer have off-setting effects on \( \bar{\nu} \). Instead the fall
in \( s_u \) weighs more heavily than the rise in \( \gamma \). The reason is that the
increased future re-employment probability (because of the larger chance
of programme participation) is discounted more heavily than the reduced
immediate re-employment probability for a newly laid-off worker, who has
to spend at least one period in open unemployment before he is placed in
a programme. The tendency to a wage reduction thus follows from the
increased competition that the present insiders meet from outsiders in
the case of lay-offs. Again, it can be shown that this effect is
stronger, the later programme placements occur.
2.2.3 The effect on the outflow from the labour force

It can also be shown that the wage-raising effect of a reduced risk of dropping out of the labour force is weakened with targeted labour market policy. The explanation is again that the welfare gain is discounted more heavily when participation in a programme is offered at a later stage.

The conclusion is thus that the qualitative effects on wages and employment of non-targeted policy remain with targeted policy as well, but that the wage-raising effects become weaker. Moreover, an additional wage-reducing effect is added because newly laid-off workers will meet more competition from outsiders. The probability that labour market policy has positive effects on employment is thus greater, the longer job searchers have to wait before they are placed in a programme. This highlights the advantages of such targeting.

2.3 Labour market programmes for entrants

Finally, we analyze the case when only entrants are placed in programmes. This is captured by the assumption that $\gamma_a > 0$, whereas $\gamma_n = \gamma_r = \gamma_u = 0$. Policy makers are again assumed to choose the fraction of the total pool of job searchers that are placed in programmes, i.e. $\gamma = r/(r + u)$, and then derive the $\gamma_a$ implied. From (3) we then obtain that

\[
\gamma_a = \frac{\gamma(r + u)}{a}.
\]

The interpretation is straightforward. $\gamma_a > \gamma$ depends upon whether $r + u > a$. We now obtain
\[ v = \frac{(1+i)\rho v_u + (1+i)m_u v^p + [(s + q+a-1)\rho + (q+a-1)m_n]v^n}{(q + \rho)m_u + (q + \rho + s_u)\rho}, \]

and

\[ \frac{\partial \hat{v}}{\partial \gamma} = \frac{\partial s_u}{\partial \gamma} = \frac{\rho(1 + i)[m_u(v^n - v^p) + \rho(v^n - v^u)]}{[(q + \rho)m_u + (q + \rho + s_u)\rho]^2} \]

\[ \cdot \frac{n}{1 - n} \cdot \frac{H(m_r - m_u) - Q(c-1)}{[\gamma(c - 1) + 1]^2} < 0, \]

where \( H = [\gamma(c - 1) + 1](1 + q/a) > 0 \) and \( Q = [q + a + m(1 + q/a)] > 0 \).

Since a laid-off worker is never placed in a programme in this case, the only effect on the alternative utility for present outsiders, \( \hat{v} \), of an increase in \( \gamma \) occurs through the re-employment probability for an openly unemployed worker, \( s_u \). It falls because laid-off workers are exposed to more competition from entrants. There are two reasons for this. First, the flow out of the labour force is reduced. Second, the search effectiveness of entrants is enhanced. As a consequence \( \hat{v} \) falls. This lowers the wage setting schedule. The outcome is a tendency to lower wage and higher employment. Our analysis thus underscores the benefits of targeting programmes on entrants.

3. **Beveridge-curve effects**

We have implicitly assumed that all vacancies are immediately filled. Search effectiveness has not influenced the number of job matchings. However, a common argument is that labour market programmes improve the matching technology and shift the Beveridge curve (the
vacancy-unemployment relationship) inwards. Following Pissarides (1990) and Holmlund & Lindén (1991), we explore this channel as well.

The effective stock of searchers (as a fraction of the labour force) is defined as $f = cr + u$. The number of hirings, $h$ (measured in the same way) is assumed to depend upon both the effective stock of searchers and vacancies, $\nu$ (as a fraction of the labour force), so that

$$h = h(f, \nu) = h(cr+u, \nu),$$

where $h_1 > 0$ and $h_2 > 0$. The $h$ function exhibits constant returns to scale. Let $\ell = h/\nu$ denote the rate at which vacant jobs are filled and define $\theta = \nu/f = \nu/(cr+u)$ as labour market tightness. Then it holds that

$$\ell = \frac{h(f, \nu)}{f} = h(1, \frac{\nu}{f}) = h\left(\frac{\ell}{\theta}, 1\right) = \ell(\theta),$$

where $\ell_1 < 0$ since $h_1 > 0$.

We can now interpret $s_u$ as the re-employment probability of an effective job searcher (the number of job searchers is thus measured with the openly unemployed as "numeraire"). Since hirings must equal the flow into employment, i.e. $h = s_u f$, we have

$$s_u = \frac{h(f, \nu)}{f} = h(1, \frac{\nu}{f}) = h(1, \theta) = s_u(\theta),$$

where $s_u' > 0$ since $h_2 > 0$.

In the next step, a mechanism for determining vacancies and employment, which replaces our earlier labour demand curve, must be introduced. We denote the present value of the last filled vacancy in firm $j$ (the marginal value of employment) $J^1_n$, and the present value of the last unfilled one (the marginal value of vacancies) $J^1_v$. If $\delta$ is the discount rate for the firm and $k$ the fixed cost of a vacancy, we have
(37) \[ \frac{J^j_{n,t}}{1+\delta} = \frac{1}{1+\delta} \left[ f'(N^j_t) + (q+a)J^j_{v,t+1} + (1-q-a)J^j_{n,t+1} - \psi^j_t \right] \]

(38) \[ J^j_{v,t} = \frac{1}{1+\delta} \left[ \xi^j_{n,t+1} + (1-\xi)J^j_{v,t+1} - k \right]. \]

(37) states that the marginal value of employment is the instantaneous marginal product of labour plus the future marginal value of present employment minus the wage cost. The future marginal value of present employment is a weighted sum of the marginal value of an unfilled vacancy and the marginal value of continued employment with the weights corresponding to the probabilities of a separation (due to a quit or "death") and continued employment. (38) states that the marginal value of an unfilled vacancy is the difference between the future marginal value of an unfilled vacancy and the cost of a vacancy. The future marginal value of an unfilled vacancy is a weighted sum of the marginal value of a filled vacancy and the marginal value of an unfilled one, the weights being the probabilities of filling and not filling a vacancy, respectively.

Vacancies are opened as long as they are profitable, i.e. until \( J^j_{v,t} = 0 \). Imposing this condition and assuming a steady state, so that we can drop time superscripts, (37) and (38) give

(14b) \[ f'(N^j) = \omega^j + \frac{\delta + q + a}{\xi} k. \]

Employment is determined by the equality of the marginal product of labour and the wage plus the discounted present value of the hiring cost. (14b) replaces the earlier labour demand schedule (14). Maximizing the utility function (13) subject to (14b), however, gives the same first-order condition (15) and hence also the same wage-setting relation (16) as before. This follows form the additive property of (14b) and an
assumption that all the variables in the second term of the RHS are exogenous to the individual union.

From (14b) we can derive an aggregate employment equation

\[(14c) \quad f'(N^j) = f'(nM/F) = g'(n) = w + \frac{(\delta + q + a)}{\ell(\theta)}k,\]

which replaces the earlier equation (14a). Moreover, the reemployment probability \(s_u\) now is a function of labour market tightness according to (36). Together (20) and (36) give

\[(39) \quad s = s_u(\theta)[\gamma(c-1) + 1] = \frac{n}{1-n} [q + m + a + \frac{mq}{a}].\]

We confine the analysis here to non-targeted policy. In Section 2.1 we had from equation (20) that \(s = s(n)\) and from (21) that \(\hat{\nu} = \hat{\nu}(s)\). Since these relations still hold, we obtain exactly the same wage-setting schedule as before. It depends upon \(\gamma\) in exactly the same way as earlier. The introduction of vacancies hence does not change the analysis of how programmes influence the wage-setting schedule.

The analysis of labour demand is, however, affected. Instead of the earlier aggregate employment equation (14a) we now have to consider (14c) and (39) together. From them we can derive a reduced-form employment schedule. Differentiating the two equations with respect to \(w\), \(n\), \(\gamma\) and \(\theta\) and then eliminating \(d\theta\), we obtain

\[(40) \quad \frac{dn}{Cdw} = \frac{ALd\gamma}{g^nC - AB} - \frac{ALd\gamma}{g^nC - AB},\]

where \(A = -(\delta + q + a)k' \ell^2 > 0\), \(B = (q + m + a + mq/a)/(1-n)^2 > 0\), \(C = s_u'[\gamma(c-1)+1] > 0\), \(L = s_u(c - 1) + n(1 + q/a)(m_u - m_r)/(1 - n)\) and \(g^n < 0\). It follows that \(dn/dw < 0\), so that this reduced-form employment is relationship downward-sloping as well. It will be shifted by changes in
\( \gamma \). Hence an extra effect is added to the earlier analysis of the wage-setting schedule. If \( c > 1 \) the reduced-form labour demand in Figure 3 is shifted to the right. The intuition is that hiring costs are reduced when aggregate search effectiveness is increased. The optimal union response is to let both the wage and employment increase.

The search-effectiveness effect on the employment schedule has implications for the Beveridge curve. Such a relationship can be derived by exploiting the steady-state equality between hirings and the flow out of employment, i.e. that \( h(c r + u, v) = (q + a)n \). Since \( r = \gamma(r+u) \), \( u = (1-\gamma)(r + u) \) and \( n = 1 - (r + u + p) \), we obtain \( h((\gamma(c-1) + 1)(r+u), \nu) = (q+a)[1-(r+u+p)] \). Since we also have from (4) that \( p = m(r+u)/a \) in a steady state, we obtain

\[
(41) \quad h((\gamma(c-1)+1)(r+u), \nu) = -(q+a)(1 + \frac{m}{a})(r+u).
\]

We can thus draw a Beveridge curve with vacancies and job searchers, \((r+u)\), on the axes in Figure 4. The curve is downward-sloping since \( dv/d(r+u) = -h_1((\gamma(c-1)+1) + (q+a)(1+m/a))/h_2 < 0 \). Differentiation with respect to \( \nu \) and \( \gamma \), holding \((r+u)\) constant, gives

\[
(42) \quad dv/d\gamma = -h_2/[(r+u)(h_1(c-1) + (q+a)(m_r - m_u)/a)].
\]

In the case when \( m_r = m_u \), so that the aggregate exit probability from the labour force is left unchanged, the Beveridge curve shifts unambiguously to the left when \( \gamma \) increases if \( c > 1 \). Then there is thus a direct correspondence between the shifts of the Beveridge curve and of the reduced-form employment schedule in Figure 3. But the shift of the Beveridge curve has no implications for the wage-setting schedule. An expansion of labour market programmes may thus in principle shift the
wage-setting schedule outwards at the same time as the Beveridge curve is shifted inwards.\textsuperscript{13}

If \( m_r < m_u \) there is not the same simple correspondence between shifts of the employment schedule and of the Beveridge curve. An expansion of programmes then gives rise to an offsetting effect tending to shift the Beveridge curve outwards (the second term within brackets in (42)). Since the aggregate exit rate from the labour force decreases, the stock of early retired falls and a given number of job searchers becomes associated with higher employment. Hence the flow out of employment increases, which in a steady state necessitates a larger number of vacancies in order to increase hirings.

4. An efficiency-wage version

Our analysis has been cast in terms of a union model, but the analysis is similar within an efficiency-wage framework as well. We illustrate this by extending the Blanchard-Fisher (1989) version of the Shapiro-Stiglitz (1984) model, so that it takes labour market programmes into account.

The assumption is now that employers set the wage so as to provide incentives for employees not to shirk. A shirking worker in firm \( j \) obtains the instantaneous utility \( v(w_c^j) \), and a non-shirking one \( v(w_c^j) - e \), where \( e > 0 \). A shirker is discovered and fired with probability \( \tilde{q} \), whereas a non-shirker quits with probability \( q \), where \( q < \tilde{q} \). The value function \( v_{t}^{sh} \) and \( v_{t}^{ns} \) for shirkers and non-shirkers, respectively, are defined as
\[ (7a) \quad v_{t+1}^{sh} = \frac{1}{1+\alpha} \left[ v(w_{t}) + qv_{t+1} + (1-q-a)v_{t+1}^{sh} \right] \]

\[ (7b) \quad v_{t+1}^{ns} = \frac{1}{1+\alpha} \left[ v(w_{t}) - e + qv_{t+1} + (1-q-a)v_{t+1}^{ns} \right], \]

where as before \( \bar{V}_{t+1} \) is the value of joining the pool of job searchers in the next period. To induce workers not to shirk, it is profitable to pay a wage that equalizes the value of not shirking with that of shirking, i.e., \( v_{t}^{sh} = v_{t}^{ns} \). We also follow the Shapiro-Stiglitz assumption of letting the firm determine a wage for all future periods, from which follows that \( v_{t}^{sh} = v_{t+1}^{sh} \) and \( v_{t}^{ns} = v_{t+1}^{ns} \).

If we drop time subscripts and again, assume a symmetrical equilibrium, we can derive that

\[ (43) \quad v(w) = \rho \bar{V} + \frac{(\rho + \tilde{q})e}{q - q} \]

If \( v_{t}^{ns} \) is substituted for \( v_{t}^{n} \) in equations (7) - (12), we obtain that

\[ (44) \quad \bar{V} = \frac{\rho(\rho+q)v^{S} + ps v^{n} + m(\rho + q)v^{p}}{\rho[m(\rho+q) + \rho(\rho+q+s)]} \]

in the case with non-targeted labour market policy, i.e. when

\[ \gamma_{n} = \gamma_{r} = \gamma_{a} = \gamma_{u} = \gamma. \]

Substituting (44) into (43) and using (20) again gives us an upward-sloping wage-setting schedule. To analyze how it depends on \( \gamma \), the wage-setting equation is differentiated partially with respect to \( w \) and \( \gamma \) for fixed \( n \), which gives

\[ (45) \quad \nu_{1} [1 - \frac{se}{D}] dw - \rho \frac{\partial \bar{V}}{\partial \gamma} d\gamma = 0, \]
where \( D = m(\rho + q) + \rho(\rho + q + s) \) as before. It follows that \( \text{sgn} \frac{dw}{d\gamma} = \text{sgn} \frac{\partial \bar{V}}{\partial \gamma} \). The latter partial is given by

\[
\frac{\partial \bar{V}}{\partial \gamma} = \frac{\partial \bar{V}}{\partial v^s} \cdot \frac{\partial v^s}{\partial \gamma} + \frac{\partial \bar{V}}{\partial s} \cdot \frac{\partial s}{\partial \gamma} + \frac{\partial \bar{V}}{\partial m} \cdot \frac{\partial m}{\partial \gamma} = \frac{\rho + q}{D} (v^r - v^u) + \\
\frac{s(m(v^u - v^p) + \rho(v^n - v^s))}{(a + m)D} (m_r - m_u) + \\
\frac{(\rho + q)(v^p - v^s)}{D} (m_r - m_u).
\]

The effects on the wage-setting curve can thus be decomposed in the same way as earlier, and the relative magnitudes of the effects are the same (cf (23)). This follows from the assumption that it is the alternative opportunities for a laid-off worker that matter in both the union and the efficiency-wage model.

5. General equilibrium tax effects

Our analysis has been considered tax repercussions. The implicit assumption has been that the real product wage determining employment is unaffected by induced tax changes. It is, however, straightforward to show how the analysis is modified, if we allow tax increases to raise the real product wage and add an explicit government budget constraint, such as

\[
ty(n) = ub^u + rb^r + pb^p,
\]

where \( t = \) the income tax rate, and \( y = \) per capita output.\(^{15}\)

The general presumption is that the tax rate moves in the opposite direction to regular employment, partly because of the effect on the tax
base (output), partly because the numbers of openly unemployed, programme participants and early retired are related negatively to employment. If, e.g., the net effect of an expansion of programmes is to increase regular employment, this increase tends to be reinforced by a tax rate decrease that induces a lower real product wage. For this not to occur, the compensation in programmes would have to be much higher than the unemployment benefit, so that it is very costly to shift job seekers from open unemployment to programmes. 16

6. Conclusions

We have provided a rigorous framework for the analysis of the macroeconomic effects of active labour market programmes. Several channels of influence affecting wage-setting incentives were identified. An expansion of programmes is likely to maintain labour-force participation, which exerts downward pressure on wages, as has been claimed in the international policy discussion. But the fact that the risks of dropping out of the labour force are reduced, i.e. that lay-offs become less dangerous, will simultaneously tend to weaken the incentives for wage restraint. A similar effect arises to the extent that labour market programmes are associated with higher instantaneous utility than open unemployment.

Our analysis highlights the importance of targeting more clearly than has been done before. With insufficient targeting, the wage-raising effects may dominate with crowding-out effects on regular employment as the result. The reason is that programmes in this case serve not only to improve the job prospects of outsiders (those that have been unemployed for some time) but to improve the alternative employment opportunities of insiders as well. The less targeting there is, the more important it is
that compensation in programmes is not too high, if adverse wage-setting effects are to be avoided.

Programmes targeted on the long-term unemployed are indeed likely to reduce wage pressure, as has been stressed especially by Layard et al. (1991). One explanation is that the wage-raising effects on the welfare of the participants are weakened, because of more heavy discounting, the later programme placements occur. Moreover, to the extent that programmes enhance search effectiveness, targeting on long-term unemployed imply more competition for the newly laid-off insiders. Programmes for entrants, i.e. in effect youth programmes, reduce wage pressure unambiguously since their only effect is to increase competition for jobs.

In addition to the effects on wage-setting behaviour, labour market programmes that increase the search effectiveness of participants also stimulates labour demand, because hiring costs are reduced when job matching is improved. This tends to raise both wages and employment at the same time as the Beveridge curve is shifted inwards. An inward shift of the Beveridge curve is not, however, a sufficient condition for positive employment effects.

There are several aspects of labour market policy that warrant further study. We have not taken into account that the possibilities of raising re-employment probabilities through labour market programmes are likely to decrease with the spell of unemployment. Neither have we dealt with the role of training programmes in order to increase the mobility of labour between sectors, nor with the issue of how the productivity of labour may be influenced. Finally, we have neglected how the provision of active programmes may interact with the rules on the duration of unemployment benefits in the political process.
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2 This differs from Holmlund & Lindén (1992), who assumed c ≤ 1. It is true that surprisingly many studies have failed to find that labour market programmes exert a positive influence on re-employment probabilities (Björklund, 1990; Havemann & Hollister, 1991). It may also be the case that short-run and long-run responses differ, as pointed out by Edin & Holmlund (1991): re-employment probabilities may be lower for participants while still in programmes but higher once they are completed. We prefer to assume that programmes do indeed attain their target of improving employment opportunities for participants.

3 The utility function belongs to a wider class of functions

\[ u^j = u(v^j_t - \bar{v}_t, n^j_t). \]

The analysis remains qualitatively unchanged as long as \( u_1 > 0, \ u_2 > 0, \ u_{11} \leq 0, \ u_{22} \leq 0 \) and \( u_{21} > 0 \) (the last assumption means that marginal utility with respect to employment is increasing in the welfare difference \( v^j_t - \bar{v}_t \)). With the rent-from-unionization formulation \( u_1 = n^j_t, \ u_2 = \bar{v}^j_t - v^j_t, \ u_{11} = 0, \ u_{22} = 0 \) and \( u_{21} = 1 \).

Rent maximization is equivalent to maximization of a utilitarian utility function \( u^j = n^j_t v^j_t + (m^j - n^j_t) \bar{v}_t - n^j_t (v^j_t - \bar{v}_t) + m^j \bar{v}_t \), where \( m^j \) - the (constant) membership, if \( \bar{v}_t \) is exogenous to the individual union (Hoel, 1988; Jackman, 1988, 1990).

4 The usual assumption is that the (same) wage is set for all future periods (Shapiro & Stiglitz, 1984; Layard & Nickell, 1987; Jackman, 1988, 1990; Hoel, 1988). It is more realistic to let the wage be determined only for a limited number of periods, but the results are not affected qualitatively.

5 To obtain the solution we made use of the computer algebra programme Derive.

6 Since the size of programmes varies with unemployment (Grubb, 1993), this assumption seems more appropriate than treating the numbers of programme participants as exogenous (Calmfors & Forslund, 1990, 1991; Calmfors & Nymoen, 1990).

A rise in \( h \) has an ambiguous effect: on the one hand the number of job openings increases with the number of attritions, on the other hand a larger inflow of new entrants increases the competition for jobs.

The condition is that \( f'' \) is not too large.

See footnote 8!

Since a constant \( \gamma \) and a constant \( r \) (u) implies a constant \( u \) (r), it does not matter which of the equations we choose.

In our model, policy makers that strive for as high employment as possible should let all entrants pass through a labour market programme. This extreme result follows from the assumption that an entrant must always spend at least one period as a job searcher before a regular job can be obtained. It would not hold if we allowed for the possibilities that jobs could be obtained without such a period of search and that programmes might actually reduce incentives for job search during the period of participation (see Edin & Holmlund, 1991).

This contradicts the Layard (1991) claim that inward shifts of the Beveridge curve are inconsistent with outward shifts of the wage-setting schedule. The conclusion that the wage-setting schedule is not affected hinges, however, on the assumption that posting vacancies and raising wages are not used as substitutes for attracting labour as is the case in, e.g., Layard et al. and Johnson & Layard (1986).

The assumption that the wage is set for one period only does not work in this simple framework, since \( V_{h} = V_{n} = V_{f} \) in (7a) and (7b) would imply that the \( v(w_{t}) \) terms cancel out. This follows from the additive separability of the instantaneous utility function for non-shirkers. If a wage equation is to be derived under this assumption, the wage must be set for at least two periods.


In addition, the reduction of early retirement associated with an expansion of programmes may be costly to the extent that early retirement pensions are lower than unemployment benefits and compensation in programmes. We would, however, expect this effect to be of minor importance.
Figure 2: Labour market equilibrium

Figure 3: The effect of improved matching
Figure 4: The Beveridge curve