

## Labor Policies to Raise Employment

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*Using panel data for 15 industrial countries, active labor market policies (ALMPs) are shown to have a positive effect on employment rates, after controlling for institutional variables and country-specific effects. Among such policies, direct subsidies for job creation were the most effective. This paper shows that ALMPs raise employment by improving labor market functioning: higher expenditure on ALMPs is associated with lower wages for given levels of the unemployment rate. Whether ALMPs are cost-effective from a budgetary perspective remain to be determined, but they are certainly not substitutes for comprehensive institutional reforms. In particular, if higher expenditures on ALMPs are financed through increased labor income taxation, it could have deleterious effects on labor utilization. [JEL D2, E2, J23]*

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The steady rise in unemployment rates in Europe during the 1970s and 1980s has been attributed to a variety of factors, including mismatches between labor skills demanded and supplied, excessive wages vis-à-vis productivity levels, overly generous social benefits, and rigid labor market institutions. In response, governments introduced “active labor market

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policies” (ALMPs) designed to mold characteristics of the labor force to conform to changes in demand, to lower firms’ labor costs directly, and to increase job-search efficiency.<sup>1</sup> Following the increased focus on these policies, employment performance improved appreciably in several European countries during the second half of the 1990s.

This paper shows that increased spending on ALMPs raises employment in the business sector. Direct subsidies for job creation were the most effective form of ALMP in raising employment rates, whereas expenditures on training programs seem to have been largely ineffective. By estimating a wage-setting curve for the same sample of countries, it is also shown that substantial wage moderation was associated with increases in ALMPs in the 1990s and could be a key reason for the improved employment performance in the same period. These results reveal one of the possible sources of the hitherto unexplained wage moderation in some European countries.<sup>2</sup> However, even though ALMPs do increase employment, they also weigh heavily on the budget. If such budgetary costs are paid with increased taxation on labor income, additional spending on ALMPs could have a negative overall effect on employment rates, because the tax wedge on labor income is estimated to negatively affect employment.

The methodology used here addresses four key shortcomings of previous macroeconomic studies of the effect of ALMPs on the labor market, which have generally been inconclusive. First, the specification used in many of these studies tends to overestimate the effect of ALMPs on the unemployment rate. Second, none of the previous work has focused on the most appropriate measure of labor market performance, the business employment rate. Third, many studies use either pooled cross-country regressions or panel data with random effects, with no (or very little) within-country variation in ALMP spending. In particular, most of the literature has focused on the effect of institutions on unemployment rates, leaving ALMPs as a control variable. In many cases, such a focus has limited the amount of time variation in the data, because institutions tend to change very little over time. Fourth, in general, the data used in previous studies did not extend beyond 1995.<sup>3</sup>

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<sup>1</sup>ALMPs consist mainly of training, targeted subsidies for job creation, public employment services, and other expenditures aimed at promoting employment. Nontargeted policies to lower labor costs are not included in this definition because they are considered general macroeconomic policies.

<sup>2</sup>This moderation has been used as one of the main variables to explain sharp labor market improvements in the Netherlands and Spain, for instance (Blanchard, 2000; Decressin and others, 2001). Microeconomic data for France also point to structural labor market improvements, which seems to have originated from moderation of wage demands (Estevão and Nargis, 2005).

<sup>3</sup>An alternative strategy focusing on institutional details, implementation timing, and microeconomic data can provide satisfactory evaluation of specific policies, but it cannot answer the question of how effective aggregate expenditures on ALMPs are in increasing aggregate employment, for instance. Section II briefly discusses key lessons from microeconomic evaluation studies of ALMPs.

### I. Why Might ALMPs Increase Employment?

ALMPs may affect employment through at least five channels. To catalog these effects, consider a simple labor market model with a downward-sloped labor demand and an upward-sloped wage-setting relationship; the latter could be generated by most existing theories of wage setting, including the wage bargaining models discussed in Layard, Nickell, and Jackman (1991) (Figure 1).<sup>4</sup>

First, ALMPs may generate more efficient matching between job vacancies and unemployed workers by adjusting the skill mix of job seekers (for instance, through training programs) or enhancing the effectiveness of job searches (for instance, through more active employment agencies). The resulting smaller ratio between vacancies and unemployment reduces wage pressure, causing a downward shift in the wage-setting curve. Because vacancies are costly to employers, the reduced vacancy-to-unemployment ratio also causes an outward shift in labor demand. Both effects will tend to raise employment with an uncertain overall effect on real wages.

Second, labor force productivity may increase, owing either to training programs or to on-the-job learning in the case of direct subsidies for job creation. This productivity increase would shift up the labor demand and lift employment and wages.

Third, ALMPs may keep unemployed workers attached to the labor force, even after long periods of inactivity. The resulting stronger competition for jobs would shift the wage-setting curve down, raising employment and reducing wages.

Fourth, job creation programs (for example, direct subsidies for low-skill employment) could increase employment through both a positive substitution effect (for the subsidized group) and a scale effect from an overall reduction in labor costs. However, significant negative substitution effects, through the displacement of nonsubsidized workers, could counteract the beneficial effects on employment.

Fifth, active policies may lower the disutility of being unemployed, because they provide an occupation to otherwise unemployed workers, some income, and a hope of keeping their labor skills. But workers would then demand higher wages during bargaining and, in equilibrium, employment would actually be lower. Additional undesirable side effects include locking-in effects (ALMPs may stimulate workers to reduce their search efforts) that counteract the desired treatment effects.<sup>5</sup>

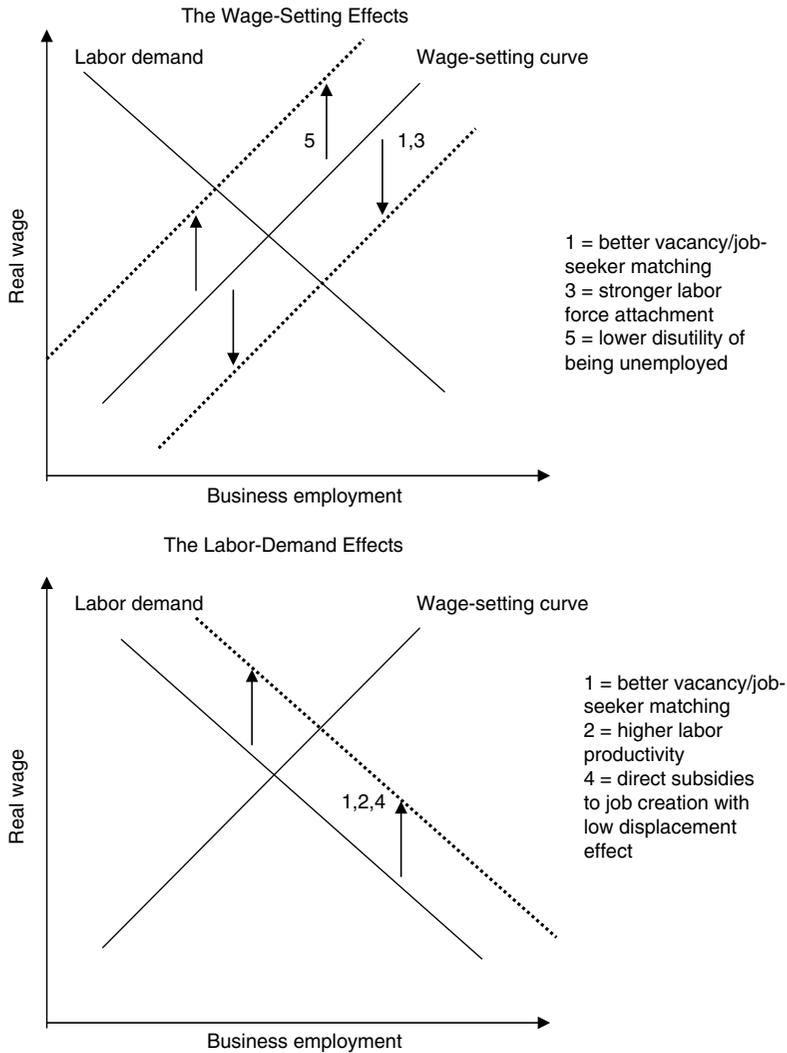
Finally, an important caveat should be noted. Even if a positive effect on employment might be discerned, the fiscal cost of ALMPs may be very high and given that they are financed through taxation, their overall effectiveness in a general equilibrium or cost-benefit sense remains questionable.

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<sup>4</sup>Most of these factors were outlined in OECD (1993).

<sup>5</sup>See the discussion in Calmfors (1994), for instance.

Figure 1. How Might ALMPs Affect Employment? The Wage-Setting Effects



## II. Literature Review and Key Identification Issues

### Policy Evaluation Studies Using Microeconomic Data

Evaluation studies of ALMPs using microeconomic data produce different results depending on the type of policy being evaluated, on the methodology being used, and on the chosen performance criteria, but, in many cases, they show a positive effect on employment rates among the targeted population. In an effort to organize the vast literature on the topic for the United States, Heckman, Lalonde, and Smith (1999) set up a microeconomic framework for grouping the evaluation studies and distilling their main results. Under this framework, changes in human capital accumulation is the key result variable

for evaluating the effectiveness of ALMPs. The authors conclude that available studies overstate the human capital-enhancing benefits of ALMPs, as evidenced by the fact that these programs do not significantly affect participants' lifetime wages; most of their positive effects happen through improved employment prospects.

Microeconomic evaluation studies tend to find no significant effects of training policies on employment, although they report more positive effects for job-subsidy and job-search measures on targeted individuals. However, studies stress possible substantial displacement effects on nonparticipating individuals.

Martin and Grubb (2001) show that training programs tend to be among the most expensive active measures, accounting for a large share of ALMP expenses, but microeconomic evaluations for Organization for Economic Cooperation and Development (OECD) countries suggest a mixed track record. Programs in Canada, Ireland, Sweden, and the United States have generally yielded low or even negative rates of return for participants, although the evidence discussed in Friedlander, Greenberg, and Robins (1997) stresses a few cases of success. In general, evaluation studies for the United States found that training policies were more successful when carefully targeted to specific groups, mainly adult women. Results tended to be less favorable when programs were targeted to adult men, and they were quite abysmal for programs aimed at out-of-school youth. The available evidence for the effects of training policies on employment in European countries tends to be a bit more positive (Heckman, Lalonde, and Smith, 1999).

Micro evaluations of job-search assistance programs have produced more positive results. Several studies show that these programs cost little and raise employment rates significantly, although often job displacement effects are large.<sup>6</sup>

Direct job subsidies are more common in Europe and in general have been found to affect employment positively, with a substantially stronger impact than training programs.<sup>7</sup> However, several studies also show that subsidies for private sector employment have large deadweight and substitution effects.<sup>8</sup> Thus, the net employment gains from these policies

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<sup>6</sup>See, for instance, the evidence in Engstrom, Lofgren, and Westerlund (1988) for Sweden.

<sup>7</sup>Among the many papers showing a positive effect of direct subsidies for private sector jobs on employment rates, see Stromback and Dockery (2000) for a comparative evaluation of the Jobstart hiring subsidy in Australia, O'Leary (1998) for the Intervention Works program in Poland, Carling and Richardson (2004) for subsidized employment in Sweden, and Gerfin and Lechner (2002) for hiring subsidies in Switzerland. Calmfors, Forslund, and Hemström (2001) discuss other studies on Sweden that produce similar results. Crépon and Dezplatz (2001) provide strong evidence that about 450,000 jobs were either created or maintained in France between 1994 and 1997 because of reductions in employers' social security contributions targeted to the hiring of low-skilled workers.

<sup>8</sup>Evidence on these deleterious side effects can be found, for instance, in Begg, Blake, and Deakin (1991) and Dolton (1993) for the United Kingdom; de Koning (1993) for the Netherlands; and Forslund and Krueger (1994) for Sweden.

could be small. Most analysts conclude that the effectiveness of subsidies for private sector jobs depends on good targeting and close monitoring to avoid abuses. Turning to direct job creation in the public sector, Martin and Grubb (2001) show that it has not been successful in helping the unemployed get permanent jobs in the open labor market.

### Evaluation Studies Using Macroeconomic Data and Key Identification Issues

Although microeconomic studies have the advantage of better isolating particular policies and controlling for specific features, they do not provide an overall picture of how effective ALMPs are in raising aggregate employment. Macroeconomic evaluations have the advantage of allowing a joint evaluation of different ALMPs while aggregating their direct and indirect effects, including windfall, substitution, and deadweight effects. In addition, they do not require specific surveys or data collection because they use administrative information and general labor market statistics, and they apply simpler estimation techniques than those required for microeconomic experimental and quasi-experimental studies. On the downside, aggregate impact evaluations do not identify possible negative outcomes (such as lower wages and bad working conditions) for particular parts of the society. These studies also need to be performed particularly carefully because the results tend to be sensitive to the specification of variables and the estimation methods used.

This paper uses macroeconomic data and a methodology that addresses several specification flaws in previous studies of the same type. These are (1) the inability to separate the role of labor market institutions from that of policies, whose resolution calls for using a panel database; (2) small sample size that leads to insufficient time variation in ALMPs (quite related to item 1); (3) unstable results depending on the metric used for ALMPs; (4) the reverse causality from movements in employment to changes in expenditures in ALMPs (for example, when employment is low, more people sign up for training and consult public employment services (PES), and the government is more likely to enact new or more generous subsidy programs); and (5) a focus on unemployment, which leads to overestimation of the returns of ALMPs on employment and neglect of labor force participation effects.

The first macroeconomic studies used only a very limited number of observations (usually around 20), with countries as individual units and no time variation in the data.<sup>9</sup> Because a few institutional controls cannot be expected to account for all cross-country variations unrelated to ALMPs, this method is likely to wrongly attribute the influence of some unobserved institutional features of unemployment rate to ALMP spending.

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<sup>9</sup>The literature on the effects of active policies on labor market variables using OECD country-level data was initiated by Layard, Nickell, and Jackman (1991) and immediately pursued in OECD (1993), Heylen (1993), and Forslund and Krueger (1994). Zetterberg (1995), initially published in Swedish in 1993, was one of the first studies that used panel data.

Subsequent work, conducted during the second half of the 1990s, takes advantage of the extended availability of data to use panel methods, therefore improving the identification of institutional effects on the unemployment rate.<sup>10</sup> However, the same studies tend to pool the data in two periods or average the information on ALMP expenditures to minimize the reverse causality problem, going from movements in the unemployment rate to variations in the expenditures on ALMPs, which bias the estimates toward finding a positive effect of ALMPs on the unemployment rate. This averaging neglects variation in the time domain as a source of parameter identification. Other studies have attempted to handle reverse causality by using the ratio of expenditures on ALMPs to unemployment, but such a measure only changes the sign of the bias towards finding a negative correlation between ALMPs and unemployment rates.<sup>11</sup>

However, it is important to consider the possibility of reverse causality between expenditures on ALMPs and labor utilization. Given that ALMPs are a response to high unemployment, such reverse causality is likely responsible for the negative raw correlation between expenditures on ALMPs as a share of GDP and business employment rates (the labor utilization measure used in the next section) across countries (Figure 2).<sup>12</sup> Similarly, passive labor market policies (PLMPs), comprising unemployment compensation payments and early retirement for labor market reasons, are negatively correlated with employment rates—even more so than ALMPs. That might be because of the mechanical link between lower employment rates, larger unemployment rates, and larger unemployment compensation outlays, although this effect may be partly offset by the negative effect of more generous unemployment compensation on incentives to work.

The countercyclicality of expenditures on PLMPs sheds suspicion on other measures used to evaluate the effect of ALMPs on the labor market; for example, ALMP expenditure as a share of total labor market expenditure (that is, expenditure on active and passive labor market policies) (Zetterberg, 1995). As long as an increase in unemployment leads to a larger increase in spending on PLMPs than in spending on ALMPs (which is probable because of the strong mechanical link between unemployment compensation outlays and the unemployment rate), the effect of ALMP expenditure in reducing unemployment would tend to be overstated.

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<sup>10</sup>Among the best studies are Zetterberg (1995); Jackman, Layard, and Nickell (1996); Bellmann and Jackman (1996); Scarpetta (1996); Elmeskov, Martin, and Scarpetta (1998); and Nickell and Layard (1999).

<sup>11</sup>Suppose that ALMP spending had no effect on unemployment: if ALMP spending rises (because of reverse causality) less than proportionally with unemployment, there would be an apparent negative relationship between ALMP spending as a ratio of unemployment, and the unemployment rate.

<sup>12</sup>The business employment rate is the share of business employment in the working-age population. Conversely, as stated in the previous paragraph, reverse causality creates a *positive* bias in estimates of the effect of ALMPs on the unemployment rate. Appendix I describes the OECD Labor Market Policies database.

Although previous work has focused on identifying the effect of ALMP spending on the unemployment rate, it is difficult to deduce the final effect of employment creation because of the possible effect of ALMP spending on labor force participation.<sup>13</sup> In addition, the focus on unemployment rates creates a bias because of the exclusion of program participants from unemployment statistics.<sup>14</sup> Finally, total unemployment is not the right target variable when subsidies to private employment are included among ALMPs; ideally, the focus should be on the net job creation resulting from these subsidies.

In summary, existing studies using macroeconomic data for the OECD might overestimate the actual effect of ALMPs on labor market outcomes because of the way they define the policy variable (expenditures on ALMPs per unemployed, or some variation of this measure) or because they do not correct for the decrease in unemployment owing to program participation. On the other hand, the reason many of the studies reviewed did not identify an effect may be because of their limited use of the variation in the yearly data and the short sample period—from the mid-1980s to the early 1990s, in general. Finally, only a few of these studies have estimates for employment rates and none of them, to my knowledge, focus on employment rates in the business sector.

### III. Empirical Identification of the Effect of ALMPs on Employment Rates

The empirical strategy selected is motivated by the problems with past studies discussed in the previous section.

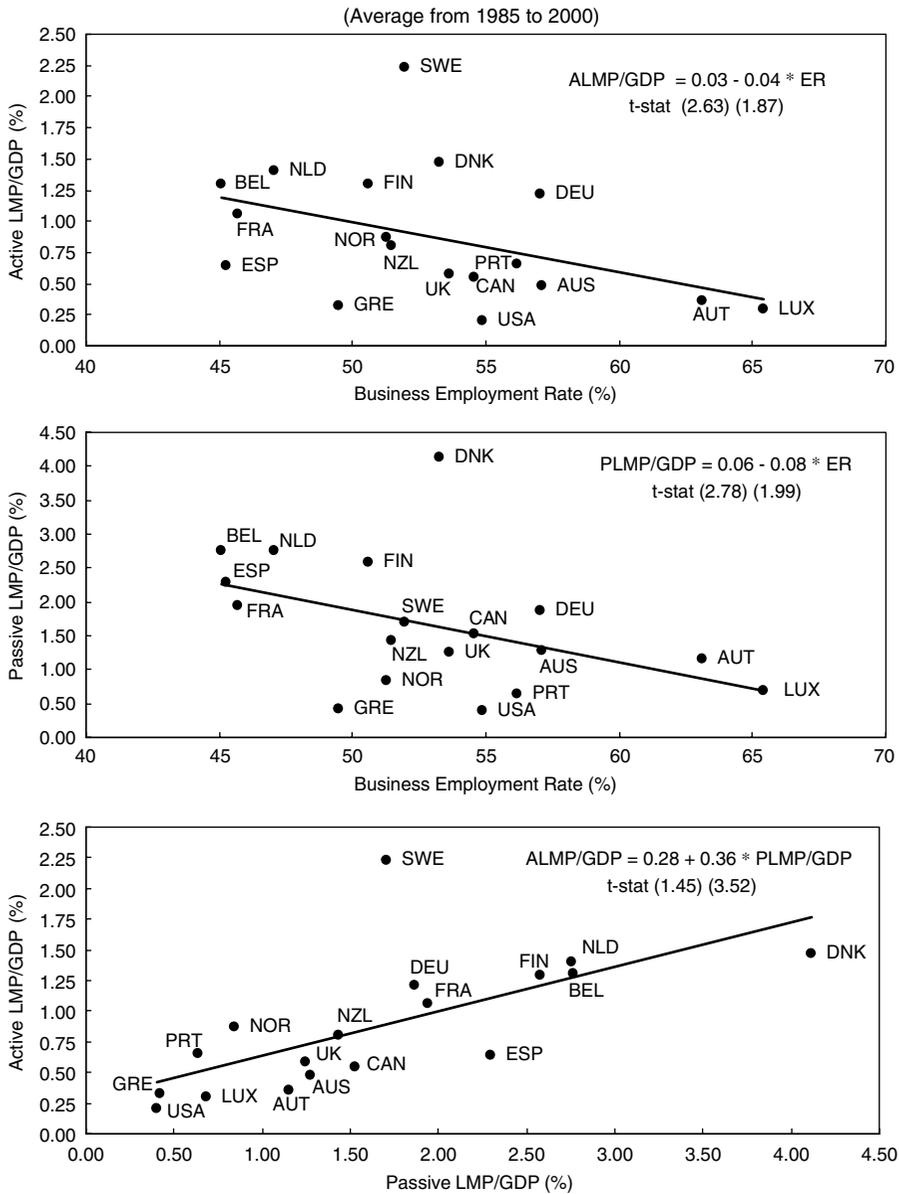
First, the dependent variable used here is the share of the working-age population employed in the business sector; that is, the employment rate in the business sector. By focusing on the employment rate, variations in labor

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<sup>13</sup>The effect of ALMPs on labor force participation has been documented in several of these papers. Calmfors, Forslund, and Hemström (2001) conclude that the Swedish literature found a positive impact of ALMPs on labor force participation. Bellmann and Jackman (1996) also find that ALMPs increase female labor force participation and do not affect unemployment rates. Scarpetta (1996) finds stronger and more significant coefficients for ALMPs in the nonemployment equation (sum of the inactive and the unemployed divided by the working-age population). In contrast, Nickell and Layard (1999) do not find a significant effect of ALMP when they consider employment-to-population ratios, unlike their findings for the unemployment rate.

<sup>14</sup>Because of evidence that the number of “hidden” unemployed workers probably increases with unemployment, Scarpetta (1996) mentions the mostly positive correlation between the unemployment rate and the rate of inflows into ALMPs (except in Germany and the Netherlands). Calmfors, Forslund, and Hemström (2001) use the results of several papers to compute the effect of program participation on total unemployment, that is, open unemployment minus program participation. To do so, they use simplifying assumptions about the unemployment rate, the program participation rate, and expenditure per program participant as a share of per capita GDP. According to their estimates, though, program participation appears to significantly reduce total unemployment in only three cases: Zetterberg (1995), Scarpetta (1996), and Blanchard and Wolfers (2000) for the nonemployment specification.

Figure 2. Expenditure on Active and Passive Labor Market Policies, and Business Employment Rate



Source: OECD and author's calculation.

force participation owing to the effect of ALMPs can be accounted for. Also, the focus on *business* employment rates avoids overestimating the policy importance of ALMPs by automatically excluding cyclical increases in public sector employment, which do not represent real improvements in labor market functioning. Finally, although the unemployment rate is the focus of

many macroeconomic theories, the employment rate is a better measure of the utilization of able-to-work individuals.

Second, to avoid a bias towards estimating a positive effect of ALMPs on employment, expenditures on ALMPs are normalized by GDP and not by unemployment. Such a normalization may bias the results downward because aggregate output shocks will change employment in the same direction and provoke a spurious negative correlation between ALMPs/GDP and the employment rate (Figure 2). However, these effects may be attenuated by carefully controlling for institutions and other country-specific factors. In any case, the final estimate may be viewed as a lower bound for the effect of ALMPs on employment.

ALMP expenditures are defined as the sum of expenditures (as a share of GDP) on PES and administration, labor market training, and subsidized employment. The OECD database also includes expenditures to enhance the labor market prospects of young and disabled workers. However, these policies were excluded from the econometric exercise below because they refer to specific groups of the population. The main thrust of the results reported here is not affected by including these additional policies. These ALMP categories are described in detail in Martin (2000) and Martin and Grubb (2001). Complete data, at the time this paper was written, were available for 15 industrial countries between 1985 and 2000.<sup>15</sup>

The estimated equation should be interpreted as a reduced form of a model determining employment rates and wages. As discussed in Section I, many of the expected effects of ALMPs on employment will occur through variations in wages, which are also a function of ALMPs. So wages are excluded from the employment rate specification, and the estimated effect of ALMPs on employment rates should already incorporate shifts in wage setting. The benchmark equation is

$$BE_{it} = \beta_1 ALMP_{it} + \beta_2 X_{it} + \beta_3 Y_t + \beta_4 C_i + \varepsilon_{it}, \quad (1)$$

where the indices  $i$  and  $t$  designate, respectively, country and year;  $BE$  is the business employment as a share of the working-age population;  $ALMP$  is spending on active labor market policy (as a share of GDP);  $X$  is the vector of control variables capturing changes in institutions and incentives to work;  $Y$  is the vector of year dummies to control for common shocks;  $C$  is the vector of country dummies; and  $\varepsilon$  is the error term.

Time and country dummies are very important components of the specification. The time dummies may alleviate the reverse causality problem if the timing of adverse shocks is correlated between countries. Country-fixed effects capture all time-invariant institutional and economic features explaining why a particular country's employment rate differs from the average. Several studies focused on the effect of specific institutional

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<sup>15</sup>These countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, the Netherlands, New Zealand, Norway, Spain, Sweden, the United Kingdom, and the United States.

differences (employment protection laws, extent of coordination in wage bargaining, union membership, and so on) on labor market performance and often had to exclude country dummies when these institutional measures did not vary over time. Obviously, other studies could not include country dummies when performing a simple cross-section regression.

Control variables in the basic specification include only country-specific institutional variables that vary over time (for a detailed description, see Appendix II). This specification mirrors in spirit most empirical assessments of the effects of ALMPs on labor market outcomes. However, several of these institutional variables do not have enough time variation and may miss changes that are correlated to the flow of expenditures in ALMPs, generating biased estimates for the effect of ALMPs on employment rates. The share of GDP spent on PLMPs is included in the basic specification to improve the control for work incentives: the larger the share of resources directed at supporting out-of-work individuals, the lower are the incentives to work. Although this variable should be correlated with the replacement rates already included in  $X$ , it captures other aspects of the unemployment benefits system (scope and duration of benefits, for instance) and expenditures on early-retirement schemes. Because of the strong cyclicity of expenditures on PLMPs as a share of GDP, its inclusion will also capture cyclical factors affecting expenditures on ALMPs and will attenuate the reverse causality bias discussed in the previous section.<sup>16</sup>

As a final note to the identification strategy, the conditional correlation between employment and ALMP expenditure as estimated in Equation (1) could be due to a third variable not included in the regression, which would drive the levels of both ALMP expenditures and employment. Calmfors and Skedinger (1995) propose instruments for ALMP spending, but it is very unlikely that the variables they use affect unemployment only through ALMPs. Lagged values of expenditures on ALMPs were used as instrumental variables for current expenditures on ALMPs in some of the specifications and they do not change the results.<sup>17</sup>

### Estimates of the Effect of ALMPs on the Employment Rate

Estimates suggest that ALMPs had a significant positive effect on business employment rates during the 1993–2000 period (Table 1, column 2).<sup>18</sup>

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<sup>16</sup>The common cycle in ALMPs/GDP and PLMPs/GDP is clear in the strong positive correlation between both variables (Figure 2).

<sup>17</sup>Other specifications with lagged expenditures on ALMPs as regressors (instead of instruments for current expenditures) to check for dynamic effects were also used, but do not alter the basic results and, thus, are not reported here.

<sup>18</sup>The results reported in this section are broadly unchanged if feasible generalized least squares are used as the estimation procedure and different assumptions are made about residual serial correlation (whether country-specific or not) and heteroscedasticity. Ordinary least squares results were then selected to be presented for transparency reasons and to facilitate replication by other researchers.

**Table 1. Active Labor Market Policy and Employment**  
*Dependent variable: share of the working-age population working in the business sector*

	(1)	(2)	(3) Excluding Nordic Countries	(4) Excluding Nordic Countries
Time period	1985–2000	1993–2000	1985–2000	1993–2000
Estimation method	OLS	OLS	OLS	OLS
ALMP expenditures/GDP	0.75 (0.86)	<b>2.28 (3.34)</b>	<b>3.14 (2.95)</b>	<b>2.51 (3.39)</b>
PLMP expenditures/GDP	<b>3.25 (10.13)</b>	<b>-1.40 (-5.24)</b>	<b>-3.39 (-9.63)</b>	<b>-1.42 (-6.47)</b>
Replacement rate	<b>-0.09 (-1.93)</b>	<b>-0.12 (-3.11)</b>	-0.01 (-0.10)	<b>-0.08 (-1.97)</b>
Union membership	<b>-0.21 (-5.56)</b>	<b>-0.15 (-2.77)</b>	<b>-0.24 (-6.23)</b>	<b>-0.10 (-2.24)</b>
Employment protection	-0.04 (-1.72)	<b>0.15 (2.92)</b>	<b>-0.13 (5.30)</b>	<b>0.38 (6.47)</b>
Bargaining coordination	<b>0.03 (2.94)</b>	0.00 (0.04)	0.02 (1.60)	<b>0.19 (6.01)</b>
Tax wedge	-0.05 (-0.96)	<b>-0.10 (-1.98)</b>	-0.10 (-1.75)	<b>-0.18 (-3.15)</b>
Time and country dummies	Yes	Yes	Yes	Yes
Number of observations	233	116	188	94
Adjusted $R^2$	0.88	0.98	0.92	0.99

Sources: Organization for Economic Cooperation and Development (OECD), Analytical database, Expenditure in Labor Market Policies database, and Benefits and Taxes database; some institutional variables from Nickell and Nunziata (2001) and Debrun (2003); and authors' estimations.

Notes: Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, New Zealand, Spain, Sweden, United Kingdom, and United States.

OLS: Ordinary least-squares estimation.

Generalized least squares specifications generated the same qualitative results. *T*-statistics in parentheses. Bold figures are significant at least at a 5 percent level. Expenditures in labor market policies expressed as a share of GDP in the relevant fiscal year. Columns (3) and (4) exclude Sweden, Norway, and Denmark.

However, the results for the whole sample period depend on the inclusion of the Nordic countries: in their presence, ALMPs do not affect employment (column 1), but, in their absence, ALMPs have a strong effect on employment (column 3).<sup>19</sup> In addition, the ALMP coefficient estimate for the second half of the sample is about the same whether Nordic countries are included or excluded (columns 2 and 4, respectively), which suggests either data problems in the first half of the sample or a structural change for Nordic countries. Similar issues have arisen in previous studies—using data beginning in the mid-1980s and ending in the early 1990s, Elmeskov, Martin, and Scarpetta (1998) and Scarpetta (1996) noticed that country

<sup>19</sup>These results are robust to small changes in the cutoff year.

composition could influence the evaluation of ALMPs. They show that including Sweden in their sample lowers the precision of estimates, which are not statistically significant (at the 5 percent level). To resolve this issue, I kept Nordic countries in the sample but focused on estimates for the second half of the sample. Results for more recent years should also be more relevant for current policy analysis. All the subsequent results for the effects of ALMPs on employment and wages are qualitatively unchanged if longer periods are used for a panel excluding the Nordic countries. Thus, the benchmark result for the effect of ALMPs on the business employment rate (using the results in Table 1, column 2) is that a 1 percentage point increase in ALMP spending as a share of GDP is associated with an increase in the business employment rate of 2.3 percentage points.<sup>20</sup>

The effect of institutional variables on employment are, in general, insensitive to sample composition effects and are consistent with theoretical predictions and previous results in the literature. Increases in expenditures on PLMPs (as a share of GDP), in the replacement rate, in union membership, and in the tax wedge on labor income depress employment rates because they lower incentives to work.<sup>21</sup> A higher degree of coordination between the actors involved in wage bargaining increases employment rates, as the deleterious effects of excessive wage demands on employment are taken into account during negotiations. The theoretical literature finds that the effect of employment protection laws on employment is dubious because higher employment protection might curb hiring as well as firing.<sup>22</sup> In any case, the econometric results for this variable are not robust to sample changes: the negative effect on employment is reversed for the second half of the sample.

The positive effect on employment of increasing ALMP expenditures is robust to most specification changes, but key aspects of the benchmark equation (as in Table 1, column 2, or Table 2, column 1) need to be respected. When the ratio of expenditures on PLMPs to GDP is excluded from the main specification, the sign of the coefficient of interest is preserved but it is not estimated precisely (Table 2, column 2). This result confirms the importance of controlling for reverse causality running from business cycle variations to expenditures in ALMPs. The highly cyclical PLMP variable accounts for this effect. Estimates of other coefficients also lose precision. However, solely excluding early retirement policy expenditures from the definition of PLMPs does not change the tone of the results (Table 2, column 3), which points to the importance of unemployment compensation

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<sup>20</sup>The results are robust to other country-composition effects. For instance, excluding Anglo-Saxon countries does not change the flavor of the estimates reported here.

<sup>21</sup>Estimates of the tax-wedge and replacement rate effects are more statistically significant in the second half of the sample.

<sup>22</sup>Bertola and Bentolila (1990) show the importance of both effects with a model of firms' optimal employment policies under linear adjustment costs. They find that firing costs have a larger effect on firms' propensity to fire, than to hire and (slightly) increase average long-run employment, a result consistent with estimates for the second half of our sample.

**Table 2. Robustness Check: Effects of Ommiting Variables and/or Country**  
*Dependent variable: share of the working-age population working in the business sector*

Time period	(1) 1993–2000	(2) 1993–2000	(3) 1993–2000	(4) 1993–2000	(5) 1993–2000	(6) 1993–2000	(7) 1993–2000	(8) 1993–2000
Estimation method	OLS Benchmark Results	OLS Excl. Passive Policies	OLS Different PLMP Definition	OLS Excl. Institutions	OLS Also excl. Country Dummies	OLS Excl. Time Dummies	OLS Excl. Anglo-Saxon Countries 3\	OLS Excl. France and Germany
ALMP expenditures/ GDP	<b>2.28</b> (3.34)	1.15 (1.56)	<b>2.23</b> (3.31)	0.77 (1.23)	<b>-5.27</b> (-3.02)	<b>2.85</b> (3.58)	<b>2.55</b> (3.28)	<b>2.65</b> (3.66)
PLMP expenditures/ GDP	<b>-1.40</b> (-5.24)	—	—	<b>-0.86</b> (-2.93)	-0.78 (-1.08)	<b>-2.53</b> (-9.60)	<b>-1.52</b> (-5.08)	<b>-1.38</b> (-4.79)
PLMP exp. (excl. early retirement)	—	—	<b>-1.27</b> (-5.40)	—	—	—	—	—
Replacement rate	<b>-0.12</b> (-3.11)	-0.08 (-1.91)	<b>-0.13</b> (-3.40)	—	—	<b>-0.15</b> (-3.14)	<b>-0.14</b> (-3.14)	<b>-0.14</b> (-3.49)

Union membership	<b>-0.15</b> (-2.77)	-0.08 (-1.40)	<b>-0.14</b> (-2.63)	—	—	<b>-0.35</b> (-7.22)	<b>-0.19</b> (-2.85)	<b>-0.13</b> (-2.38)
Employment protection	<b>0.15</b> (2.92)	0.09 (1.69)	<b>0.14</b> (2.91)	—	—	<b>0.11</b> (1.95)	0.10 (1.73)	<b>0.21</b> (3.53)
Bargaining coordination	<b>0.00</b> (0.04)	0.01 (0.44)	0.00 (0.21)	—	—	-0.04 (-1.87)	-0.02 (-0.79)	-0.01 (-0.70)
Tax wedge	<b>-0.10</b> (-1.98)	-0.10 (-1.82)	-0.09 (-1.79)	—	—	<b>-0.13</b> (-2.19)	-0.11 (-1.87)	-0.08 (-1.47)
Time dummies	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Number of observations	116	116	116	136	136	116	93	97
Adjusted $R^2$	0.98	0.97	0.98	0.97	0.22	0.97	0.98	0.98

Sources: Organization for Economic Cooperation and Development (OECD) Analytical database, Expenditure in Labor Market Policies database, and Benefits and Taxes database; some institutional variables from Nickell and Nunziata (2001) and Debrun (2003); authors' estimations.

Notes: Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, New Zealand, Spain, Sweden, United Kingdom, and United States.

OLS: Ordinary least-squares estimation. Generalized least squares specifications generated the same qualitative results.  $T$ -statistics in parentheses. Bold figures are significant at least at a 5 percent level. Expenditures in labor market policies expressed as a share of GDP in the relevant fiscal year. Column (7) excludes Canada, United Kingdom, and United States.

policies—the only item left within the PLMP variable—to capture cyclicality and changes in work incentives. Including institutional variables is also important for producing a significant effect of ALMPs on employment (Table 2, column 4) and without country-specific dummies the estimated coefficient turns negative (Table 2, column 5). This result explains why cross-sectional work hides the positive correlation between expenditure in ALMPs and labor market performance; without time variation in the data, country-specific effects cannot be controlled for and coefficient estimates are negatively biased.<sup>23</sup>

Breaking down the ALMP aggregate reveals that direct subsidies to employment creation are more effective in raising employment rates in the business sector than expenditures on training or PESs (Table 3).

Expenditures on PESs appear at first to affect employment rates negatively, but this result is not robust to changes in time period (Table 3, column 2) or the exclusion of Nordic countries from the sample (Table 3, column 3): with any of these changes the coefficient of PESs is not significantly different from zero. Further research on the causes of this erratic effect is outside the scope of this paper. At first sight, this evidence contradicts results from the microeconomic evaluation literature, which, in general, finds a positive, albeit often small, effect of job-search assistance (a component of PESs) on employment prospects of participants. My results suggest, though, that displacement effects may be strong, as many analysts have pointed out in their microstudies. In addition, the OECD data on expenditures on PESs include administrative costs of running employment agencies and other incidental spending not directly related to job-search assistance. This is an imperfection of available macroeconomic information, which should be corrected when better data become available. The absence of a significant effect of expenditures in labor force training to determine employment is consistent with results from the microeconomic literature reviewed in Section II.

Unlike other types of ALMPs, direct subsidies to regular employment in the private sector, increase employment rates independently of the period used in the estimation or the inclusion of particular country groups (although the coefficient is not statistically different from zero at the 5 percent level of significance in column 1 of Table 3).<sup>24</sup> This result also corroborates a general view from the microeconomic literature, which documents positive employment effects from direct job subsidies. The results presented here add to this microeconomic literature by showing that negative indirect effects from job subsidization schemes (for instance, displacement effects) are not strong enough, on average, to undo their positive direct effects on employment.

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<sup>23</sup>The exclusion of time dummies or other groups of countries does not alter the results (Table 2, columns 6–8).

<sup>24</sup>The sign and significance of the coefficients of each ALMP were robust to marginal changes in time periods and specifications but their estimated sizes were more sensitive to these changes than the specifications in Tables 1 and 2.

**Table 3. Robustness Check: Detailed Breakdown of ALMP**

*Dependent variable: share of the working-age population working in the business sector*

	(1)	(2)	(3)	(4)
Time period	1985–2000	1993–2000	1985–2000 OLS Excl. Nordic Countries	1993–2000 OLS Excl. Nordic Countries
Estimation method	OLS	OLS		
ALMP expenditures/GDP				
PES	<b>-14.51 (-2.91)</b>	-5.88 (-1.69)	-6.80 (-1.35)	-2.12 (-0.66)
Labor market training	1.11 (0.67)	2.28 (1.41)	-0.56 (-0.24)	2.22 (1.20)
Subsidized employment 4\	1.93 (1.65)	<b>2.51 (2.26)</b>	<b>5.23 (4.07)</b>	<b>2.55 (2.42)</b>
PLMP expenditures/GDP	<b>-3.08 (-10.86)</b>	<b>-1.33 (-4.39)</b>	<b>-3.21 (-10.71)</b>	<b>-1.43 (-5.87)</b>
Other variables as in Table 1				
Number of observations	234	116	189	94
Adjusted $R^2$	0.89	0.98	0.92	0.99

Sources: Organization for Economic Cooperation and Development (OECD) Analytical database, Expenditure in Labor Market Policies database, and Benefits and Taxes database; some institutional variables from Nickell and Nunziata (2001) and Debrun (2003); author’s estimations.

Notes: Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, New Zealand, Spain, Sweden, United Kingdom, and United States.

OLS: Ordinary least-squares estimation; PES: Public employment services and administration.

Generalized least squares specifications generated the same qualitative results.  $T$ -statistics in parentheses. Bold figures are significant at least at a 5 percent level. Expenditures in labor market policies expressed as a share of GDP in the relevant fiscal year. Labor market training: training for unemployed adults and those at risk, and training for employed adults. Subsidized employment: subsidies to employment in the private sector, support of unemployed persons starting enterprises, and direct job creation (public or nonprofit). Columns (3) and (4) exclude Sweden, Norway, and Denmark.

#### IV. ALMPs and Wage-Setting Behavior

To assess the effect of ALMPs on wage setting, the following “wage curve” was estimated:

$$\log(BW_{it}/P_{it}A_{it}) = \alpha_1 \log(u_{it}) + \alpha_2 ALMP_{it} + \alpha_3 X_{it} + \alpha_4 Y_t + \alpha_5 C_i + \eta_{it}, \quad (2)$$

where  $BW_{it}$  is the wage per person in the business sector,  $P_{it}$  the consumer price index,  $A_{it}$  the technology level (described in Appendix II),  $u_{it}$  the unemployment rate,  $ALMP_{it}$  the expenditures on ALMP as a share of GDP,  $X_{it}$  the vector of institutional variables,  $Y_t$  the year dummies,  $C_i$  the country dummies, and  $\eta_{it}$  is the residual. This wage curve may be obtained theoretically using the same wage bargaining models behind the discussion in

**Table 4. Estimates of the Wage-Setting Curve**  
*Dependent variable: logarithm of economy-wide wages deflated by the consumer price index and technology level*

	(1)	(2)	(3)	(4)
Time period	1985–2000	1993–2000	1986–2000	1993–2000
Estimation method	OLS	OLS	IV	IV
Log unemployment rate	<b>-0.12 (-5.99)</b>	<b>-0.13 (-6.62)</b>	<b>-0.14 (-6.15)</b>	<b>-0.15 (-6.13)</b>
ALMP expenditures/GDP	<b>-6.70 (-2.28)</b>	<b>-8.56 (-5.85)</b>	<b>-7.75 (-2.36)</b>	<b>-11.68 (-6.05)</b>
Employment protection	<b>-0.31 (-4.22)</b>	-0.13 (-0.88)	<b>-0.30 (-4.22)</b>	-0.11 (-0.67)
Benefits duration	<b>0.48 (4.92)</b>	1.72 (1.41)	<b>0.27 (2.83)</b>	1.17 (0.92)
Time dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of observations	237	123	216	118
Adjusted $R^2$	0.99	0.99	—	—

Sources: Organization for Economic Cooperation and Development (OECD)—Analytical database, Expenditure in Labor Market Policies database, and Benefits and Taxes database; some institutional variables from Nickell and Nunziata (2001) and Debrun (2003); authors' estimations.

Notes: Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, New Zealand, Spain, Sweden, United Kingdom, and United States.

OLS: Ordinary least-squares estimation. Generalized least squares specifications generated the same qualitative results.

IV: Instrumental variables estimation using lagged log unemployment rate and lagged ALMP expenditures as a share to GDP.

*T*-statistics in parentheses. Bold figures are significant at least at a 5 percent level. Expenditures in labor market policies expressed as a share of GDP in the relevant fiscal year.

Section I. In these models, variables affecting workers' utility from being employed vis-à-vis the alternative of unemployment shift the wage curve and should be included in  $X_{it}$ . All institutional variables included in Equation (1) were tested but only the ones found (ex post) to be significant were retained in the final specification.

Increases in expenditures with ALMPs as a share of GDP are associated with wage moderation throughout the sample (Table 4), which can be behind the overall positive effect of ALMP spending on employment. Estimates for the second half of the sample are larger and more precisely estimated (Table 4, column 2), again corroborating the more robust effect of ALMP spending on employment during the period 1993–2000 reported in the previous section. Correction for possible simultaneity among wages, unemployment, and ALMPs (using the lagged unemployment rate and expenditures on ALMP as a share of GDP as instrumental variables) generates stronger effects of ALMP expenditures on wages (Table 4, columns 3 and 4). Table 5 contains results for the second half of the sample when particular groups of countries are excluded. As was the case with the employment rate, country composition does not alter the basic results when the analysis is limited to the 1993–2000

Table 5. Robustness Check: Effects of Omitting Countries

*Dependent variable: logarithm of economy-wide wages deflated by the consumer price index and technology level*

	(1)	(2)	(3)	(4)
Time period	1993–2000	1993–2000	1993–2000	1993–2000
Estimation method	OLS	OLS	OLS	OLS
	Benchmark Results	Excl. Nordic Countries	Excl. Anglo-Saxon Countries	Excl. France and Germany
Log unemployment rate	<b>-0.13 (-6.62)</b>	<b>-0.13 (-5.82)</b>	<b>-0.13 (-6.85)</b>	<b>-0.09 (-4.34)</b>
ALMP expenditures/GDP	<b>-8.56 (-5.85)</b>	<b>-8.74 (-3.27)</b>	<b>-9.43 (-6.49)</b>	<b>-8.74 (-8.82)</b>
Employment protection	-0.13 (-0.88)	-0.03 (-0.10)	-0.17 (-1.06)	-0.12 (-0.74)
Benefits duration	1.72 (1.41)	0.92 (0.63)	<b>3.43 (2.28)</b>	0.27 (0.20)
Time dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Number of observations	123	100	100	107
Adjusted $R^2$	0.99	0.99	0.99	0.99

Sources: Organization for Economic Cooperation and Development (OECD)—Analytical database, Expenditure in Labor Market Policies database, and Benefits and Taxes database; some institutional variables from Nickell and Nunziata (2001) and Debrun (2003); authors' estimations.

Notes: Countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, New Zealand, Spain, Sweden, United Kingdom, and United States.

OLS: Ordinary least squares estimation. Generalized least squares specifications generated the same qualitative results.

$T$ -statistics in parentheses. Bold figures are significant at least at a 5 percent level.

Expenditures in labor market policies expressed as a share of GDP in the relevant fiscal year.

Column (2) excludes Sweden, Norway, and Denmark.

Column (3) excludes Canada, United Kingdom, and United States.

period. Remarkably, the estimated elasticity of wages to the unemployment rate varies between 0.09 and 0.15 in the two tables, confirming the claim in Blanchflower and Oswald (1995)—substantiated by their estimates of different wage curves using national microdata—that this, elasticity is close to  $-0.1$  independent of the country or time period under analysis.<sup>25</sup> Turning to the institutional variables included in the wage curve estimation, more employment protection reduces wages, probably to keep labor attractive to employers, and, as expected, longer unemployment benefits boosted wages by

<sup>25</sup>Several papers have been written since Blanchflower and Oswald (1995) showing that there may be some variation around the  $-0.1$  estimate. Card (1995), in particular, raises doubts on their basic specification and notices that elasticities for the United States could be smaller than that claimed in the book. More recently, Estevão and Nargis (2005) have shown this elasticity to be exactly  $-0.1$  for France, using microdata from the French labor force survey and a different methodology. This general result does not seem to be unique to more developed industrial economies: Estevão (2003) estimates, also using microdata and different methods, an elasticity of about the same size (but a bit smaller) for Poland.

lowering the costs of being unemployed. However, these coefficients were estimated less precisely in the latter half of the sample (Table 4, columns 2 and 4, compared to columns 1 and 3).<sup>26</sup>

## V. Conclusions and Policy Implications

This paper presents evidence indicating that ALMPs have been effective, on average, in raising employment rates in the business sector of 15 industrial countries. Among such policies, direct subsidies for job creation seemed the most effective, which is consistent with a general message from microeconomic evaluation studies. The results shown here are evidence of the net effect of spending on ALMPs for business employment once externalities are taken into account. ALMP spending is also negatively correlated with real wage growth after allowing for technological growth, variations in the unemployment rate, and institutional changes. This wage moderation effect might have been a key cause for the association of ALMPs with better employment rates.

The new and robust evidence on the positive effect of ALMPs on employment presented here addresses some shortcomings of previous papers. First, the literature has focused on the unemployment rate, an imperfect measure of labor utilization in a country. By focusing on the employment rate in the business sector, this paper takes into account changes in labor force participation associated with the introduction of other ALMPs besides controlling for more intensive public sector hiring. Second, most previous papers have not fully used the time variation in the data to identify key parameters, fearing the introduction of biases from reverse causality and other factors. Instead, this paper adds additional variables to capture the cyclical effects going from changes in labor market conditions to ALMP spending, while at the same time controlling for country- and time-specific effects and institutional changes. Moreover, it specifies the econometric model in a way to bias results against finding a positive effect of ALMP spending on employment, implying that the estimates provided here could be viewed as a lower bound for the effect of these policies. Third, the time span covered in the paper is longer than that in previous studies.

The estimates presented here do not detect significant dynamic effects of ALMP spending on employment rates, but that does not mean that they are not relevant. A strict interpretation of the results suggests that reductions in ALMP spending as a share of GDP would reduce employment rates, independently of their previous beneficial effects. That may be explained by the continued low employment rates in several countries included in this study up to the end of the sample. However, it is plausible that ALMPs

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<sup>26</sup>The other institutional variables included in the employment rate equation were insignificant in the wage curve estimation and were dropped from the specification shown in Tables 4 and 5. Unlike in the employment rate equation, when including the three components of active labor market policies separately, the coefficient estimates were not robust to changes in sample period and country composition and are, therefore, not reported. Dynamic specifications for the wage curve allowing for lagged effects of ALMP expenditures did not alter the basic results.

would become less necessary as employment rates rise and workers' quality of life and morale improve. This hypothesis should be tested with more data as employment rates rise across OECD countries.

Whether ALMPs are cost-effective from a budgetary perspective remains to be determined, and their financing through tax increases could have deleterious effects on labor supply. Despite the positive effect on employment rates, their budgetary cost is high and they are likely to be subject to diminishing returns as employment rates rise. At the present level of employment rates, there is a good chance that ALMPs would recoup their cost if they place benefit recipients into jobs and these benefits are phased out. If that is not the case, increased taxation on labor income should not be used to finance ALMPs. As forcefully argued in Prescott (2004), under some extreme assumptions, low labor force participation vis-à-vis the United States could be explained by higher income taxes in Europe. Although this result has been disputed by others (see, for instance, Alesina, Glaeser, and Sacerdote, 2005), it is hard to deny the negative effect of taxes on labor utilization. The results presented here corroborate this impression because measures of the wedge between labor income and take-home pay are negatively correlated with employment rates.

Notwithstanding the positive effects of ALMPs on employment, given the negative effect of current institutional arrangements on European labor markets, institutional reforms are the first priority for improving labor utilization. In addition, they do not impose direct costs to the public budget although they may affect particular social groups more directly than others. Among the many possible reforms, the estimated coefficients for the institutional variables used in my econometric work suggest that reductions in tax wedges, in benefits replacement rates, and, more generally, in insiders' wage bargaining power would have important benefits.

## APPENDIX

### Appendix I. The OECD Labor Market Policies Database

The OECD labor market policies database includes expenditures on programs targeted to particular labor market groups, therefore excluding general employment or macroeconomic policies.<sup>27</sup> So, some important policies, such as nontargeted reductions in taxes and social security contributions, would not be considered expenditures in labor market programs even if they lowered labor costs. The data for ALMPs are broken down into the following five categories:

- (1) *PES and administration*, which includes placement, counseling, and vocational guidance; job search courses; and support for geographic mobility and similar costs in connection with the job search and placement. It also encompasses overhead costs of labor market and unemployment benefit agencies and other administrative costs.

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<sup>27</sup>For further information on this database, see OECD (1993, Chapter 2, Annex 2.B) and Martin and Grubb (2001).

- (2) *Labor market training*, which includes measures related to labor market policies that are not targeted to youth or disabled individuals. It is broken down into two parts: (a) training for unemployed adults and those at risk, and (b) training for employed adults.
- (3) *Youth measures*, which includes only special programs for youth in transition from school to work and is broken down into two parts: (a) measures for unemployed and disadvantaged youth, and (b) support for apprenticeship and related forms of general youth training.
- (4) *Subsidized employment*, which comprises targeted measures to promote employment for unemployed individuals (other than youth or the disabled) and is broken down into three parts: (a) subsidies to regular employment in the private sector, (b) support for unemployed persons starting enterprises, and (c) direct job creation (public or nonprofit).
- (5) *Measures for the disabled*, which includes only special programs for the disabled, limited to two types of policies: (a) vocational rehabilitation, and (b) work for the disabled.

The OECD database has information on PLMPs broken down into two categories:

- (1) *Unemployment compensation*, which comprises all forms of cash benefits to compensate for unemployment, except early retirement. In addition to unemployment insurance and assistance, it also includes publicly funded redundancy payments and other compensation for workers who are jobless owing to a firm's permanent or seasonal shutdown.
- (2) *Early retirement for labor market reasons*, which includes special schemes in which retirement pensions are paid to individuals without work or otherwise because of labor market policies. Only subsidized early pensions rather than funded schemes within regular pension plans (for example, by actuarial calculations of the amounts paid) are taken into consideration.

## Appendix II. Data Definitions and Sources

Most of the data used to build the variables used in this study came from the OECD Analytical Database (AD), the OECD Expenditure in Labor Market Policies Database (LMPD), and the OECD Benefits and Taxes Database (BTD).<sup>28</sup> Institutional variables either built or made available by Nickell and Nunziata (2001) (NN) were also used.<sup>29</sup>

Data for the employment rate in the business sector come from the AD. Data for the share of GDP diverted to ALMP expenditures come from the LMPD. GDP data are an aggregation of quarterly series to match each country's fiscal year. (All the labor market policies data are in fiscal year units.) Business sector wages and the consumer price index were obtained from the OECD Analytical Database.

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<sup>28</sup>Data for public expenditures on labor market policies, participant inflows, and many institutional and labor market variables can be found at <http://www1.oecd.org/scripts/cde/members/LFSDATAAuthenticate.asp>. Additional indicators and derived statistics can be found at <http://www1.oecd.org/scripts/cde/members/LFSINDICATORSAuthenticate.asp>.

<sup>29</sup>Their database goes from 1960 to 1995. Debrun (2003) extends part of the data up to 1998 and kindly provided the database. When used here, institutional data from Nickell NN for 1999 and 2000 are assumed to be constant at their 1998 level.

Control variables include the following:

- (1) Expenditures on PLMPs (unemployment compensation and early retirement for labor market reasons) from the LMPD expressed as a percentage of GDP.
- (2) Technological growth in the business sector, used in the wage curve estimation, was measured as<sup>30</sup>

$$\Delta A = \frac{(\Delta Y - \alpha \Delta L - (1 - \alpha) \Delta K)}{\alpha},$$

where  $Y$  is the GDP,  $L$  the employment,  $K$  the capital, and  $\alpha$  is the labor's share in income. All variables refer to the business sector and  $\Delta$  denotes the logarithmic difference.

- (3) Average gross replacement rate during the first year of unemployment from the OECD BTD. That is a rough approximation for the ratio between unemployment benefits and work income, but there are no available time series for net replacement rates.<sup>31</sup>
- (4) Union membership, as a percentage of employees, using data from the OECD website. Missing values are replaced by the previous year's value (or the following year's value when there is no previous value). Alternative measures from NN were used, generating similar results.<sup>32</sup>
- (5) An index of employment protection made available by NN and originally built by Blanchard and Wolfers (2000).<sup>33</sup>
- (6) Tax-wedge data from the OECD website, which include social security contributions of employers and employees and labor income taxes. Data stopped in 1997 and are assumed unchanged between 1998 and 2000.
- (7) The second bargaining coordination variable provided by NN.
- (8) The index of unemployment benefits duration from NN.

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<sup>30</sup>This variable is equivalent to the traditional Solow residual adjusted for the elasticity of labor in the production function. It is a proxy for labor-augmenting (Harrod neutral technical) progress to allow for balanced growth in a dynamic setup. The measure proposed here is a proxy for this variable and has also been used in Blanchard (2000), Blanchard and Wolfers (2000), Estevão and Nargis (2005) and Estevão (2003).

<sup>31</sup>The average replacement rate computed by the OECD is not a very attractive measure because it gives equal weight to replacements rates in year 1, in years 2–3, and in years 4–5. Alternative specifications use the average in the second and third years, as well as the overall OECD measure. All these measures are available for only every other year, and an average of adjacent years was used to complete missing observations.

<sup>32</sup>Collective agreement coverage, which is the share of employees covered by a collective agreement, was also used in some specifications. This variable is available for 1980, 1990, and 1994 (for 1985–89, the average of 1980 and 1990 was used; for 1990–93, the 1990 value was used; for 1994–2000, the 1994 value was used).

<sup>33</sup>Other specifications, including different indices for regular and temporary employment protection, were also tried. Measures of employment protection were available for two periods: late 1980s and late 1990s (the average of the two measures were used for 1990–94).

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