# Indirect Effects of Active Labour Market Policies

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**Motu Working Paper 05–01**
**Motu Economic and Public Policy Research**

**January 2005**

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Acknowledgements
This paper was prepared on contract to the New Zealand Ministry of Social Development. Thanks to Dean Hyslop for helpful comments, and to members of the MSD Jobs Jolt Technical Advisory Group for discussions about the material.

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## Abstract

This paper provides an overview of the analysis of the indirect effects of active labour market policies. Indirect effects arise where some of the improved labour market outcomes for programme participants come at the expense of other workers or jobseekers. The paper outlines some common theories about how indirect effects operate, and discusses approaches to estimating the strength of indirect effects. It also presents a brief summary of relevant empirical findings. The paper is intended as a relatively non-technical guide for policy analysts working on the design, costing, and evaluation of active labour market policies.

JEL classification
I38, J68

Keywords
Active labour market policies; Substitution; Displacement; General equilibrium effects.

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# Introduction

This paper outlines theoretical and estimation issues related to the indirect effects of active labour market policies (ALMPs). It also presents a brief summary of relevant empirical findings.

The *direct effect* of ALMPs is the effect that the policy has on those who receive assistance (‘the treatment group’). It is useful to distinguish between gross outcomes (the outcomes experienced by the treatment group), and net outcomes (the *change* in outcomes experienced by the treatment group, beyond what they would have experienced in the absence of the assistance). The direct effect is equivalent to the net outcome.

The *indirect effect* is the effect that an ALMP has on people other than those in the treatment group. Indirect effects can take many forms, as will be discussed in later sections. In general, the nature of indirect effects is that some of the gains made by the treatment group are at the expense of other workers or jobseekers.[1] For instance, members of the treatment group may find employment, but this is only possible because they have filled jobs that would otherwise have been filled by non-assisted workers.

From an efficiency perspective, an ALMP should achieve strong positive direct effects without any negative indirect effects. In essence, this requires that new jobs are created as a consequence of the policy. The treatment group members need not be placed in the new jobs, but the number of new jobs must be at least as great as the direct effect for the treatment group. ALMPs are often, however, designed to achieve equity objectives as well. Policies may aim to improve the employment prospects of disadvantaged workers, in which case policies may be desirable even if there is no net increase in employment. The current paper focuses solely on the analysis of indirect effects, without making any judgements about the desirability of policies with different levels of indirect effects.

[1] As we will see, it is possible that the gains of the treatment group generate gains for untreated workers, although this is a less common case, both in theory and in empirical findings.

The focus of the following theory section is on the ways that indirect effects may arise, and the conditions under which ALMPs can generate additional employment. The sections on empirical approaches and findings will report on attempts to measure the size of indirect effects of various policies, and the impact of ALMPs on total employment.

Although the primary focus is on employment effects, as it is in the literature reviewed, the paper will also, where appropriate, discuss the effects of ALMPs on wage levels and on fiscal expenditure.

# 2 Some theories about indirect effects

This section outlines some of the key ideas about how indirect effects arise. Within the literature on indirect effects, the concepts of substitution effects and displacement effects have received particular attention. These effects relate, however, only to programmes that alter the relative labour costs associated with the treatment group, such as wage subsidy programmes. I start therefore by analysing the impact of wage subsidies, before moving on to a broader range of programmes.

Some important insights into the indirect effects of ALMPs, and the ability of ALMPs to generate employment increases, can be gained from the standard competitive neoclassical model of supply and demand. This approach does not, however, explicitly model some of the mechanisms by which ALMPs affect outcomes. I therefore also present some analyses using a more refined model, attributed to Layard and Nickell, which is commonly used to provide a framework for analysing the effects of ALMPs.

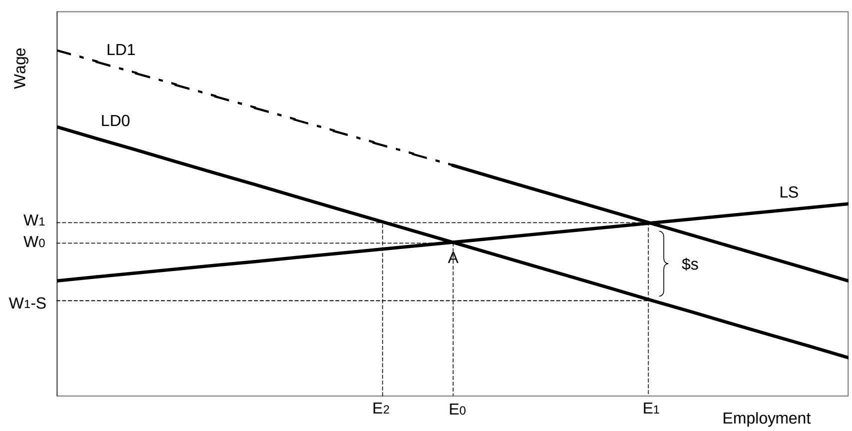
## 2.1 Policies that change relative labour costs: wage subsidies

Figure 1(a) shows a standard neoclassical analysis of labour supply and demand, incorporating the effect of a universal wage subsidy. *LS* is the labour supply curve, indicating how much labour workers are willing to provide at each wage level. The curve is upward sloping, reflecting that workers will require increasingly high wages to induce them to give up more non-work time. $LD_0$ is labour demand in the absence of a subsidy. It is downward sloping, reflecting the assumption that additional input of labour into production makes progressively smaller contributions to output, and employers are therefore willing to employ more labour only if wages are lower. The initial equilibrium is at point *A*, with $E_0$ workers employed at wage $w_0$.

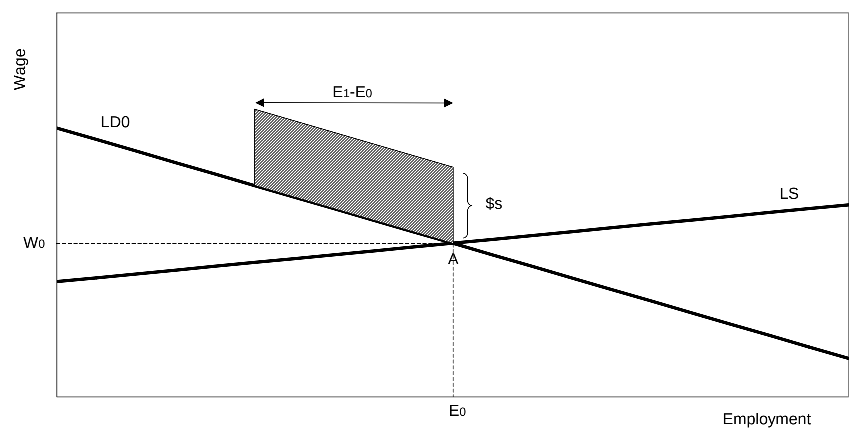
The impact of a universal wage subsidy is indicated by the line labelled $LD_1$. Employers are willing to employ more labour at any given wage level. Faced with a subsidy of *$s*, they will employ labour up to the point $E_1$, where they pay $w_1 - s$ and workers receive wages of $w_1$.

**Figure 1: Analysis of the impact of a wage subsidy**

(a) The intent of a wage subsidy of $s per worker




(b) New equilibrium with 100% substitution



Note that the subsidy scheme characterised in this way is very costly. The employer receives a subsidy for *all* workers, including the $E_0$ workers who were previously employed. In practice, many wage subsidy programmes are designed with the intent of subsidising only those jobs within a firm that are in excess of initial employment $E_0$. Graphically, this intent is reflected by adding only the solid portion of $LD_1$. Under such conditions, all employees receive the same wage but some employees are less costly to the employer, due to the subsidy. The employer would prefer to employ the cheaper (subsidised) workers instead of the unsubsidised ones, and if possible, will try to substitute subsidised for unsubsidised workers. This process of substituting cheaper for more expensive workers is one of the main types of indirect effect of wage subsidies and is commonly referred to as the *substitution effect*.

Having secured subsidies for ($E_1 – E_0$) employees, the employer has an incentive to reduce the employment of unsubsidised workers (as long as the administrative rules do not cause the subsidy to be lost when employment is reduced). With wages at $w_1$, the employer is making a loss on each unsubsidised worker in excess of $E_2$ (wages are above $LD_1$). If any unsubsidised workers were to leave, the employer would not replace them unless total employment fell below the initial employment level, $E_0$. Figure 1(b) shows the equilibrium if the employer manages to achieve full substitution. Employment and wage levels are exactly the same as they were initially—the only difference is that the employer is now receiving a subsidy of *$s* on each of the ($E_1$ - $E_0$) subsidised workers. There has been 100% substitution of subsidised for unsubsidised workers.

The 100% substitution is a consequence of the assumption that all workers are identical. A more general (and more interesting) case arises where subsidised workers differ from the initially employed workers. A crucial factor then is how the addition of unsubsidised workers affects the productivity, wages, and employment of unsubsidised workers.[2]

[2] Technically, this relationship is measured as the *elasticity of substitution* between subsidised and unsubsidised workers. Although related, this use of the word ‘substitution’ differs from its use to describe the indirect impact of wage subsidies.

It is generally assumed (and found empirically) that the addition of subsidised workers leads to a reduction in the number of unsubsidised workers who are employed. This is consistent with the two types of workers being substitutes in production. It is, however, theoretically possible that subsidised workers may be ‘complements’ to unsubsidised workers, meaning that the addition of subsidised workers raises the marginal productivity of unsubsidised workers, thus leading to increased employment.

When measuring substitution effects of wage subsidies, it is common to define the substitution rate as one minus the ratio of net employment change to the number of subsidised jobs [$1 - \Delta E/N_s$]. The analysis presented above indicates the wide range of possible values for this ratio. Without production complementarities, the net employment change is between zero and ($E_1$ - $E_0$). The number of subsidised workers is between ($E_1$ - $E_0$) and $E_1$ (employers would prefer to have subsidies for all of their workers, if permitted). The substitution rate can therefore be as low as 0, and as high as 1. The more similar are subsidised and unsubsidised workers, the higher the substitution rate will be. With production complementarities, the increase in employment could be larger than the number of subsidised workers, so the substitution rate could be negative. The extent of substitution is an empirical question to which we will return in Section 4.

Figure 1(b) also serves to illustrate the related issue of *displacement effects*. The employer is receiving a subsidy, with wage and employment levels that are the same as they would have been in the absence of the subsidy. The effect of the subsidy is thus to raise the profits of the employer. The employer is able to produce output at a lower cost than unsubsidised competitors, and is able to increase market share by undercutting competitors. This would lead to an expansion of employment in the subsidised firm, at the expense of jobs in unsubsidised firms. The expansion of employment in the subsidised firm is achieved by *displacing* employment elsewhere.

A further indirect effect not shown in Figure 1(b) is the fiscal effect. The subsidy payment of $\$s(E_1 – E_0)$ to the employer is paid for from funds raised by taxation. The impact on aggregate employment of the taxes should also be counted as part of the wider impact of the subsidy programme.

## 2.2 Other policies

Despite the prominence given to substitution and displacement effects in the literature, they strictly apply only to policies such as wage subsidies that alter the relative costs of different types of labour or groups of workers. There are many other forms of ALMP that do not rely on changing relative costs. They therefore do not have substitution or displacement effects, at least in the strict sense outlined in the previous section. There may, however, be other forms of indirect effect, whereby some of the gains of the treatment group are at the expense of workers who are not assisted. A simple example will serve to illustrate the mechanisms.

**Figure 2: The impact of a policy to increase labour supply**

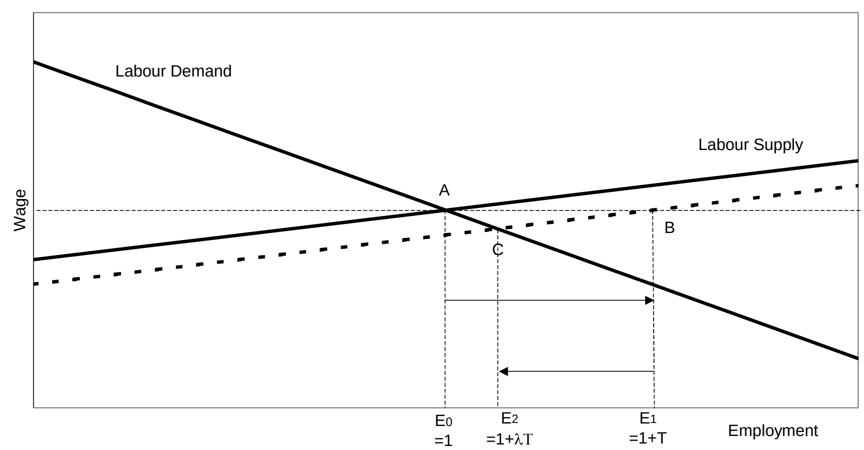



Figure 2 shows labour supply and labour demand. Where the curves cross is the unique equilibrium where supply and demand are equal. In this model there are only two ways to generate an increase in employment. Either labour supply must increase, so that more labour is supplied at any given wage, or productivity must increase, so that employers are willing to employ more workers at any given wage.

The relevance of this model for the consideration of indirect effects of ALMPs is that it shows how wage flexibility can offset some of the direct effect of ALMPs. The dotted line in Figure 2 shows the effect of an ALMP that has increased labour supply, possibly by reconnecting discouraged workers with the labour market. At any given wage, there are now more workers willing to work. The number of additional workers is equal to the difference between $E_1$ and $E_0$. However, employers are not willing to employ this many workers at the initial wage level—they are still willing to employ only the same number as they were initially. Wages fall, until labour supply and labour demand are again equal, at point C, where employment equals $E_2$.[3]

So, what are the direct and indirect effects of the policy to increase labour supply by ($E_1 – E_0$)? For ease of exposition, the initial number of workers ($E_0$) is normalised to be equal to 1. The number of additional workers, expressed as a proportion of the initial employment, is $1+T$, and the number of additional jobs is $1+\lambda T$, where $\lambda<1$. The net change in employment is ($E_2 – E_0$), or $\lambda T$. However, the direct effect experienced by the treatment group may be larger or smaller than this.

If there is no turnover in the labour market, all of those who were initially employed retain their jobs, and a proportion of the treatment group gain employment. The proportion is $\lambda T/T = \lambda$. Analogously to the calculation of the substitution rate, we can define a 'crowding-out rate', which is 1 minus the ratio of net employment change to the number of the treatment group gaining employment $(1 - \Delta E/de)$ where *de* is the direct effect of treatment on the treated. In the 'no turnover' case, the direct effect (*de*) is that $\lambda T$ of the treatment group gain employment. The change in employment ($\Delta E$) is also $\lambda T$, so that the crowding-out rate equals zero.

[3] In this figure, employment increases by less than half of the increase in the number of workers, due to the fact that the labour demand curve is steeper than the labour supply curve. This is a fair representation of average labour demand and supply elasticities (slopes), although the relevant slopes may be different for different groups of workers. For instance, labour supply is fairly inelastic (steep) for married prime-aged males, and elastic (flat) for single youth. Labour demand is more elastic (flatter) for low-skilled workers. In general, policies to increase labour supply will have smaller wage effects, and thus larger employment effects, where labour demand is elastic and labour supply is inelastic. Similarly, policies to increase labour demand will have a larger employment impact when labour demand is inelastic and supply is elastic. Unfortunately, this means that policies have the greatest employment effects where the curve they are targeting is least responsive (inelastic).

In contrast, if jobs last only for one period, and everyone has to apply for the available jobs, there are *$(1+\lambda T)$* jobs available for *$(1+T)$* workers. Assuming that everyone, including the $T$ members of the treatment group, has an equal chance ($p$) of getting a job, the probability equals $(1+\lambda T)/(1+T)$. As long as $\lambda<1$ (i.e. as long as labour supply is not totally inelastic), the existence of turnover increases the chances that a treatment group member gains employment. When everyone has an equal chance of gaining employment, the direct effect of the treatment is $pT$, and the crowding-out rate equals $1 - \lambda T/(pT) = 1 - \lambda/p$. A key implication of this relationship is that if the treatment group is small relative to initial employment levels (i.e. for very small $T$) the crowding-out rate is close to 100%. Intuitively, everyone, including the treatment group, has an almost 100% chance of getting a job. Given that almost all of the jobseekers are not treatment group members, it is most likely that those who miss out will not be members of the treatment group.

In reality, it is unlikely that the treatment group have the same chance of gaining a job as untreated workers. Turnover will be less than 100%, so only a proportion of employed workers are at risk of losing their jobs. Furthermore, the treatment group members may be more or less efficient at securing the available jobs, either because of their search behaviour, or because they are not exactly the same as non-treatment group members. When the treatment group is different, their share of available jobs will depend also on how employers choose to combine them in production (the degree of complementarity or substitutability in production, as mentioned above in the context of subsidies).[4]

The more effectively the treatment group searches for jobs, the higher will be the proportion of the available jobs they will secure, and the higher will be the proportion of previously employed workers who fail to get a job. If all of the treatment group gain jobs, the proportion of those jobs that are at the expense of

[4] The figure describes a market for homogeneous workers. Where there are different types of workers, the effect on employment depends on the inter-related demands for the various productive inputs. We would *generally* expect that an increase in supply of one type of labour would lower the price for that type of labour. More of that type of labour would be used, and less of other inputs.

others is (1 - $\lambda$). The indirect effects (job losses by untreated workers) thus lie between 0 and (1 - $\lambda$).$T$. In addition, wages are lower as a result of the policy.

### 2.2.1 The Layard and Nickell model

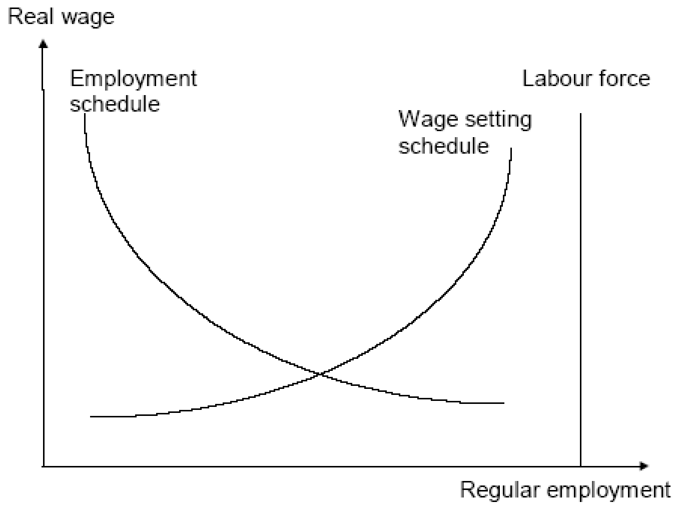
While the competitive model is useful for illustrating the role of wage flexibility in dissipating supply or demand changes, and for illustrating the difference between direct effects of treatment and net employment change, it is limited in its treatment of unemployment and disequilibrium. For instance, one feature of the competitive model is that there is no involuntary unemployment. The people who do not have a job are those who respond to the lower wages by choosing to leave the labour market. There is nobody who is without a job but willing to work at the (lower) final wage. The model is well suited to analysing changes in long-term equilibrium, but it does not have much to say about the process of job and worker turnover and matching.

For these reasons, most analytical treatments of ALMPs in the literature rely on a somewhat less constrained model of the labour market, which incorporates elements of wage bargaining and job search and matching, and contains a more explicit treatment of unemployment.

Calmfors (1994) presented a framework for analysing the design of ALMPs. This framework stems from the earlier equilibrium wage and unemployment model developed by Layard (1986) and Layard et al. (1991). It has subsequently been used in many papers, including OECD (1993) and Calmfors et al. (2001). Although a formal derivation of the Layard and Nickell model is beyond the scope of the current paper, the following section summarises the key relevant features of the model for analysing the effects of ALMPs. The presentation here will follow that of Calmfors et al. (2001).

The structure of the model can be summarised by the three curves that appear in Figure 3.

**Figure 3: The Layard and Nickell model**




*Source: Calmfors et al. (2001), Figure 4, p. 76*

The horizontal axis represents regular (i.e. excluding relief work) employment. The downward sloping Employment Schedule (*ES*) may be thought of as the familiar labour demand curve. It can also be derived as a reduced-form relationship between wages and employment, derived from a search model along the lines of Pissarides (1990), and Mortensen and Pissarides (1994). The advantage of such a derivation is that it is possible to model how labour demand depends on the pattern of dynamics and matching in the labour market, and not just on the employment level. Shifts in the *ES* curve may arise for all of the same reasons that labour demand shifts. In addition, any aspect of matching that makes it more attractive to open up a job vacancy will raise the *ES* curve. For instance, employers will demand more employment at any given wage if worker quit rates drop; if hiring and firing costs drop; or if there is more efficient matching of vacancies and unemployed workers.

The upward sloping wage setting schedule (*WS*) captures the fact that higher employment levels raise wage pressures. This relationship can be derived in a number of ways. It can be the outcome of collective bargaining; it can be the result of unilateral employer wage setting in a situation of 'efficiency wages' (i.e. where higher wages raise worker effort and hence productivity); or it can be the outcome of worker–employer bargaining. It is this final derivation that we will focus on.[5]

In the presence of hiring costs (or some other matching 'friction'), each filled job earns a profit. Existing or new firms will open new vacancies up to the point where the profit associated with opening a vacancy is reduced to zero. At that point, the profit from having a filled job is still, however, positive. We say that the hiring costs generate 'economic rents' on filled jobs, and it is these rents that workers and employers bargain over. The *WS* curve shifts upwards in response to any factors that strengthen the relative bargaining power of workers, or otherwise raise the ability of workers to negotiate higher wages. More efficient matching means that vacancies are filled more quickly, which strengthens the employer's hand in bargaining, moving the *WS* curve down. However, at any given employment level, a jobseeker's probability of finding is independent of matching efficiency.[6] Higher unemployment benefit levels increase workers' bargaining positions, leading to a rise in the *WS* curve.[7]

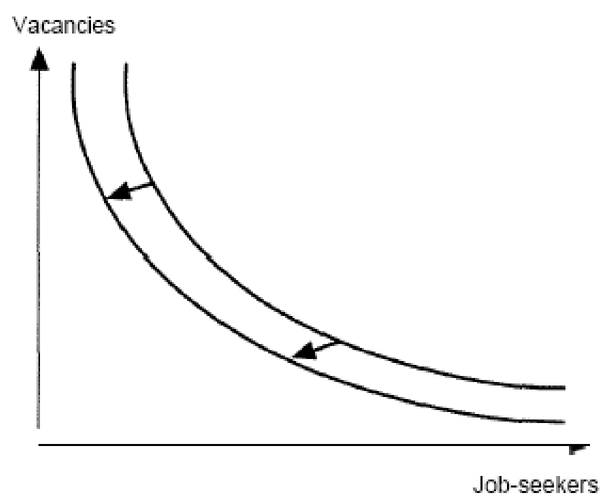
The vertical labour force curve (*LF*) to the right of the diagram represents the number of workers who are available for work and willing to work. For the purposes of modelling, it is assumed that workers are willing to work at any wage—a stark contrast with the upward sloping labour supply curve in the standard model. This strong assumption can be weakened to allow LF to slope upwards—the predictions of the model still hold as long as the LF curve is always to the right of the intersection of the ES and WS curves.

Equilibrium in this model is determined by the intersection of the (ES) and (WS) curves. At this equilibrium there are still workers who are unemployed, but willing to work at the equilibrium wage. Unemployment equals the horizontal distance between this intersection and the vertical labour force curve.

[5] For a more detailed derivation, see Mortensen and Pissarides (1999), or Pissarides (2000).
[6] See Calmfors et al. (2001), p. 77, footnote 5.
[7] The standard labour supply explanation for an upward sloping relationship between employment and wages still applies. Workers' outside options (in the form of increasing marginal utility of leisure) increase as employment levels rise, strengthening their ability to negotiate higher wages. This mechanism alone cannot, however, account for the links between matching and equilibrium, or the existence of involuntary unemployment, which are generated within the Layard and Nickell model.

Given the importance of the matching process in this version of the Layard and Nickell model, it is often presented alongside the Beveridge Curve, which summarises the relationship between unemployment and vacancies. A Beveridge Curve is shown as Figure 4. The Beveridge Curve can be viewed as an equilibrium relationship between unemployment and vacancies within a model of job matching. The downward sloping curve shows all combinations of unemployment and vacancy levels that generate the same number of job matches. Equilibrium employment in Figure 3 is associated with a unique ratio of unemployment to vacancies, and hence a unique point on the curve in Figure 4. An improvement in the efficiency of matching is captured as a movement inwards of the Beveridge Curve. For any level of unemployment, the same number of matches can be achieved with fewer vacancies. To link Figure 4 with Figure 3, we note that rising employment levels are associated with north-west movements along the Beveridge Curve, leading to higher vacancies and lower unemployment. For each employment level, there is a unique point on the Beveridge Curve that is consistent with stable unemployment.

**Figure 4: The Beveridge Curve**




### 2.2.2 Characterising ALMPs

In order to analyse the impacts of active labour market policies within the framework of the Layard and Nickell model, we need to characterise policies in terms of the variables included in the model. Calmfors (1994) and Calmfors et al. (2001) group the effects of active labour market policies under the following headings (Calmfors et al. (2001), p. 76 ff.):

*effects on the matching process*

Improving the efficiency with which vacancies and unemployed workers are matched makes it more attractive for employers to open vacancies *(ES* moves up), and raises employers' bargaining position (*WS* moves down).[8] The net effect is higher employment and ambiguous wage effects (E+).

*effects on the competition for jobs*

Increasing the effectiveness with which jobseekers search for new jobs weakens the bargaining position of workers by making unemployment less attractive. The *WS* curve shifts down, leading to higher employment and lower wages (E+, W-). 'Locking-in' effects can have the opposite effect—while jobseekers are on labour market programmes, they may reduce their job search activities, reducing competition for jobs (E-, W+).

*productivity effects*

If workers are more productive, the value of a filled job increases and employers are willing to pay more (*ES* moves up). There may be an offsetting rise in the *WS* curve if workers raise their reservation wage. The net effect is for higher wages and (probably) higher employment (W+, e+).

*effects on the allocation of labour between sectors*

This case requires an extension of the basic model presented above. Because the *WS* curve is convex (curves upward), shifting workers from sectors where employment is high relative to labour force yields a larger decline in wages

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[8] This conclusion reflects the treatment in Calmfors et al. (2001). The derivation of the matching model in Chapter 1 of Pissarides (2000) suggests that the wage curve (*WS*) is independent of matching efficiency for a given level of 'tightness' (=V/U), and that matching efficiency affects only the *ES* curve. This contrasts with the argument in Calmfors et al. (2001) p. 77) that, for a given *employment* level, matching efficiency lowers the wage curve, and the presentation in Cahuc and Zylberberg (2004) Chapter 9), which suggests that it raises the wage curve. I have been able to reproduce Pissarides' findings but have been unable to reconcile it with the other treatments. The outward shift in the *ES* curve is unambiguous.

than the rise in wages resulting from their entering a low-employment sector. Net employment increases and (average) wages drop (E+, W-).

*direct crowding-out effects on regular labour demand*

This covers the ‘displacement’ and ‘substitution’ effects described above. Recall that subsidised employment is excluded from regular employment, as shown in Figure 3. Substitution and displacement therefore lead to a leftward shift of the *ES* curve, leading to lower employment and wages (E-, W-).

*accommodation effects of wage-setting*

If ALMPs reduce the costs and undesirability of unemployment, workers will be willing to negotiate for a higher wage since the threat of unemployment is not as great. The *WS* curve shifts up, leading to lower employment and higher wages (E-, W+). More stringent work testing, or requirements to participate in programmes, may make unemployment more undesirable, lowering *WS* and leading to higher employment and lower wages (E+, W-).

The search and matching version of the Layard and Nickell model is thus able to illustrate how a range of different ALMPs can have effects on the level of employment. Without such effects, a positive direct employment effect of ALMPs would be possible only at the expense of non-participants.

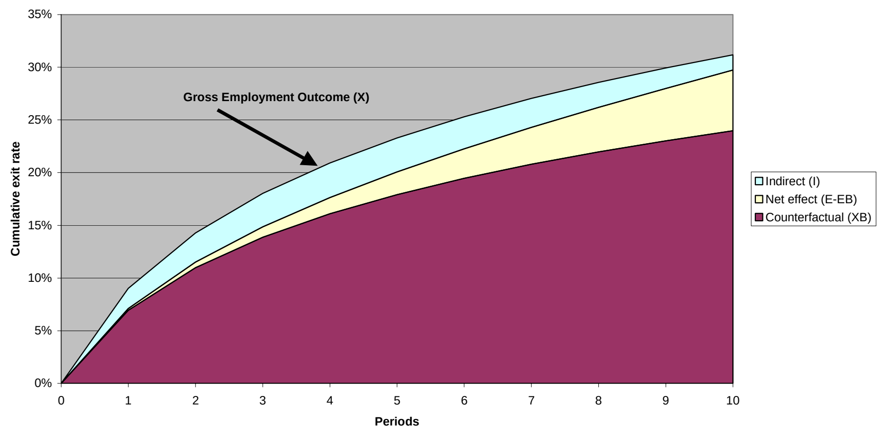
# 3 Estimation approaches

In general, impact evaluations of ALMPs estimate either the direct impact of a policy (on the treatment group), or the net impact of a policy (on total employment or fiscal costs). Estimating indirect effects is a subsidiary task, required for intermediate calculations. The use of, and interest in, estimates of indirect effects varies according to the task at hand. Consider the following equation for the net employment effect of an ALMP:

$$[E-E_B] = [X-X_B] - I \qquad (1)$$

where $E$ = total employment, $X$ = outcomes for the treatment group; $I$ = indirect effects; and the subscript $B$ denotes a baseline or counterfactual level. The equation thus says that the growth in the number of jobs as a result of the policy ($E$ - $E_B$) equals the policy-induced increase in the number of jobs filled by the treatment group ($X$ - $X_B$), less the loss in jobs by non-participants. This relationship is summarised in Figure 5

**Figure 5: Decomposition of cumulative gross employment outcomes**




The upper line in the graph represents the observed cumulative gross employment outcomes ($X$), expressed as the proportion of the participants who gain jobs, observed at various periods after the treatment is received. In this hypothetical example, outcomes range from 8% in the first month to over 30% after 10 months. This effect is graphically decomposed into three parts. The lower block shows the counterfactual outcomes that would have been observed in the absence of the programme ($X_B$). The light band in the middle shows net employment creation, and the top band shows the indirect effect—placements of participants that have been achieved only at the expense of fewer non-participants having jobs.

Because the upper line is cumulative, it should be non-decreasing (unless enough of the treatment group return to unemployment). Similarly, we would expect the counterfactual line to be non-decreasing.

## 3.1 For evaluation

For an *ex post* evaluation of the impact of an ALMP, two of the quantities in Equation 1 will be known: total employment ($E$) and total number of jobs filled by the treatment group ($X$). There remain three unknown quantities ($E_B$,

$X_B$, and $I$). Estimating any two of them is sufficient to identify the third, since the third can then be calculated using Equation 1.

If the objective of the evaluation is to *estimate direct effect* ($X$-$X_B$), we need to estimate only the counterfactual outcomes ($X_B$) for the treatment group. While this may sound straightforward, finding ways to estimate such counterfactuals is the main focus of most of the quantitative evaluation literature. A review of these methods is beyond the scope of the current review, although Heckman et al. (1999) provide a thorough review of the main issues and approaches.

If the objective of the evaluation is to *estimate net employment effects* ($E$ - $E_B$), there are two main approaches.

First, we could estimate $E_B$ directly, using a model of the aggregate or local labour market. This would provide an estimate of what the level of employment would have been in the absence of any (policy) change. Unexplained changes in employment could be attributed to the policy, although this would reflect a lot of faith in the labour market model. To be more sure that the unexplained changes were a result of the policy rather than of other omitted variables, we would like to find a stronger test. For instance, we could use (ideally randomised) variation in the intensity of policy effects across local labour markets to pin down the correlation between unexplained employment change and the policy. If we were to take this first approach, and also obtain an estimate of the direct effect ($X$ - $X_B$), we could derive an estimate of $I$ which, although not necessary, would be useful for future forecasting exercises, or as an input for the second approach to estimating net employment effects (see below).

An alternative approach to estimating ($E$ - $E_B$) directly is to ignore flows into and out of the labour market, and use the negative of the net *unemployment* impact ($U$ - $U_B$) as a proxy for the employment impact. If workers are either employed or unemployed, then the change in employment equals -1 times the change in unemployment. This general approach can be further refined by estimating separate counterfactuals for unemployment inflows and outflows, and comparing those with observed inflows and outflows. As for the identification of employment effects, using spatial (or other available) variation better to isolate the relationship between unexplained changes in flows and the policy is desirable.

The second approach would be to estimate ($E$ - $E_B$) by using estimates of the other elements of Equation 1. Estimates of $X_B$ and $I$ would be sufficient to generate an estimate of the net employment effect. $X_B$ can be obtained from an estimate of the direct effect ($X$ - $X_B$), as in the first approach. The remaining challenge is to separate the effects of the two remaining variables ($E_B$ and $I$). Without modelling aggregate labour market outcomes directly, we must obtain an estimate of $I$. This is problematic as there is not, in general, a reliable way to estimate $I$ directly. We must use estimates of $I$ obtained from other sources, such as previous evaluations that have taken the first approach of estimating $E_B$ directly. However, our estimate of the net employment effect is only as good as the external estimate of $I$.

The choice of which approach to take comes down to which estimation method yields the more reliable (lower variance) estimates, given the data that are available. If we are confident about our external estimates of $I$ then the second approach is fairly straightforward. If we are not, then we would prefer the first approach, as long as the errors in modelling total employment do not yield even greater errors.

## 3.2 For forecasting

For the purposes of forecasting, the challenges are greater, and we are forced to rely to a greater extent on externally derived assumptions and parameters. None of the five unknown quantities in Equation 1 ($E$, $E_B$, $X$, $X_B$, $I$) is observed.

Two assumptions are needed to forecast direct effects. We could use assumed values for both $X$ and $X_B$, which would be sensible if we were confident about our forecasts of both the counterfactuals and the gross employment outcomes. Alternatively, we may have more confidence in our ability to forecast the relationship between these two quantities than to independently forecast the levels of both. For instance, we may have prior information on the likely 'deadweight ratio' ($\delta = X_B/X$), which is the proportion of outcomes that would have occurred in the absence of any policy change. In this case it is sufficient to make assumptions about $\delta$ and $X_B$. An estimate of ($X$ - $X_B$) is then available as a simple scaling of $X_B$: $X - X_B = X_B*(1 - \delta)/\delta$.

Using Equation 1, we can see that forecasting (E - EB) requires making three assumptions—one for each of the unknowns on the right-hand side of the equation. Obtaining an independent estimate of I (the number of jobs filled by participants that were at the expense of non-participants) is likely to be difficult. There may be more stability and predictability in the ratio of indirect to direct effects ($\gamma$ = I / (X - XB)). Using the definitions of $\delta$ and $\gamma$, Equation 1 becomes:

$$[E - E_B] = X_B\left(\frac{1-\delta}{\delta}\right)(1-\gamma) \qquad (2)$$

so that the forecast of the net employment effect is generated as a proportion of the baseline (counterfactual) outcomes. Equivalently, the net employment effect can be expressed as a proportion of the gross employment outcomes: $E - E_B = X(1 - \delta)(1 - \gamma)$. The three parameters for the forecast are for $X_B$, $\delta$, and $\gamma$. Equation 1 can be rewritten in many different forms, depending on what information is available. For instance, forecasters may have good estimates of the ratio of gross employment outcomes to participants ($X/P$ or $X_B/P$), in which case a different version of Equation 1 can be derived.

## 3.3 The special case of subsidies: substitution and displacement effects

As in the theory section, wage subsidies are a special case, in that indirect effects can, at least conceptually, be separated into substitution ($S$) and displacement ($D$) effects ($I=S+D$). Substitution occurs where employers substitute cheaper (subsidised) workers for other workers. Displacement occurs where firms with subsidised workers can out-compete other firms, causing those other firms to reduce employment.

Separating the indirect effects into substitution and displacement effects is advantageous for forecasting and estimation only if reliable estimates are available for at least one of these components separately, or if a subsequent evaluation will be able to isolate one of these effects and compare it against initial estimates. Otherwise, it would be simpler to use an estimate of their sum, since the two effects enter into calculations in the same way.

Substitution and displacement effects are customarily summarised as proportions, either of gross outcomes ($X$) or of the direct effect ($X - X_B$), giving the following two possible forms for Equation 1:

$$S = \sigma X,\ D = \phi X \Rightarrow E - E_B = X(1 - \delta - \sigma - \phi) \tag{3a}$$

$$S = \sigma(X - X_B),\ D = \phi(X - X_B) \Rightarrow E - E_B = X(1 - \delta)(1 - \sigma - \phi) \tag{3b}$$

In the second of these specifications, the indirect effects appear as a factor $(1 - \sigma - \phi)$ that scales the direct effect $(X(1 - \delta))$. Some authors extend this 'factoring' approach and express the indirect effects factor in the form $(1 - \sigma')(1 - \phi')$.[9]

There are two reasons that these effects make sense only in the case of subsidies. First, only with subsidies is it possible to identify directly affected jobs and firms as well as directly affected jobseekers. Second, only with subsidies can the policy be characterised as a price change. These unique features of subsidy programmes also open up possibilities for testing and estimating effects.

*Direct interviewing*: Some studies of wage subsidy programmes have estimated substitution effects by directly asking employers whether the subsidised hire is additional to hires that would otherwise have been made. Given that 'additionality' is often a requirement of wage subsidy hires, we might expect employers to understate the extent of substitution. Where there is substitution, some studies also ask whether the particular person hired would have been hired in the absence of the subsidy. Within the context of studies of subsidy programmes, this is referred to as a 'deadweight effect'. The use of the term in this context is narrower than the concept of deadweight effect shown by $\delta$ in the equation. In the equation, $\delta$ refers to the proportion of positive outcomes for the treatment group that would have found jobs even without the policy.

[9] The parameters will be different, since $(1 - \sigma - \phi) = (1 - \sigma)(1 - \phi) - \sigma\phi$.

In the wage-subsidy context, ‘deadweight’ often refers to the proportion of subsidised hires where the employer would have hired the *same person* even without the subsidy. We will refer to this form of deadweight effect as ‘*firm deadweight*’. It is a subset of deadweight as measured by $\delta$, since participants who are placed in a specific job that they would have secured anyway are a subset of participants who would have secured a job without the subsidy.

*Firm-based counterfactuals:* If it were possible to model counterfactual employment levels for firms that employed subsidised workers, the resulting estimates would provide a means of estimating substitution effects. I have not seen any studies taking this approach.

*General equilibrium modelling:* Because subsidies can be modelled as a change in price, they are well suited to modelling within a general equilibrium framework. This approach explicitly models economy-wide adjustments to changes in prices, labour supply, etc. By comparing the estimated employment level before and after the inclusion of a policy effect in the model, we can get an estimate of economy-wide displacement effects.

# 4 Empirical estimates

There is a startling lack of empirical estimates in the evaluation literature of indirect effects of ALMPs. The primary focus of most of the literature has been on direct effects—the effect of treatment on the treated. For instance, in Heckman et al. (1999), only 11 of the 232-page chapter reviewing ‘the economics and econometrics of active labour market programmes’ deals with indirect effects, and of this, almost half is devoted to a review of a single study (Heckman et al. (1998)). Smith (2000, p. 33) refers to “the literature’s general avoidance of the topic [of general equilibrium effects]”.

Many studies contain explicit comments about the importance of indirect, macroeconomic, and general equilibrium effects, and note that it is not possible to evaluate programmes fully with only direct effects. Very few, however, make any attempt to estimate indirect effects. The studies that do contain estimates of indirect effects are almost exclusively studies of wage subsidies or, to a lesser extent, training programmes. Except in the wage subsidy studies, most empirical work attempts to estimate net employment effects, and is not concerned with deriving estimates of indirect effects. As far as I can tell, there is a complete absence of studies that independently estimate direct effects and net employment effects, which is what would be needed to derive an independent estimate of the strength of indirect effects.

There are four streams of empirical studies of indirect effects of ALMPs, reflecting different estimation strategies, and to some extent different interests.

First, there are studies that derive estimates by surveying employers or participants and asking them directly about the extent of indirect effects. These studies are particularly relevant for wage subsidies. Some of these studies also supplement survey responses with administrative data. Section 7 of OECD (1993) summarises findings from several such studies, and Tables 10 and 11 of Calmfors et al. (2001) list similar Swedish studies.

The second stream of studies link regional employment outcomes to measures of programme intensity across regions to identify net employment effects, usually expressed as a proportion of programme participants (subsidised jobs). These studies are really only suitable for examining fairly large-scale programmes, as it would be difficult to separate the impacts of small programmes from random variation in employment. The studies in this stream often use dynamic panel analysis methods for estimation. Within this stream there are two main approaches. Most authors take a ‘reduced form’ approach, essentially regressing employment levels on ALMP intensity. An alternative approach is taken by some authors such as Hagen (2003), who adopt a theoretically-based structural model and estimate the parameters of the model. There is growing use of structural matching models, based on a search version of the Layard and Nickell model presented above.

Studies from the third stream group ALMPs into broad categories and use cross-country variation in expenditure/GDP or participants/labour force as an ALMP measure, to examine links between ALMPs and national labour market outcomes. There have been a large number of such cross-country studies, many using data from the OECD. In many cases the main focus of the studies is not on ALMPs but on examining links between economic performance and labour market institutions more generally, as summarised by Nickell and Layard (1999). Studies of this type that are primarily focused on ALMPs include Jackman et al. (1990), OECD (1993), and Estevao (2003). Several others are summarised in Section 5 of Calmfors et al. (2001).

The fourth stream of studies use calibrated theoretical models to estimate the quantitative impact of simulated policy changes. Not surprisingly given the large investment needed to build such models, there are only a few examples, the most prominent of which are Davidson and Woodbury (1993), and Heckman et al. (1998).

Table 1 and Table 2 provide an indicative list of studies and summarise their findings. The list is not exhaustive. I have attempted to present findings in a way that is consistent with the notation introduced earlier. All of the studies listed in Table 1 are studies of wage subsidy programmes, and reflect a variety of estimation approaches. Many of the studies contain multiple estimates of the parameters of interest. Where possible, I have used the authors' preferred estimate. Otherwise I have preferred estimates that best control for problems of omitted variables and endogeneity of ALMPs.[10]

While there is a good deal of variation in findings, the overall pattern is of large indirect effects. Net employment growth due to wage subsidies is generally estimated to be around 5–10% of the gross effect ($(E - E_B)/X$). Different studies attribute different amounts of the indirect effect to deadweight, substitution, and displacement, although these terms are used in different ways, and in some cases interchangeably, in different studies. At the risk of oversimplifying the patterns of findings, we can link the findings to the terminology used in this paper as follows: deadweight effects ($\delta$) in the order of

[10] Endogeneity arises where causality runs from employment levels to ALMPs rather than from ALMPs to employment, yielding biased estimates. Such a problem may arise if ALMP expenditure falls in response to employment growth. Many of the studies use some form of instrumental variables estimation to control for this problem.

60%; substitution (S/X) of around 25%; and displacement (*D/X*) of around 5%. Net employment effects are generally somewhat larger for subsidy programmes that are not targeted at the private sector.

Table 2 reports a selection of findings from studies that are not focused on wage subsidies. Many of the studies in Table 2 provide analyses of overall ALMP participation or expenditure. Some of them also disaggregate these measures into broad categories of ALMP, such as training, subsidies, placement services, and work experience. Rather than report all findings, I have listed only main insights from each of the studies.

The findings from Table 2 are in general more 'broad brush' than those in Table 1, reflecting a broader interest in the impacts of ALMPs rather than in the impact of a particular programme. Many of them also focus on unemployment rather than employment, or on wage pressure rather than on net employment effects. Overall, the findings are that ALMP expenditures tend to decrease open unemployment (i.e. excluding programme participants), and to have more positive effects on total unemployment. The estimated impact of ALMP expenditure on wage pressure appears to vary quite a lot across studies.

It is difficult to link these general findings to the factors expressed in Equation 1. The studies give an indication of the direction of net employment effects but they are generally expressed in terms of their links to expenditures, and cannot easily be translated into indirect effects per participant, as would be needed to incorporate them into Equation 1. Estevao (2003), and the various studies summarised in Section 5 of Calmfors et al. (2001), frame and interpret their work in the context of the Layard and Nickell model presented above. In many cases though, the empirical estimates are of the reduced form relationship between ALMPs on the one hand and wages, employment, or unemployment on the other. The theory generally serves mainly as motivation, and is at this stage more well developed than the accompanying empirical work.

**Table 1: Summary of empirical studies of indirect effects—subsidy policies**

| *Authors* | *Type of programme* | *Method* | *Indirect effect estimated* |
|---|---|---|---|
| *Subsidies* | | | |
| New Zealand Department of Labour (1984) | Private sector wage subsidy | Survey: direct questions | Substitution (*S/X*): 65% (brought forward hiring) |
| Calmfors et al. (2001) | Various forms of partial or full subsidy programmes | Summarising 11 direct interview studies | Substitution (*S/X*): 39%–84% (larger where programme is close to 'regular' labour market) |
| Davidson and Woodbury (1993) | Re-employment subsidy | General equilibrium simulation modelling (with fixed prices) using a search model | Net effect (($E$-$E_B$/$X$): 40–70% |
| Calmfors et al. (2001) | Various forms of partial or full subsidy programmes | Summarising six econometric studies, each of which covered one or more programmes. Mostly panel of local areas (one aggregate time series) | 'Displacement' (not D/*X*): typically well above 60%<br>=> Net effect (($E$ - $E_B$/$X$) below 40% |
| Kangasharju and Venetoklis (2003) | Wage subsidy | Panel analysis of firm unit record data | Deadweight + substitution 46%<br>Displacement: Not significant |
| Breen and Halpin (1989) (as reported in OECD (1993), Table 2.10) | Employment subsidy | Employer interviews | Deadweight (($X$ - $X_B$)/$X$): 70%<br>Substitution (*S/X*): 21%<br>Displacement (*D/X*): 4% |
| de Koning et al. (1992) (cited in OECD (1993), Table 2.10) | Private sector wage subsidy | Econometric analysis of placement data; employer interviews | Deadweight (($X$ - $X_B$)/$X$): near 0<br>Deadweight + substitution: 76–89% |
| Blake et al. (1999) (cited in OECD (1993), Table 2.10) | Private sector wage subsidy | Participant and employer interviews; register data on other unemployed persons | Deadweight (($X$ - $X_B$)/$X$): 67–79% |
| Forslund and Krueger (1997); also cited by Calmfors et al. (2001) | Public relief workers (full subsidy) | Regress unsubsidised jobs on lagged number of subsidised jobs | Net effect (($E$ - $E_B$/$X$): (1–69)=31% |
| Hagen (2003) | Wage subsidy in non-profit organisations | Estimated matching function and dynamic panel estimation of local labour demand | Net effect [$E$ - $E_B$]/$X$: 6–10% |
| Katz (1998) | 10% wage subsidy for low wage workers | Impose supply and demand elasticities on competitive equilibrium model | Wages rise by 2%<br>Employment of low wage workers rises by 0.8% |
| Hujer et al. (2002) | Job subsidy | Dynamic panel GMM using regional variation in participant numbers | Unemployment rate lowered for one quarter |
| Heckman et al. (1998) | Tuition subsidy | General equilibrium simulation modelling of the impact of a revenue-neutral $500 increase in tuition subsidy | Substitution: college enrolment up 0.5% (up 5.3% if relative prices are held constant) |

**Table 2: Summary of empirical studies of indirect effects—other policies**

| ***Authors*** | ***Type of programme*** | ***Method*** | ***Indirect effect estimated*** |
|---|---|---|---|
| Calmfors et al. (2001) | Cross-country evidence on impact of increased ALMP participation by 1% of Labour Force | Summarising 10 studies | Open[11] unemployment: 0–1.5% reduction |
| Calmfors et al. (2001) | Various forms of ALMP (mainly relief work and training) | Estimated wage-setting schedules | Wage pressures increased by ALMP (nil or negative effect for training) |
| Calmfors et al. (2001) Section 4.1) | Measures of participation in various forms of ALMP | Studies estimating Beveridge Curves, matching functions, and geographic mobility | Weak positive or no effect on matching efficiency<br>Mixed results on geographic mobility (interpreted as matching efficiency) |
| Hujer et al. (2002) | Participants in vocational training | Dynamic panel GMM using regional variation in participant numbers | Unemployment rate lowered slightly |
| Altavilla and Caroleo (2002) | Participants in all programmes | Dynamic panel GMM and panel VAR modelling using regional data | Unemployment rate lowered |
| Speckesser (2003) | UK and German subsidy and training | Dynamic panel estimation using regional variation | Impact on unemployment and on matching efficiency “results . . . weak and not robust” |
| Hagen (2003) | Subsidised training | Estimated matching function, and dynamic panel estimation of local labour demand | No effect on matching or total employment |
| Calmfors et al. (2001), Table 15) | ALMP expenditure per person | Summarised 10 reduced form studies using either cross-section or panel analysis of OECD countries | Reductions in open unemployment, with smaller reductions or increases of total unemployment |
| Estevao (2003) | ALMP expenditure as a proportion of GDP | Cross-country panel estimation of reduced form relationships, as well as estimation of a wage-setting schedule | Employment increased<br>• particularly for subsidies and measures for disabled<br>• no training effect<br>• employment lowered by placement services<br>Wage pressure lowered<br>• especially for training and subsidies<br>• placement services raise wage pressure |

[11] Open unemployment = (total unemployment, including ALMP participants) – ALMPs participants

# 5 Summary

This paper was prepared for the New Zealand Ministry of Social Development, as an input into its ongoing work to analyse, evaluate, and forecast the impacts of ALMPs in New Zealand. The review updates and extends previous work of Chapple (1999).

The paper sets out some key issues in thinking about and estimating indirect effects of labour market policies. The *indirect effect* of an ALMP is the effect that it has on people other than those in the treatment group. In general, the nature of indirect effects is that some of the gains made by the treatment group are at the expense of other workers or jobseekers, although it is theoretically possible that policies that improve the prospects of assisted jobseekers also improve outcomes for other workers.

In the special case of policies that change the cost of labour to the employer (e.g. wage subsidies), there is a meaningful distinction between substitution and displacement effects. Substitution effects arise when employers choose to employ cheaper, subsidised workers instead of other workers. Displacement occurs where firms employing subsidised workers are able to produce goods more cheaply and increase their market share, at the expense of unsubsidised firms.

Indirect effects are generally ignored in evaluation studies, where the focus is commonly on the improvements in outcomes for assisted jobseekers (direct effects). The direct effect of an ALMP is the improvement in outcomes, relative to what the treatment group would have experienced in the absence of the policy. The term ‘deadweight’ is used to refer to treatment group outcomes that would have occurred even without the treatment.[12]

In the absence of indirect effects, the direct effect of a policy is matched by a net increase in employment. Net employment growth equals the direct effect, less indirect effects: $[E - E_B]=[X - X_B] - I$.

[12] The use of the terms ‘substitution’, ‘displacement’, and ‘deadweight’ varies within the literature.

The examination of indirect effects is thus tantamount to examining the ability of policies to generate employment increases. While the competitive model of the labour market is a good starting point, we need a more sophisticated model if we are to examine the impacts of different labour market policies—one that captures some of the key institutional features of the labour market. The equilibrium unemployment model introduced by Layard and Nickell is widely adopted for analysing ALMPs. This model emphasises the process of matching unemployed workers to vacancies. Policies that improve the rate or quality of matching can increase employment.

In order to estimate the strength of indirect effects, we need estimates of both the net employment increase, $[E - E_B]$, and the direct employment effect $[X - X_B]$. Generally, the information required to estimate each of these two elements differs. The net employment increase is commonly estimated based on variation in local programme intensity and predicted local labour market outcomes, often with particular attention paid to employment of groups of workers whose employment is expected to be most affected by the treatment group. Direct employment effects are estimated by comparing outcomes for the treatment group with an estimate of what their outcomes would have been without the policy (usually modelled as a function of outcomes for a comparison group).

For the purposes of forecasting net employment effects, more assumptions are needed. There are a number of forms that the assumptions can take, depending on what information is most reliable or available.

It is difficult to compare estimates of the strength of indirect effects. Different studies vary in their approaches, definitions, and the form of their estimates. Empirical estimates of indirect effects are available almost exclusively for one particular type of policy—wage subsidy programmes. At the risk of oversimplifying the insights from many studies, the general findings are of deadweight effects of around 60% of gross employment outcomes, and net employment of 5–10% of gross outcomes. Indirect effects are thus around 30–35% of gross outcomes, or about three-quarters of the direct employment effect (30%/(100% - 60%)). The indirect effects of 30% of gross outcomes are accounted for by substitution (25 points) and displacement (5 points).

For policies other than wage subsidies, studies tend to estimate net employment effects rather than indirect effects. The theory is better developed than the empirical work in studies of non-subsidy policies, and the nature of predicted effects is thus better understood than the size of indirect effects.

Preparing policy costings and forecasts is going to require a good deal of judgement and sensitivity analysis for the foreseeable future, until a more robust evidence base is built up through well-focused empirical studies and evaluations.

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