Costs and Benefits of Danish Active Labor Market Programs*

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July, 2004

Abstract

Since 1994, unemployed workers in the Danish labor market have participated in active labor market programs at a large scale. This paper contributes with an assessment of costs and benefits of these programs. Long-term treatment effects are estimated on a very detailed administrative dataset by propensity score matching. For the years 1995-2000 it is found that private job training has positive employment and earnings effects, but also public job training and classroom training end up with positive effects when a long enough time horizon is allowed. When the cost side is taken into account, then all three program types come out with surplusses.

Keywords: Cost-benefit analysis, Active labor market programs, Propensity score matching.

JEL Codes: H00, J68

*We thank Jan V. Hansen, Anders Holm, Michael Lechner, Søren Bo Nielsen, Michael Rosholm, Barbara Sianesi and Hege Torp for valuable comments. A previous version of the paper was presented at the Nordic conference on effects of labor market policy and education, Copenhagen, 2004, and at Economic Policy Research Unit, University of Copenhagen.

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1 Introduction

Since 1994 unemployment benefit collection throughout longer spells of unemployment has been conditional on participation in active labor market programs (ALMPs) in Denmark. As a result, large-scale enrollment of unemployed into programs has occurred, so that the Danish system of ALMPs is one of the most extensive in the OECD. Today Denmark and Sweden are the countries in Europe that spend most money on active labor market policy as a share of GDP. The policies have – at least for the Danish case – been implemented without much prior knowledge about potential beneficial effects, let alone whether such benefits exceed the costs of the programs.

Active labor market policies constitute an important element of the functioning of labor markets not just in Denmark but in most European countries, while in the US they have limited scale. In this light it is somewhat paradoxical that the practice of evaluating programs is much less developed in Europe than in the US, as pointed out by Kluve & Schmidt (2002). For the existing European studies they find that program effects are mixed and very heterogeneous across types of programs and target groups, and that the studies very rarely are accompanied with rigorous cost-benefit analyses, as the cost side mostly is neglected. The purpose of this paper is to help fill this gap with an assessment of costs and benefits of the large-scale system of ALMPs in Denmark.

We measure the net social benefit from the ALMPs by subtracting the programs' costs from its discounted stream of benefits. As noted by Heckman, LaLonde & Smith (1999) the primary social benefit reported in most cost-benefit analyses is the discounted earnings gain, which is usually of far larger magnitude than other measured benefits. Therefore it is important to obtain credible and precise estimates of the earnings gain. We calculate treatment effects on employment and earnings for a sample of unemployed who are followed over the years 1995-2000, and we show that in a labor market such as the Danish it is also very important to be in position to estimate long-term effects, since the benefits may not appear until years after the first entrance into programs. On the cost side we take into account direct costs of operating the programs (administration costs, cost of education and training expenditures), corrected for marginal costs of public funds. Among relevant effects unaccounted for are general equilibrium effects such as displacement of non-participants, and potential ex ante effects on the transition rate out of unemployment.

We have access to a rich register-based (non-experimental) data set, and the econometric approach used to estimate treatment effects is propensity score matching. Non-experimental evaluations have to address the issue of possible bias in the program effects

due to selection of participants into programs. The method of matching (see e.g. Heckman, Ichimura & Todd (1997)) assumes that all relevant variables that affect the selection process and labor market outcomes are known, such that conditional on these variables the program effects are identified and unbiased. This is the conditional independence assumption (CIA). We argue that our data set contains so much information that most heterogeneity is observed, thus making the CIA plausible.

Surveys of the literature are given by Heckman et al. (1999), Martin & Grubb (2001) and Kluve & Schmidt (2002), but a few European evaluations of particular relevance for this paper should be mentioned.[1] Raaum, Torp & Zhang (2002) undertake a cost-benefit analysis of the specific program 'labor market training' in Norway. They have access to data for the period 1992-1997, and find that the effect of the program on annual earnings mostly is positive and rising over time, and that for women with labor market experience the gains exceed the costs, while for men costs are close to benefits. For labor market entrants, however, the gains are lower than the costs.

The extent of the Swedish system of ALMPs comes closest to the Danish, and treatment effects of the Swedish ALMPs are estimated by e.g. Sianesi (2001). A sample of first-time unemployed individuals (in 1994) is followed over a 6-year period, and, except for job subsidies, adverse employment effects are found. For example for labor market training and work experience placement (almost 70% of the participants are enrolled in these programs), there is initially negative (locking-in) effects, and it is not until after 4-5 years that they become (insignificantly) positive. The disappointing effects are partly attributed to the massive use of large-scale programs which is claimed to have resulted in inefficient program administration and partly to the fact that participation is a way to renew eligibility for unemployment benefits. Larsson (2003) evaluates the effects of two Swedish youth programs on earnings, employment probabilities and the transition to regular education for a two-year period in the first half of the 1990's. She finds negative short-term effects (one year after program start) on earnings and employment, but these negative effects tend to become insignificant after two years.

Gerfin & Lechner (2002) evaluate the effects of the Swiss ALMPs over a 15 month period, and they find that employment and training programs have adverse effects on

[1] Among Danish evaluations there exists one post 1994-reform study of the entire system of Danish ALMPs (see Munch & Skipper (2003)), but this study is mainly concerned with short-term effects, since they estimate treatment effects in a timing-of-events unemployment duration model. After accounting for selection into programmes based on observed and unobserved characteristics, they find that most programmes have negative net effects on the transition rate from unemployment to employment, which is often attributed to negative locking-in effects, but sometimes also negative post-programme effects. One exception is private job training which tends to have a small positive net effect.

employment outcomes, while temporary wage subsidies have positive employment effects. Common to Raaum et al. (2002), Sianesi (2001), Larsson (2003) and Gerfin & Lechner (2002), and our study is that there is access to rich data sets, and the econometric approach used to estimate treatment effects is propensity score matching.

The rest of the paper is organized as follows. In the next section the institutional framework of the Danish labor market is described. Section 3 outlines the evaluation problem and the method of matching. Section 4 describes the data set and the selection process into programs, while section 5 reports the estimated program effects. Section 6 discusses the costs and benefits accounted for and section 7 compares costs and benefits of the programs. Finally, section 8 concludes.

2 The Danish labor market

2.1 Institutional framework

In Denmark labor market institutions play an important role in implementing labor market policies, and many labor market reforms are the outcome of tripartite agreements between unions, employer confederations and the government. This is also true for the labor market reforms of the 1990s, that introduced active labor market measures to the unemployed on a larger scale.

Those who are unemployed in Denmark can receive relatively generous financial support, either in the form of unemployment insurance or social security payments. The receipt of unemployment insurance payments – unemployment benefits – is conditional on (voluntary) membership of an unemployment insurance (UI) fund. Once a member has been unemployed for more than four years, the right to receive unemployment benefits is suspended until the member has been in employment for a period. Similarly, individuals who join a UI fund have to be employed for a certain period before they earn the right to receive unemployment benefits. For low income workers the unemployment benefits replace up to 90% of the previous wage.

In the early 1990s the Danish economy was in a recession, but conditions improved significantly since 1993, and the unemployment rate dropped from a high of 12.4 % in 1993 to 5.2 % in 2001. A considerable part of this reduction is due to the strong economic expansion throughout the last part of the 1990s. In the same period, a large number of people switched to voluntary schemes of withdrawal from the labor market comprising early retirement, transitional early withdrawal benefits and paid leave schemes, which also reduced unemployment. Any remaining part of the reduction in unemployment can

presumably be ascribed to changes in the framework for the labor market, cf. Danish Economic Council (2002). More decentralized wage negotiations are likely to have been a factor behind the fall in unemployment, but changes in labor market policy certainly also have contributed to this improvement.

2.2 The 1994 labor market reform

In the 1990s a shift in labor market policies was introduced starting with the 1994 labor market reform. An important element of the reform was the introduction of active labor market measures to the unemployed on a larger scale. The main objective of these programs was to improve the employment prospects of the unemployed. Another element in the reform was the abolition of the rule allowing the unemployed to renew their eligibility for benefit periods by participating in active labor market programs. The maximum period for receiving benefits was reduced from nine to seven years.

Subsequent changes have aimed at strengthening active labor market measures, on the principle that benefit entitlements should be conditional on participation in active labor market programs (the "right and duty" principle). The benefit period has gradually been shortened to four years, and the time until participation in ALMPs has been advanced correspondingly so that by January 2001 the unemployed were in principle obliged to participate after one year of unemployment. Once this period of unconditional benefits has expired the unemployed must participate in ALMPs during 75% of further time spent in unemployment.[2] Furthermore, availability and eligibility criteria have been tightened. A special youth program was introduced in 1996, resulting in earlier ALMP participation and cuts in benefits.[3]

The fraction of the unemployed participating in programs has more than doubled since the first reform in 1994. This is partly due to the strengthening of active measures, and partly due to the fact that the reforms also entailed a forward shift in the active period such that more people are affected by the requirements of the ALMPs. In 1994 more than 80,000 yearly full-time UI fund members participated in some ALMP, and since then this number has settled at a level between 45,000 and 55,000, with a decline to around 42,000 in 2001. In the same period the number of yearly full-time social security recipients participating in active measures rose steadily from somewhat more than 20,000 in 1994 to around 36,000 in 2001. When comparing these numbers to the corresponding numbers

[2] After the latest reform in 2002 the unemployed are instead required to participate in a programme every time they have had six consecutive months of unemployment.

[3] For more details and effects of this particular programme, see Jensen, Svarer & Rosholm (2003).

of unemployed (288,000 in 1994 and 145,000 in 2001) it becomes clear that the scale of the Danish system of ALMPs today is massive, and this has led Kluve & Schmidt (2002) to highlight Denmark as the prime example among European countries performing the transition from a benefit system of passive measures to one of active measures.

2.3 The four program types considered

In this study we focus exclusively on members of UI funds, since social security recipients often also are disabled or have other social problems besides being unemployed. Bolvig, Jensen & Rosholm (2003) gives a description of the programs offered in the social security system, and they estimate short-term employment effects of participation. There are several different types of programs offered to unemployed UI fund members, and in this study they are aggregated into four main types: private job training, public job training, classroom training and residual programs.

Private employers taking in an unemployed for job training receive a wage subsidy, and the wage rate of participants in private job training equals the negotiated salary among the regularly employed. In contrast, the participants in public job training are employed in a public institution where a maximum hourly wage rate applies. The duration of private job training programs are on average shorter than those in the public sector, with average durations of 22 and 39 weeks respectively. Participants in ordinary classroom training receive a compensation equivalent to that of their UI benefits[4]. The average duration of classroom training is 28 weeks, and usually there is only access to programs with a maximum duration of two years. Ordinary classroom training is a rather heterogenous program type, as a substantial number of different courses are available, but the available data set does not allow a more detailed classification. Residual programs consist of individual job training (either public or private), entrepreneurship subsidies, targeted classroom training, targeted courses, public employment programs. Entrepreneurship subsidies constitute a funding equivalent to 50% of regular UI benefits when recipients start up smaller business enterprises. This program type was abandoned in 1998. Individual job training is targeted towards a weaker group of unemployed who are having difficulties in finding jobs under regular circumstances. Public employment programs have a longer duration (up to three years) at a public employer and entails, among other things, that the work being done has to be of a kind that would not otherwise be undertaken by the public sector. To sum up, the residual program type is very heterogenous, but is primarily targeted towards the weaker unemployed.

[4] Those below the age of 25 receive half of maximum UI benefits.

There has been a shift in the composition of the types of programs, see Table 1. The most frequently used programs are ordinary classroom training, private job training and public job training. In 1995 30% of all participants were enrolled in ordinary educational programs, while this percentage had risen to 65% in 2000. At the same time, the fraction of those participating in private job training was more than halved from 14 to 6%, while the share of participants in public job training fell from 31 to 15%.

Insert table 1 about here

3 The evaluation problem and matching

In this section, we will briefly discuss the non-experimental estimator applied and the identifying assumptions underlying this estimator. We begin with a brief outline of some notation, assumptions, and a formulation of the traditional impact estimator enriched to encompass our setting with more than two alternatives to choose from. The objective of the evaluation is to measure the effect or impact of a treatment, $d \in \{0, 1, ..., D\}$, on an outcome variable, Y. Let $Y_{d'i}$ be the person-specific outcome in the presence of treatment d', and Y_{0i} the outcome in the absence of any treatment, $d = 0$. Hence, the person-specific impact of the program d' is defined as $\Delta_i = Y_{d'i} - Y_{0i}$, $d' \neq 0$. The fundamental evaluation problem is that we do not observe the same person with both outcomes. Therefore it becomes impossible to construct the person-specific impact for anyone by simply looking at the data. Instead, attention usually shifts to constructing means. The parameter we are interested in, is the average effect of "treatment on the treated" defined as

$$\begin{aligned} \Delta &= E\left[Y_{d'} - Y_0 | d = d'\right] \\ &= E[Y_{d'}|d = d'] - E[Y_0|d = d']. \end{aligned} \tag{1}$$

Hence, the problem is to find the counterfactual $E[Y_0|d = d']$ in (1), which is unobserved but must be constructed in order for the defined impact measure to be identified, i.e. some assumptions are needed to obtain identification.

Matching is based on the assumption that all outcome-relevant differences between program participants and non-participants are captured in their observed characteristics such that any difference in outcomes can be attributed to the programs. The idea is to construct comparison groups among all the non-treated which are as similar as possible to the groups of participants in terms of their observed attributes. That is, conditioning on observables, $\mathbf{X}$, should eliminate the selective differences between program participants

and non-participants. Thus in focusing on (1) we make the assumption (following Imbens (2000) and Lechner (2001))

$$E\left[Y_0 \left| \mathbf{X}, d = d' \right.\right] = E\left[Y_0 \left| \mathbf{X}, d = 0 \right.\right] = E\left[Y_0 \left| \mathbf{X} \right.\right]. \tag{2}$$

In order to be able to utilize (2) it is necessary to make sure that there is a non-participant analogue to each participant, i.e.,

$$\Pr\left(d = d' \left| \mathbf{X} \right.\right) < 1. \tag{3}$$

When a large number of covariates, $\mathbf{X}$, is in use, matching can be difficult to implement due to the dimensionality of the problem. A way to circumvent the curse of dimensionality without imposing arbitrary assumptions is based on the results in Rosenbaum & Rubin (1983). Here the focus is shifted from the set of covariates to the probability of program participation, $P(\mathbf{X}) = \Pr\left(d = d' \left| \mathbf{X} \right.\right)$. As long as (2) and (3) hold it is shown that,

$$E\left[Y_0 \left| P(\mathbf{X}), d = d' \right.\right] = E\left[Y_0 \left| P(\mathbf{X}), d = 0 \right.\right] \tag{4}$$

over the common support, $S_P = Supp\left(P(\mathbf{X}) \left| d = d' \right.\right) \bigcap Supp\left(P(\mathbf{X}) \left| d = 0 \right.\right)$. This new conditioning variable, $P(\mathbf{X})$, changes our conditional mean assumption into (4) which together with $P(\mathbf{X}) < 1$ are the only conditions required to justify propensity score matching to estimate the mean impact on the treated, see Heckman, Ichimura & Todd (1998). The matching estimator implemented – local linear regression matching – is described in Appendix A.

4 Data and the selection into programs

Our data set is a register-based 10% random sample of the Danish population for the years 1988-2000 consisting of two parts. The first part is annual observations on a long list of socio-economic variables which are extracted from the integrated database for labor market research (IDA) and the income registers in Statistics Denmark. The second part is detailed event history information about the labor market state of the individuals, which is based on information from four different administrative registers (CRAM, AMFORA, SHS and CON). That is, we know whether the individuals are employed, unemployed, participating in ALMPs or out of the labor force in any week.

Since the main objective of the ALMPs is to improve the employment prospects of the participants, we evaluate the employment outcome of the unemployed. For that reason we construct the quarterly employment rate throughout the period 1995-2000 based on

the labor market spells. However, the earnings outcome is what is relevant for cost-benefit analyses because this measure also includes effects on hours worked and the hourly wage rate, thus capturing impacts on productivity and match quality. Therefore we also evaluate the earnings outcome, and we use annual labor earnings in the period 1995-2000 as our measure. This measure consists of all taxable wage income, which means that also wage earned while enrolled in private and public job training as well as some programs in the group of residual programs is included (benefits received while in e.g. classroom training are not included). Wage income during participation (net of subsidies to the employers) should also be included as a benefit to the extent that it reflects productive activities not undertaken otherwise. This issue is discussed further in sections 5-7.

4.1 Sample selection choices

One restriction of the sample is to consider only UI fund members between 18 and 50 years of age. We exclude individuals above the age of 50 since this group is eligible for early retirement and other schemes for transition out of the labor force. Another restriction of the sample is that individuals who die or emigrate during the observation window are also excluded. We select those who were unemployed in the first week of 1995, and the four treatment groups then consist of those unemployed who end their unemployment spell by entering one of the four types of ALMPs.

In the group of non-participants we include all unemployed as of the first week of 1995 who did not terminate their unemployment spell with ALMP participation. That is, we allow for cross-overs in the sense that they possibly participate in programs following later spells of unemployment. After these sample restrictions there are 13,505 persons in the group of non-participants, while there are 525 participants in private job training, 1,264 participants in public job training, 1,275 participants in classroom training and 895 participants in residual programs.

The length of the unemployment period before program start must be expected to be an important factor behind whether the unemployed will participate in a program, so to make meaningful comparisons a variable such as unemployment duration prior to participation must be constructed for the group of non-participants in some way, even if such a variable is not well defined for non-participants. We follow an approach suggested by Lechner (1999) and applied in e.g. Gerfin & Lechner (2002) and Larsson (2003). For each non-participant a hypothetical program starting date from the empirical distribution of starting dates is drawn. Persons with a simulated starting date later than their actual exit date are excluded from the data set. Lechner (1999) compares this procedure to two

alternative methods and finds that the one applied here fares best with respect to two different summary statistics of the match. In addition Lechner (2002) gives a sensitivity analysis of the procedure by using predicted starting dates, and the results appear to be robust. After application of the procedure only 4,692 individuals remain in the group of non-participants. This means that a substantial fraction of the original group of non-participants are relatively short-term unemployed in the sense that they are assigned a hypothetical program starting week that comes after their actual exit from unemployment.

One particular issue demands special attention when evaluating employment and earnings effects in a large-scale system such as the Danish, where program starts are ongoing and differing across individuals, but where participation in principle is mandatory after a certain period of time in unemployment. Such problems are also encountered for the evaluations of the Swedish system of ALMPs, and Sianesi (2001) argues that to pick a comparison group among those who do not enroll in a program amounts to conditioning on the future, since these unemployed do not enroll exactly because they have left the UI system or found employment by waiting long enough to receive an acceptable job offer.[5] Sianesi (2001) proposes a solution to this problem by pairing a member of the treatment group with a non-participant, who has remained unemployed for at least as long as the treated. In this case treatment effects should be interpreted as the effect of ALMP participation compared to waiting longer in unemployment. However, this approach is not appropriate for a cost-benefit analysis, because the desired counterfactual in principle is no participation at all (or as close to no participation as possible). In addition we think that the problems described above are less pronounced in our analysis, since by January 1995 the unemployed were allowed a very long period of four years of unconditional UI benefits before ALMP participation becomes mandatory, so "no participation" is by no means equivalent to "employment". However, we cannot completely rule out that the estimated treatment effects are plauged somewhat by problems related to conditioning on the future. If that is the case it should be kept in mind, that the employment rate among non-participants is too high, and so any bias is towards finding that the programs do not work, cf. Fredriksson & Johansson (2004).

Table 2 shows the overall program participation rates for 1995-2000, where no distinction is made between program types (i.e. subsequent ALMP participation could be of a different type). Participants in public job training and residual programs appear to have the highest average participation rates and it is declining towards 10% in 2000. It should be noted that even if participants are allowed to switch to other program types later on,

[5] This argument is formalized by Fredriksson & Johansson (2004).

the initial program type remains the clearly dominant type throughout the years.

Insert table 2 about here

It is seen that for the group of non-participants the participation rate rises to 11% in 1999 after which it declines. The participation spells for non-participants are primarily due to enrollment in classroom training and residual programs following intermediate spells of employment and unemployment. Due to these non-negative participation rates non-participation in the present analysis does not represent a world entirely without ALMP participation. However, the participation rates of participants and non-participants tend to converge after 4-6 years, such that the estimated effects of ALMPs primarily should be ascribed to participation rate differentials during the first 3-4 years.

4.2 The selection process into programs

To proceed we need for each individual a predicted probability of participation in each of the four program types. These probabilities are estimated as functions of a long list of individual characteristics — Table 3 presents means for the sample. Of demographic variables we include four age group dummies, gender, marital status, dummies for number of children, citizenship and dummies for region birth. Attained education is captured by dummies for basic schooling, high school and further education with vocational education as reference. We also include the rate with which UI benefits replace the latest observed wage rate. This rate has a rather high ceiling of 90%. Individual wealth is also observed (in 1,000,000 DKK) and so is union membership. In Denmark the ALMPs are administered by local councils at county level, and administrative practices have been observed to deviate somewhat, so to control for such differences and other local labor market differences we also include dummies for each county. There are four main types of housing in Denmark; owner-occupied housing, cooperatives, social housing and private rented housing, and they have different implications for labor market mobility (see Munch, Rosholm & Svarer (2003)). Thus to control for such heterogeneity we include three housing dummies. Local labor market behavior may also be influenced by the size or thickness of the labor market, so we also distinguish between Copenhagen, the five largest cities outside Copenhagen and other parts of the country.

Insert table 3 about here

Finally we include several indicators for individual labor market history. The first variable is labor market experience since 1964. UI seniority measures the number of weeks the unemployed previously were unemployed and received UI benefits at the beginning of

the present unemployment spell. In 1995 this variable were reset whenever the individual had been employed for 26 weeks, but this requirement was strengthened to 52 weeks by January 1997. The UI seniority is important, since it in principle determines when the unemployed is obliged to participate in ALMPs (see section 2.2), i.e. in 1995 the unemployed were entitled to four years of unconditional benefits. There is also included a variable indicating whether the unemployed started the unemployment spell with no UI seniority. Similarly there are variables indicating the number of previous unemployment spells and whether the present unemployment spell is the first. As discussed above we also include unemployment duration prior to participation in addition to an indicator for less than 52 weeks of unemployment duration. Week of entry to the sample, mean duration of previous employment and unemployment spells and the proportion of time spent in employment and unemployment are included. Finally a variable for the proportion of time previously spent receiving sickness benefits is included as a crude measure for health status along with dummies for ALMP participation in the year before.

Even after controlling for this wealth of information we cannot rule out that there is unobserved heterogeneity left which is correlated with employment outcomes and program participation. For example we do not have variables capturing motivation, personal appearance or caseworkers' assessment of the unemployeds' chances to find job. However compared to most other evaluation studies our data set is relatively comprehensive, and we believe that there is sufficient information to make the CIA plausible.

The results of running four binary probit models for participation in each of the four program types (relative to non-participation) are shown in Table 4. Main determinants of the selection process seems to be gender, union membership, UI seniority, present unemployment duration, unemployment history and ALMP participation in 1994. For all programs, participation is more likely the more UI seniority, the longer the present unemployment spell is, and if the unemployed participated in programs in 1994.

Insert table 4 about here

For private job training, the probability of participation is decreasing with age, and women are less likely to participate than men. Also the proportion of previous time in employment increases the chances of enrollment in private job training. Participation in public job training is more likely for women and union members. Classroom training is more likely for individuals with further education and union members, while residual programs are less likely the higher UI replacement rate and the better employment record.

5 Long run employment and earnings effects

5.1 Quality of the match

After estimating the propensity scores the next step is to restrict the sample to the common support. That is, for all four pair-wise comparisons between treatments and non-participants all observations with probabilities larger than the smallest maximum and smaller than the largest minimum must be deleted. This gives rise to a loss of observations in the treatment groups of between 13.6% (public job training) and 18.9% (residual programs), which is comparable to the matching outcome of e.g. Gerfin & Lechner (2002). The quality of the match can be further studied by calculating means of the covariates for the treated and the matched non-participants, and most variables have a very small differential between treated means and matched means.[6]

5.2 Treatment effects

The estimated average quarterly employment effects from the matching analysis are shown in figure 1. For all four program types they start out negative and become positive after some time. The initial dip in the employment rate differential is reflecting the locking-in effect, i.e. that the participants are not searching while participating in ALMPs. For private job training the effect becomes significantly positive after five quarters and it converges to around 10 percentage points. Public job training programs are on average of longer duration than private job training programs which is presumably one reason behind the relatively long-lasting negative effect. The employment effects for public job training highlight the need for analyzing long-term effects, since it is not until the 20th quarter that they become significantly positive. Classroom training is somewhat similar in the sense that the employment rate differential is rising steadily until the 20th quarter to a level between 5 and 10 percentage points. Residual programs seem to have severe locking-in effects, but in this case the effects also turn positive after 3-4 years. Overall, private job training appears to perform best in terms of improving the employment prospects of the participants, which is consistent with the short-term results found in Munch & Skipper (2003).

Insert figure 1 about here

[6] Means of the variables for the treated and the matched non-participants are shown in Appendix C. Also the common support restriction is illustrated in Figure 2, where each panel presents plots of the predicted probabilities for each of the four ALMP types.

In addition to the employment effects of Figure 1, program effects on individual earnings capture effects on hours worked and the hourly wage rate, which is relevant for a cost-benefit analysis. Our earnings measure does not allow us to distinguish between wage income earned in a regular job and during participation in private or public job training or some job training programs in the category of residual programs. However, as explained below this is not a problem for the cost benefit analysis, but the earnings effects should be interpreted with this in mind. Table 5 shows annual earnings effects, and it is clear that for participants in private and public job training there is an initial rise in earnings because of wage income during participation. This effect then declines but is seen to stabilize at a high level. In fact the earnings gain constitutes a rise of 22.6% and 16.5% in 2000 for the participants in private and public job training respectively, and even if this contains some element of wage income during participation this must be regarded as very high numbers. Participants in classroom training have a positive earnings effect after one year which is surprising given that they have negative employment effects during the first seven quarters, cf. Figure 1. Again this could be due to wage income during subsequent participation in public job training and residual programs.[7] In 2000 the earnings effect equals 22.7% of the outcome without classroom training, which can be compared to an earnings gain of up to 15% of the classroom training program evaluated in Raaum et al. (2002). Finally residual programs have negative earnings effects throughout the period 1995-2000, which is partly because the entrepreneurship subsidy program – where there is no wage income – dominates in this sample.

Insert Table 5 about here

6 The net social return of Danish ALMPs

The previous section showed that the programs analyzed have significant effects on individual earnings and the prospects of finding employment. To assess whether the programs are desirable from society's point of view it is necessary to estimate the value of those benefits and other benefits of the programs and compare the benefits to the costs. Following the dominant approach in the evaluation literature (see Heckman et al. (1999)) we measure the net social return as the change in aggregate output attributable to the programs by subtracting the programs' costs from their discounted stream of benefits.

[7] The participation rate in public job training is 3-4% in 1996-1998 and 5-7% in residual programmes in 1997-2000.

Starting with the benefit side the discounted earnings impact is derived from the treatment effects on annual earnings from Table 5. This benefit is in most cost-benefit analyses found to be of much larger magnitude than other measured benefits, cf. Heckman et al. (1999). We also take into account the value of output produced during participation in job training programs. Here it is assumed that employers' value of the output of participants in private job training equals the difference between the unemployment benefit and the subsidy. For participants in public job training we assume that the value of the output produced equals the value of the output produced in private job training.

Among potential benefits not included are possible effects on labor market behavior of the unemployed prior to participation. It may be the case that the prospect of ALMP participation encourages the unemployed to intensify their job search before entering the programs in order to avoid participation. Geerdsen (2002) estimates such ex ante effects for unemployed members of Danish UI funds and finds a small but positive effect. It may also be the case that the prospect of ALMP participation lead unemployed persons, who are not genuinely interested in finding a job, to leave the labor force and stop collecting UI benefits. In addition, if the programs improve employment prospects and this is associated with reduced crime etc., then society may also benefit from reduced expenditures to e.g. the criminal system. Also, effects on the well-being of the participants, such as improvements of participants' social networks, are not accounted for.

On the cost side we take into account direct operation costs of the programs, which include purchase of education material, teacher time etc. related to classroom training and administration costs related to each program. The direct operation costs are calculated using the public annual accounts of the Danish Labor Market Agency, and they are stated per full time equivalent participant. Individuals in the sample potentially participate in several programs during the observation window. Thus to calculate costs per participant in a particular program we first calculate the average amount of time spent in different programs at different points in time. The obtained full time equivalents are multiplied by the cost per full time equivalent for each program in each year.

It is likely that the scale of the programs in Denmark implies that there are significant general equilibrium effects. One such general equilibrium effect, which is taken into account in this paper is the deadweight loss of taxation to finance benefits, subsidies and operation of programs, see e.g. Browning (1987). Based on a comprehensive general equilibrium model of the Danish economy Madsen & Pedersen (2001) find estimates of deadweight loss from taxation between 9% for the universal VAT and 23% for company taxation, and the marginal cost of public funds applied in the cost-benefit analysis lies in that range. First of all this implies that the direct resource costs of the programs

should be multiplied by a factor greater than one to capture the distortions arising from financing the costs by raising tax revenue. In addition transfers in the form of UI benefits and subsidies to employers are not costly to society as such, since they are just transfers of consumption possibilities, but these transfers must be financed by raising tax revenue thereby causing a deadweight loss. Thus, if the programs have an impact on the overall level of transfers, there will also be a change in the resulting deadweight loss of taxation. For instance if the programs are successful in improving the job prospects of participants, the society incurs savings in deadweight losses due to reduced taxes required to pay participants' future unemployment benefits. The subsidies paid to private employers only cover a part of the participants' wages; the remaining part is paid for by the employers, which reduces public sector expenses and thus leads to savings in the deadweight loss of taxation, and this is also taken into account.

Some potentially important costs, which are not considered in this paper, are the effects on participants' available leisure time. Danish ALMPs have significant locking-in effects, so the loss of leisure time may lead to a significant loss of welfare. Greenberg (1997) stresses that failing to account for this cost will bias evaluations in the direction of finding more favorable results. Furthermore, it is likely that the job training programs, which involve a wage subsidy, lead to a displacement effect of non-subsidized workers as described by e.g. Dahlberg & Forslund (1999). They find evidence of displacement effects of Swedish ALMPs of about 66% in programs whose main mechanism is wage subsidies. There may also be important effects on the macroeconomic wage formation because the search activity of the unemployed is reduced during participation. However, Danish Economic Council (2002) finds no evidence of such effects in the Danish labor market.

7 Costs and benefits compared

The net social return of Danish ALMPs is presented in Table 6. The first component of the net social benefits is the present discounted value of the estimated earnings gains from Table 5. Next is the reduced deadweight loss of taxation resulting from the reduced income transfers in the form of unemployment insurance payments following from higher employment. This component is based on the employment effects in Figure 1 and information about time spent in private job training. From these gains are deducted the unit costs of administration and the unit costs of classroom training corrected for marginal cost of public funds. These direct operation costs are also based on information about time spent in the different ALMPs by participants. Finally we have to adjust for the fact that

the earnings measure behind the earnings effects in Table 5 include labor income during participation (which equals UI benefits) in job training. As stated earlier we assume that the value of the output of participants in job training equals the difference between the UI benefit and the subsidy, so to get a correct account of a persons' productivity we have to subtract the subsidy from the earnings effects. This is based on information about the size of the subsidy and how much time each individual spend in job training programs.

Insert table 6 about here

It is apparent from Table 6 that private job training is the best program with a surplus of 278,000 DKK per participant (around 37,000 Euros) over the six years from 1995 to 2000. This surplus can primarily be attributed to an earnings gain of 330,000 DKK, which is reduced somewhat after correcting for the subsidy. There is also a notable saving on tax distortions due to reduced UI benefits, which amounts to 23,900 DKK. For participants in public job training there is also a large earnings gain, but around two thirds of this is due to the subsidy, so the net benefit is reduced to 70,500 DKK (around 9,500 Euros). Classroom training has a surplus of 22,000 DKK (3,000 Euros), which is just significant at the 5% level. Here it is worth noting that a large part of the earnings gain comes at the expense of considerable direct operation costs of the program. Residual programs end up with a big deficit of 137,500 DKK (around 18,500 Euros) which is due to a loss in earnings.

The importance of considering long-term effects becomes clear when the net benefits for the years 1995-2000 are compared to a calculation based on effects for only the first three years 1995-1997. In that case, classroom training would appear not to be worthwhile from a social point of view, and public job training would appear far less attractive. Note that for classroom training this picture would not change much if future gains from the program were projected into the future on the basis of the last-year effect, because this effect is fairly weak, cf. Table 5.

8 Discussion and conclusion

This paper has estimated long-term employment and earnings effects for participants in the large scale system of ALMPs in Denmark in the period 1995-2000. The treatment effects are estimated by propensity score matching on a very detailed administrative data set, which allows us to control for much individual heterogeneity. It turns out to be very important to derive long-term treatment effects, since participants in most programs

initially experience severe and long lasting negative locking-in effects. Positive post-program employment effects eventually come to dominate, but typically not until after 1-3 years.

The earnings effects are subsequently used as input in a cost-benefit analysis, that also accounts for direct operation costs of the programs corrected for marginal costs of public funding. We find for participants followed from 1995 to 2000 that private job training has a very high surplus and public job training and classroom training also comes out with surpluses although at a lower level. Given the relatively scarce literature on cost-benefit assessments of ALMPs — particularly in Europe — this paper contributes with new knowledge on that regard. It follows from the vast literature that confines attention to deriving treatment effects and neglect the cost side, that the success of the different programs are at best mixed. That is, to the extent that treatment effects alone are negative this picture can only be reinforced by taking the costs of the programs into account. In that respect our results are more promising, and an important lesson is that long-term effects are required to arrive at a more adequate cost-benefit evaluation of the programs.

Our results should be held up against the fact that some potentially important effects are excluded from the analysis. Probably the most important of these are displacement of non-participants in private and public job training (a neglected cost), and ex ante effects on the transition rate out of unemployment are disregarded (a neglected benefit). Furthermore the primary social benefit is the discounted earnings gain, but as discussed in section 4.1 the characteristics of the Danish labor market implies that our estimated treatment effects to some extent may be influenced by conditioning on future employment for the comparison group. This means that the earnings gain in fact may be even higher and thus should be regarded as a lower bound. Thus we can conclude that for the conclusions to be turned around any displacement effects and other neglected costs must be of a magnitude at least as large as the reported net social returns. In summary we are quite confident that private job training, public job training and classroom training were socially beneficial undertakings for the unemployed individuals in our sample.

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A Appendix: The matching estimator

Our matching estimator implemented takes on the following form

$$\Delta = \frac{1}{m_{d'}} \sum_{i \in I_{d'} \cap S_p} \left(Y_{d'i} - \sum_{j \in I_0} W(i,j) Y_{0j} \right), \tag{5}$$

where $I_{d'}$ denotes the set of people receiving treatment d', I_0 the set of controls, and $m_{d'}$ denotes the number of persons in the set $I_{d'} \cap S_p$. Notice how the match for each participant $i \in I_{d'} \cap S_p$ is constructed as a weighted average over the outcomes of non-participants, where the weights, $W(i,j)$, are constructed such that they depend on the distance between P_i and P_j, where $P_i \equiv P(\mathbf{X}_i)$. The different matching estimators implemented in the literature differ in how the weights are constructed.

The estimator typically invoked, the nearest neighbor type, uses at most one person from the comparison group in constructing a match for the program participant. We apply "Local Linear Regression matching", which is a nonparametric matching estimator that constructs matches for each program participant based on kernel weighted averages over multiple non-participants. Relative to the simple nearest neighbor matching, by using kernel techniques we reduce the variance of our matching estimates by making use of information from additional non-participants. At a cost, we introduce small sample bias because of the increased distance between participants and matched non-participants, measured in terms of their probabilities of program participation. The weights implemented for local linear matching estimates are

$$W(i,j) = \frac{K_{ij} \sum_{k \in I_0} K_{ik} (P_k - P_i)^2 - [K_{ij} (P_j - P_i)] \left[\sum_{k \in I_0} K_{ik} (P_k - P_i) \right]}{\sum_{j \in I_0} K_{ij} \sum_{k \in I_0} K_{ik} (P_k - P_i)^2 - \left(\sum_{k \in I_0} K_{ik} (P_k - P_i) \right)^2},$$

where K is a kernel function and h_n is a bandwidth. We apply local linear matching in the analyses below because of its desirable statistical properties (see Heckman et al. (1997) for details). Due to support considerations (see Heckman, Ichimura, Smith & Todd (1998) for practical details) we use as kernel function, K, the biweight kernel given by

$$K(s) = \begin{cases} \frac{15}{16}(1 - s^2)^2 & \text{for } |s| < 1 \\ 0 & \text{otherwise} \end{cases}$$

and a bandwidth following the Silverman (1986) "rule of thumb".

B Appendix: Tables and figures

TABLE 1

DISTRIBUTION OF PROGRAMS, 1995-2000[a]

	1995	1996	1997	1998	1999	2000
	Per cent					
Private job training	14	10	9	8	7	6
Public job training	31	19	19	15	16	15
Ordinary classroom training	30	46	44	55	59	65
Individual job training	8	4	6	6	4	6
Entrepreneurship subsidy	7	8	8	3	1	0
Targeted classroom training	6	4	3	4	4	2
Targeted courses	2	1	2	2	3	3
Public employment programs	0	6	8	6	5	1
Other programs	2	1	1	1	1	2

[a]The group considered are unemployed members of UI funds in the age group between 19 and 66. Only the first program for each person for each year is included.

TABLE 2

PROGRAM PARTICIPATION RATES

	Private job training	Public job training	Classroom training	Residual programs	Non-participants
1995	0.3516	0.3487	0.1595	0.2657	0.0101
1996	0.2059	0.3305	0.2727	0.4162	0.0515
1997	0.1167	0.2793	0.2444	0.4247	0.0891
1998	0.1122	0.2218	0.2125	0.2393	0.1069
1999	0.0864	0.1791	0.1621	0.1559	0.1131
2000	0.0665	0.1223	0.1022	0.1067	0.0775
# individuals	525	1,264	1,275	895	4,692

TABLE 3

SAMPLE MEANS

Variables	Private job training	Public job training	Classroom training	Residual programs	Non-participants
Age 18-25	0.2171	0.1052	0.1529	0.1341	0.1552
Age 35-39	0.1314	0.1780	0.1624	0.1877	0.1517
Age 40-44	0.1200	0.1574	0.1537	0.1430	0.1330
Age 45+	0.1086	0.2168	0.1757	0.1911	0.2168
Woman	0.4248	0.5799	0.5286	0.4559	0.5450
Married	0.3086	0.3813	0.3710	0.3844	0.3951
Child 0-2	0.1448	0.1242	0.1373	0.1508	0.1383
Child 3-6	0.1219	0.1820	0.1545	0.1777	0.1682
Child 7-9	0.0819	0.1147	0.1020	0.1318	0.1046
Child 10-14	0.1010	0.1551	0.1396	0.1587	0.1413
Child 15-17	0.0590	0.0941	0.0918	0.0939	0.0889
Citizenship (ref. Danish):					
OECD	0.0305	0.0467	0.0737	0.0693	0.0599
Non-OECD	0.0248	0.0554	0.0416	0.0603	0.0416
Region of birth (ref. Outside Copenhagen):					
Capital	0.1238	0.1028	0.1271	0.1151	0.1091
Islands	0.0914	0.1123	0.1035	0.0950	0.1010
Fyn	0.0686	0.0775	0.0769	0.0682	0.0733
North	0.1257	0.1535	0.0871	0.0905	0.1289
Central	0.2419	0.1464	0.1545	0.1687	0.1647
South	0.0743	0.0767	0.0667	0.0827	0.0586
Education (ref. Vocational education):					
Basic sch.	0.4457	0.5459	0.4494	0.5050	0.4827
High sch.	0.0819	0.0601	0.0831	0.0749	0.0774
Further edu	0.0952	0.0791	0.1616	0.1162	0.1102
Economic variables:					
UI repl rate	0.7498	0.7554	0.7305	0.7527	0.7434
Wealth	0.0225	0.0020	0.0022	-0.0054	0.0023
Union memb.	0.8229	0.9090	0.8282	0.6961	0.7758
UI fund (ref. Metal):					
Build.	0.0400	0.0229	0.0235	0.0346	0.0301
KAD	0.0400	0.0839	0.0682	0.0737	0.0667
Manuf	0.3352	0.3821	0.2259	0.3385	0.3063
Tech	0.0610	0.0443	0.0808	0.0581	0.0592
Trade	0.1981	0.1661	0.1741	0.1117	0.1520
Service	0.0457	0.0546	0.0792	0.0592	0.0767
Academic	0.0476	0.0411	0.0824	0.0492	0.0454
Others	0.1505	0.1748	0.1906	0.1844	0.1925
Selfempl	0.0362	0.0166	0.0345	0.0637	0.0362

TABLE 3 Cont.

Variables	Private job training	Public job training	Classroom training	Residual programs	Non-participants
County (ref. Copenhagen):					
Fr.borg	0.0514	0.0617	0.0314	0.0704	0.0488
Roskilde	0.0514	0.0324	0.0486	0.0291	0.0350
Vestsj.	0.0610	0.0570	0.0745	0.0547	0.0661
St.Stroem	0.0552	0.0902	0.0573	0.0715	0.0518
Fyn	0.0648	0.0926	0.0776	0.0771	0.0870
Soenderj	0.0533	0.0443	0.0329	0.0592	0.0384
Ribe	0.0229	0.0324	0.0157	0.0380	0.0269
Vejle	0.1067	0.0665	0.0635	0.0525	0.0512
Ringk.	0.0781	0.0245	0.0188	0.0547	0.0279
Aarhus	0.1657	0.1163	0.1388	0.1587	0.1411
Viborg	0.0381	0.0356	0.0196	0.0324	0.0281
Nordj	0.0990	0.1290	0.0745	0.0492	0.1119
Housing (ref. Social housing):					
Owner	0.3505	0.3339	0.3467	0.3251	0.3536
Coop	0.0248	0.0396	0.0557	0.0458	0.0512
Private	0.3524	0.3259	0.3090	0.3207	0.3107
City size (ref. Copenhagen):					
Med.city	0.1752	0.1717	0.1553	0.1642	0.1814
Sml.city	0.7486	0.6970	0.6251	0.6793	0.6468
Labour market history:					
Experience	0.6978	0.7631	0.7588	0.7192	0.7802
UI sen.	0.0263	0.0314	0.0241	0.0252	0.0176
No UI sen.	0.4724	0.4818	0.5169	0.5397	0.6029
First U spell	0.1486	0.1131	0.1686	0.1832	0.2104
No. U spells	0.2890	0.2918	0.2637	0.2630	0.2388
Unempl. dur.	0.6974	0.8527	0.8990	0.8900	0.4558
<52 weeks	0.4686	0.3347	0.3106	0.3631	0.6684
Entry week	0.0084	0.0050	0.0068	0.0104	0.0077
Mean dur. E	0.0796	0.0594	0.0825	0.0790	0.0880
Mean dur. U	0.0283	0.0367	0.0312	0.0285	0.0262
Prop. U	0.2436	0.3163	0.2554	0.2500	0.2204
Prop. E	0.6096	0.5151	0.5835	0.5411	0.6015
Prop. sick	0.0019	0.0021	0.0027	0.0034	0.0030
Private JT 94	0.0514	0.0095	0.0094	0.0179	0.0055
Public JT 94	0.0305	0.0870	0.0376	0.0313	0.0198
Classr Tr 94	0.0171	0.0182	0.0361	0.0022	0.0047
Residual P 94	0.0171	0.0079	0.0031	0.0603	0.0053
No. obs.	525	1,264	1,275	895	4,692

TABLE 4

ESTIMATION RESULTS: PROBIT MODELS FOR PROGRAMME PARTICIPATION

	Private job training		Public job training		Classroom training		Residual programs	
Variables	Coeff.	Stdv.	Coeff.	Stdv.	Coeff.	Stdv.	Coeff.	Stdv.
Constant	-3.1222	0.2880	-3.6079	0.2548	-2.1967	0.2122	-2.1239	0.2420
Age 18-25	0.0984	0.0839	0.0337	0.0758	0.0767	0.0686	0.0241	0.0801
Age 35-39	-0.2110	0.0876	0.0650	0.0668	-0.1095	0.0663	-0.0262	0.0709
Age 40-44	-0.2295	0.0940	-0.0286	0.0729	-0.1380	0.0738	-0.1358	0.0809
Age 45+	-0.6099	0.1116	-0.1124	0.0764	-0.4239	0.0772	-0.2600	0.0851
Woman	-0.2851	0.0660	0.1845	0.0525	-0.0281	0.0506	-0.2166	0.0563
Married	-0.0602	0.0713	-0.0353	0.0512	-0.0501	0.0508	-0.0227	0.0582
Child 0-2	-0.0057	0.0841	0.0326	0.0697	-0.0227	0.0656	0.0558	0.0710
Child 3-6	-0.1968	0.0855	-0.0221	0.0601	-0.1331	0.0614	0.0367	0.0659
Child 7-9	-0.0636	0.1023	-0.0564	0.0712	-0.0141	0.0766	0.1080	0.0761
Child 10-14	-0.0583	0.0952	0.0155	0.0661	-0.0307	0.0674	-0.0016	0.0736
Child 15-17	0.0357	0.1147	-0.0552	0.0765	0.1051	0.0781	0.0812	0.0866
Citizenship (ref. Danish):								
OECD	-0.3353	0.1567	-0.1435	0.1135	0.1636	0.0963	-0.0602	0.1147
Non-OECD	-0.2918	0.1825	0.1960	0.1132	0.0283	0.1151	0.0669	0.1252
Region of birth (ref. Outside Copenhagen):								
Capital	0.1453	0.0928	0.0683	0.0784	0.1315	0.0732	0.1277	0.0842
Islands	0.0262	0.1220	0.0863	0.0911	0.0401	0.0839	0.0376	0.1021
Fyn	0.1679	0.1487	0.0963	0.1083	0.2518	0.1056	0.1092	0.1204
North	0.0037	0.1400	0.1474	0.1055	0.0204	0.1109	0.0783	0.1181
Central	0.0591	0.0985	0.0093	0.0854	0.0858	0.0807	0.0012	0.0877
South	0.0869	0.1429	0.2320	0.1206	0.3285	0.1232	0.1094	0.1253
Education (ref. Vocational education):								
Basic sch.	-0.0685	0.0676	-0.0155	0.0515	0.0456	0.0534	-0.0607	0.0556
High sch.	0.0000	0.1058	-0.0576	0.0945	0.1050	0.0842	0.0217	0.1005
Further edu	0.0650	0.1164	-0.1776	0.1036	0.2313	0.0836	0.0475	0.0956
Economic variables:								
UI repl rate	0.0232	0.1790	-0.0850	0.1442	-0.2819	0.1293	-0.2496	0.1498
Wealth	-0.2586	0.1355	-0.0285	0.1018	-0.1100	0.0970	-0.0388	0.0858
Union memb.	0.0704	0.0812	0.6065	0.0735	0.2763	0.0612	-0.1803	0.0626
UI fund (ref. Metal):								
Build.	0.1099	0.1995	0.4698	0.1954	-0.0739	0.1752	0.2444	0.1810
KAD	0.0521	0.1964	0.5686	0.1805	0.0952	0.1480	0.3989	0.1737
Manuf	0.0496	0.1449	0.5739	0.1605	-0.2645	0.1229	0.1498	0.1479
Tech	0.0391	0.1731	0.4981	0.1864	0.1774	0.1381	0.1790	0.1706
Trade	0.2594	0.1500	0.6698	0.1677	0.0957	0.1259	0.0949	0.1568
Service	0.0066	0.1811	0.6836	0.1814	0.0409	0.1398	0.1163	0.1716
Academic	0.2489	0.2037	0.9946	0.2065	0.4154	0.1566	0.3174	0.1919
Others	0.0791	0.1545	0.5132	0.1660	0.0473	0.1267	0.2001	0.1549
Selfempl	0.2933	0.2115	0.8972	0.2276	0.2802	0.1730	0.5336	0.1866

TABLE 4 Cont.

	Private job training		Public job training		Class room training		Residual programs	
Variables	Coeff.	Stdv.	Coeff.	Stdv.	Coeff.	Stdv.	Coeff.	Stdv.
County (ref. Copenhagen):								
Fr.borg	0.2544	0.1426	0.3801	0.1073	-0.3524	0.1098	0.2819	0.1183
Roskilde	0.4867	0.1490	0.3575	0.1268	0.2062	0.1097	0.1012	0.1439
Vestsj.	0.1803	0.1513	0.0977	0.1137	0.0711	0.1000	0.0419	0.1314
St.Stroem	0.3159	0.1497	0.4816	0.1134	0.1294	0.1106	0.4492	0.1277
Fyn	0.0126	0.1612	0.2076	0.1178	-0.1114	0.1130	0.1136	0.1326
Soenderj	0.3959	0.1687	0.1407	0.1447	-0.0890	0.1458	0.3862	0.1510
Ribe	0.3198	0.2348	0.2242	0.1638	-0.3483	0.1917	0.5679	0.1559
Vejle	0.7054	0.1366	0.3675	0.1215	0.1076	0.1127	0.2348	0.1326
Ringk.	0.9096	0.1568	0.2396	0.1469	-0.0633	0.1532	0.7128	0.1402
Aarhus	0.3278	0.1355	0.1206	0.1116	0.0160	0.1057	0.2829	0.1159
Viborg	0.4284	0.1918	0.3864	0.1488	-0.0799	0.1719	0.2683	0.1632
Nordj	0.1826	0.1624	0.1045	0.1239	-0.1253	0.1232	-0.2768	0.1489
Housing (ref. Social housing):								
Owner	0.0628	0.0749	-0.0544	0.0593	0.0865	0.0586	0.0530	0.0636
Coop	-0.1726	0.1700	-0.0920	0.1168	-0.1081	0.1054	0.0152	0.1275
Private	-0.0132	0.0724	-0.0171	0.0575	-0.0592	0.0571	-0.0115	0.0618
City size (ref. Copenhagen):								
Med.city	0.2043	0.1559	0.1060	0.1187	-0.1080	0.1093	-0.0856	0.1235
Sml.city	0.3314	0.1242	0.1144	0.0920	0.0117	0.0780	0.0990	0.0947
Labour market history:								
Experience	0.0027	0.0606	0.1159	0.0472	0.1114	0.0469	0.0708	0.0510
UI sen.	3.3958	1.0810	4.5773	0.9057	2.7170	0.9328	2.5552	0.9445
No UI sen.	-0.1660	0.0758	-0.1299	0.0629	-0.2238	0.0620	0.0282	0.0678
First U spell	0.0754	0.1208	0.3173	0.0950	0.0624	0.0914	-0.0969	0.1018
No. U spells	1.0097	0.1817	0.6696	0.1690	1.1511	0.1704	0.8589	0.1774
Unempl. dur.	1.1355	0.1063	1.4521	0.0836	1.4285	0.0785	1.3879	0.0831
<52 weeks	0.0589	0.0908	-0.0615	0.0708	-0.0472	0.0689	0.1395	0.0757
Entry week	1.5764	1.2869	-0.0527	1.1151	-0.1873	0.8282	3.5267	0.8749
Mean dur. E	0.0029	0.6214	-1.7657	0.5079	0.3594	0.4697	1.4502	0.5099
Mean dur. U	6.0168	1.7386	7.2273	1.4010	6.9178	1.3548	3.3577	1.5606
Prop. U	-0.4792	0.2859	-0.0541	0.2223	-0.7562	0.2246	-0.6253	0.2439
Prop. E	0.6762	0.1875	0.0788	0.1481	0.2063	0.1363	-0.4470	0.1536
Prop. sick	-0.1935	1.5979	1.0113	1.5457	1.6583	1.2699	2.8053	1.4251
Private JT 94	1.2947	0.2115	0.3502	0.2778	0.3548	0.2648	0.8261	0.2251
Public JT 94	0.3515	0.1756	0.9329	0.1085	0.5797	0.1268	0.4986	0.1355
Classr Tr 94	0.7515	0.2965	0.8889	0.2319	1.5480	0.1913	-0.3337	0.4076
Residual P 94	0.6223	0.2951	0.1288	0.2965	-0.4732	0.3569	1.6049	0.1893

TABLE 5

AVERAGE EARNINGS EFFECTS (100,000 DKK)

	Private job training		Public job training		Classroom training		Residual programs	
Year	ATET	Stdv.	ATET	Stdv.	ATET	Stdv.	ATET	Stdv.
1995	0.4291	0.0247	0.4092	0.0320	-0.0266	0.0231	-0.0812	0.0170
1996	0.5030	0.0436	0.3646	0.0351	0.1018	0.0212	-0.1606	0.0215
1997	0.3324	0.0257	0.2412	0.0214	0.1577	0.0156	-0.1468	0.0145
1998	0.2950	0.0264	0.1474	0.0130	0.1632	0.0260	-0.1410	0.0260
1999	0.2938	0.0393	0.1114	0.0172	0.2238	0.0141	-0.1734	0.0228
2000	0.2728	0.0258	0.1599	0.0192	0.2389	0.0240	-0.1616	0.0158

TABLE 6

THE ECONOMIC VALUE OF DANISH ALMPS[8]

Present values per participant, 1,000 DKK, 2002

	Private job training		Public job training		Classroom training		Residual programs	
	PDV	Stdv.	PDV	Stdv.	PDV	Stdv.	PDV	Stdv.
Effects for 1995-2000:								
Earnings effect	330.5	12.0	229.2	9.7	120.5	7.9	-128.6	7.4
UI savings	23.9	1.7	-1.3	1.2	4.3	1.0	-10.9	1.2
Unit costs	-2.4	0	9.9	0	89.8	0	-4.0	0
Subsidy	79.3	0	147.6	0	13.6	0	1.9	0
Net benefit	277.5	12.1	70.5	9.8	21.4	8.0	-137.5	7.5
Effects for 1995-1997:								
Earnings effect	214.3	9.5	173.0	8.9	37.0	6.0	-64.7	5.3
UI savings	10.6	1.3	-4.2	0.9	-1.9	0.8	-15.7	0.9
Unit costs	2.3	0	9.4	0	77.0	0	2.2	0
Subsidy	78.4	0	124.3	0	9.1	0	2.2	0
Net benefit	144.2	9.6	35.1	9.0	-51.0	6.1	-84.8	5.3

[8]The stated PDVs are the sum of annual values from respectively 1995-2000 and 1995-1997, which are discounted by an annual discount rate of 6%. The deadweight loss of taxation is assumed to be 20% of the public expense on e.g. administration of the ALMP. Sensitivity analyses indicate that using deadweight losses in the range from 9 to 23 per cent does not change the qualitative results. Unit costs cover the cost of education (DKK 81,081 per full time equivalent participant in 2002 prices) and costs of administration (DKK 2,986 in per full time equivalent participant). Negative unit costs are possible to the extent that the non-participants have a higher partition rate in classroom training. All values are deflated to 2002 using the GDP deflator. Standard deviations are derived using those from Table 5 and assuming that all other effects and values are deterministic.

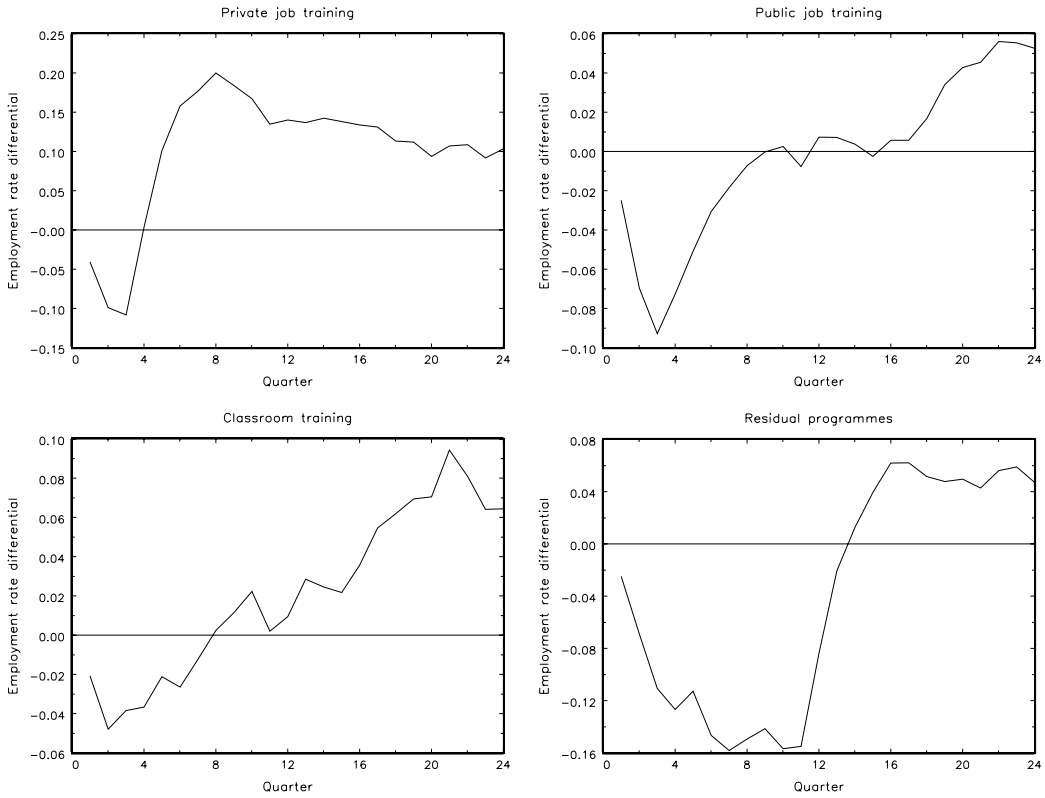

Figure 1: Average employment effects of programs.

C Appendix: Supplementary tables and figures

TABLE C1

MATCH QUALITY, MEANS

	Private job training		Public job training		Classroom training		Residual programs	
Variables	Treated	Matched	Treated	Matched	Treated	Matched	Treated	Matched
Age 18-25	0.2179	0.2091	0.1172	0.1161	0.1538	0.1418	0.1377	0.1332
Age 35-39	0.1376	0.1388	0.1685	0.1721	0.1593	0.1645	0.1722	0.1770
Age 40-44	0.1147	0.1181	0.1474	0.1460	0.1436	0.1386	0.1377	0.1347
Age 45+	0.1193	0.1226	0.2198	0.2093	0.1777	0.1803	0.1997	0.1997
Woman	0.4564	0.4483	0.5952	0.5805	0.5396	0.5374	0.4793	0.4566
Married	0.3096	0.2996	0.3919	0.3786	0.3702	0.3663	0.3994	0.3845
Child 0-2	0.1583	0.1572	0.1300	0.1418	0.1400	0.1374	0.1529	0.1509
Child 3-6	0.1353	0.1288	0.1832	0.1745	0.1529	0.1513	0.1873	0.1733
Child 7-9	0.0826	0.0801	0.1154	0.1113	0.1013	0.1059	0.1267	0.1215
Child 10-14	0.1078	0.0981	0.1575	0.1429	0.1418	0.1385	0.1570	0.1507
Child 15-17	0.0642	0.0629	0.0934	0.0924	0.0902	0.0922	0.0992	0.0904
Citizenship (ref. Danish):								
OECD	0.0298	0.0332	0.0476	0.0509	0.0672	0.0710	0.0634	0.0666
Non-OECD	0.0252	0.0256	0.0531	0.0484	0.0405	0.0347	0.0551	0.0551
Region of birth (ref. Outside Copenhagen):								
Capital	0.1261	0.1258	0.1026	0.0994	0.1206	0.1182	0.1129	0.1076
Islands	0.1009	0.1050	0.1126	0.1127	0.1059	0.1016	0.0978	0.1015
Fyn	0.0665	0.0709	0.0769	0.0764	0.0783	0.0789	0.0716	0.0694
North	0.1284	0.1236	0.1465	0.1494	0.0948	0.1006	0.0937	0.1000
Central	0.2362	0.2374	0.1566	0.1528	0.1593	0.1587	0.1722	0.1745
South	0.0849	0.0664	0.0742	0.0757	0.0672	0.0687	0.0799	0.0822
Education (ref. Vocational education):								
Basic sch.	0.4633	0.4633	0.5366	0.5421	0.4613	0.4761	0.4904	0.4873
High sch.	0.0826	0.0790	0.0614	0.0619	0.0773	0.0746	0.0785	0.0786
Further edu	0.0963	0.0997	0.0815	0.0926	0.1446	0.1407	0.1157	0.1165
Economic variables:								
UI repl rate	0.7473	0.7498	0.7535	0.7542	0.7341	0.7352	0.7459	0.7458
Wealth	-0.0162	-0.0193	-0.0029	-0.0017	-0.0041	-0.0061	-0.0060	-0.0055
Union memb.	0.8096	0.8099	0.8993	0.8804	0.8214	0.8178	0.7135	0.7100
UI fund (ref. Metal):								
Build.	0.0413	0.0348	0.0229	0.0215	0.0276	0.0290	0.0358	0.0362
KAD	0.0459	0.0439	0.0824	0.0700	0.0700	0.0688	0.0758	0.0721
Manuf	0.3440	0.3422	0.3608	0.3714	0.2265	0.2446	0.3196	0.3329
Tech	0.0482	0.0526	0.0485	0.0466	0.0801	0.0799	0.0647	0.0657
Trade	0.1881	0.1853	0.1731	0.1692	0.1731	0.1581	0.1198	0.1155
Service	0.0528	0.0537	0.0559	0.0616	0.0746	0.0704	0.0620	0.0604
Academic	0.0459	0.0457	0.0412	0.0516	0.0718	0.0708	0.0523	0.0518
Others	0.1468	0.1552	0.1804	0.1724	0.1971	0.2031	0.1860	0.1811
Selfempl	0.0390	0.0424	0.0192	0.0233	0.0368	0.0374	0.0537	0.0572

TABLE C1 Cont.

	Private job training		Public job training		Class room training		Residual programs	
Variables	Treated	Matched	Treated	Matched	Treated	Matched	Treated	Matched
County (ref. Copenhagen):								
Fr.borg	0.0573	0.0535	0.0623	0.0627	0.0331	0.0285	0.0689	0.0637
Roskilde	0.0459	0.0479	0.0330	0.0312	0.0387	0.0399	0.0275	0.0292
Vestsj.	0.0642	0.0688	0.0568	0.0629	0.0746	0.0758	0.0523	0.0609
St.Stroem	0.0573	0.0613	0.0824	0.0773	0.0562	0.0561	0.0758	0.0785
Fyn	0.0665	0.0672	0.0925	0.0894	0.0820	0.0840	0.0813	0.0768
Soenderj	0.0550	0.0517	0.0412	0.0422	0.0350	0.0413	0.0606	0.0577
Ribe	0.0252	0.0218	0.0311	0.0316	0.0184	0.0174	0.0344	0.0368
Vejle	0.0963	0.1056	0.0696	0.0681	0.0589	0.0526	0.0537	0.0526
Ringk.	0.0619	0.0592	0.0238	0.0215	0.0221	0.0189	0.0523	0.0489
Aarhus	0.1651	0.1601	0.1245	0.1402	0.1400	0.1433	0.1543	0.1580
Viborg	0.0436	0.0395	0.0375	0.0360	0.0230	0.0228	0.0331	0.0338
Nordj	0.1032	0.1028	0.1227	0.1195	0.0838	0.0881	0.0510	0.0543
Housing (ref. Social housing):								
Owner	0.3624	0.3527	0.3379	0.3435	0.3471	0.3577	0.3471	0.3422
Coop	0.0252	0.0289	0.0394	0.0371	0.0580	0.0522	0.0413	0.0454
Private	0.3486	0.3464	0.3214	0.3247	0.3066	0.3130	0.3113	0.3290
City size (ref. Copenhagen):								
Med.city	0.1743	0.1676	0.1749	0.1823	0.1602	0.1582	0.1639	0.1611
Sml.city	0.7500	0.7471	0.6951	0.6843	0.6344	0.6297	0.6804	0.6882
Labour market history:								
Experience	0.7129	0.7041	0.7632	0.7436	0.7520	0.7494	0.7435	0.7431
UI sen.	0.0249	0.0243	0.0309	0.0312	0.0245	0.0243	0.0226	0.0227
No UI sen.	0.4794	0.4989	0.4670	0.4410	0.5037	0.5010	0.5510	0.5643
First U spell	0.1491	0.1359	0.1190	0.1067	0.1510	0.1474	0.1791	0.1812
No. U spells	0.2821	0.2810	0.2908	0.2993	0.2718	0.2828	0.2581	0.2625
Unempl. dur.	0.6155	0.6301	0.7449	0.7442	0.7609	0.7702	0.7317	0.7400
<52 weeks	0.4931	0.4822	0.3672	0.3465	0.3517	0.3331	0.4022	0.3923
Entry week	0.0085	0.0088	0.0053	0.0059	0.0069	0.0063	0.0104	0.0113
Mean dur. E	0.0799	0.0775	0.0616	0.0591	0.0791	0.0777	0.0805	0.0799
Mean dur. U	0.0275	0.0286	0.0355	0.0358	0.0309	0.0302	0.0288	0.0283
Prop. U	0.2430	0.2447	0.3061	0.3147	0.2570	0.2594	0.2434	0.2419
Prop. E	0.6070	0.6061	0.5235	0.5163	0.5771	0.5761	0.5562	0.5551
Prop. sick	0.0021	0.0022	0.0024	0.0026	0.0027	0.0027	0.0038	0.0038
Private JT 94	0.0161	0.0081	0.0110	0.0099	0.0092	0.0072	0.0165	0.0157
Public JT 94	0.0298	0.0275	0.0733	0.0681	0.0414	0.0365	0.0344	0.0294
Classr Tr 94	0.0183	0.0116	0.0165	0.0169	0.0267	0.0188	0.0028	0.0032
Residual P 94	0.0138	0.0122	0.0092	0.0068	0.0028	0.0038	0.0234	0.0113

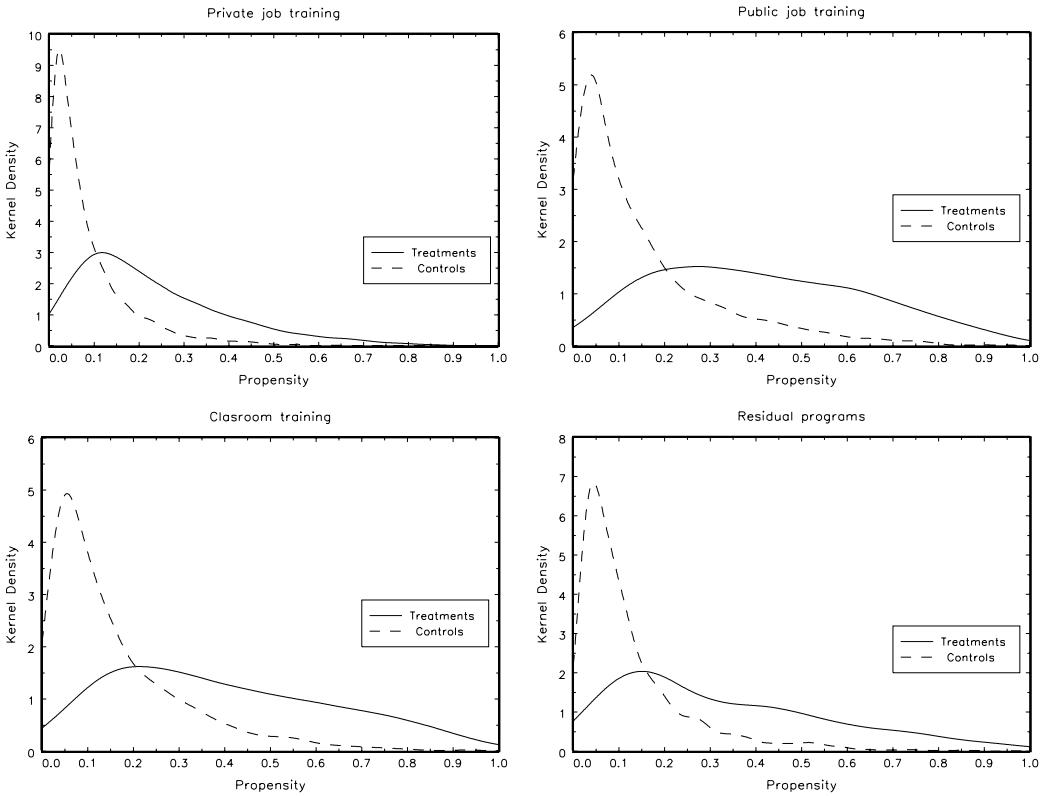

Figure 2: Nonparametric estimates of propensity densities.