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ABSTRACT

Macroeconometric Evaluation of Active Labour Market Policies in Austria*

This paper contributes to the literature on macroeconometric evaluation of active labour market policies (ALMP) by considering the regional effects on both the matching process and the job-seeker rate. We use an unique new data set on all Austrian job-seekers between 2001 to 2007 and apply GMM and Quasi-ML estimators to take into account both the simultaneity of ALMP and spatial interrelations between employment office districts. The results indicate that job schemes in the non-profit sector, wage subsidies, and apprenticeships cause particularly favourable effects on the regional matching function and the job-seeker rate.

JEL Classification: C33, H43, J64

Keywords: evaluation, active labour market policy, dynamic panel data model, spatial econometrics

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1. Introduction

In comparison with the majority of the European countries, the unemployment rate in Austria is relatively low. Nonetheless, the Austrian government recognises the need to have an effective framework of active labour market policies (ALMP) to prevent the problem of unemployment from becoming more severe. The objectives of the Public Employment Service Austria (*Arbeitsmarktservice Österreich* - AMS) stipulate an increase in the relevance of activation strategies. Early intervention by means of ALMP aims to achieve a rapid and sustainable integration of job-seekers in non-subsidised employment. To accomplish this, the objectives of Austrian ALMP can be divided into three groups:

1. Prevention and reduction of unemployment by creating and securing jobs
2. Improvement of the matching process by eliminating placement barriers and increasing the chances of re-integration
3. Integration into regular employment.

The aim of this study is to investigate whether ALMP is able to achieve these goals by looking at the effectiveness of various instruments of ALMP in Austria. There are two dimensions of how effectiveness can be perceived. The first is if an instrument has the intended impact on those job-seekers who participate. The second is if individual effects are strong enough to provide positive effects for the whole economy.

Most commonly, the individual dimension is analysed by microeconometric evaluation studies. Generally, the focus is on whether an individual improved his/her position by participating in an ALMP measure. However, it is complicated to isolate the actual treatment effect, because this would require knowledge about what would have happened if the person had not participated. The outcome of non-treatment, given a person did participate, is unobservable. An experimental approach – randomly assigning ALMP instruments to job-seekers – would not be practicable. In a non-experimental setting, participants and non-participants might very well differ systematically in their characteristics. There are several microeconometric approaches that try to take this into account, the most important examples being methods of matching, difference-in-differences estimators and instrument variable approaches. These use different identifying assumptions to estimate the average treatment effect on the treated.

There are already some micro evaluation analyses for Austria (cf. Winter-Ebmer, Zweimüller (1996), Hofer, Weber (2004), Lutz, Mahringer, Pöschl (2005), Lechner et al. (2007) and Lechner, Wiehler (2007a, 2007b)). Lutz, et al. (2005) find in their empirical study that especially wage subsidies and job creation schemes in non-profit organisations and in socioeconomic enterprises increase employment and reduce unemployment during a period of 3 years after program start. The effects of qualification measures are small because of the

lock-in effects during the participation in this program. The empirical results of Lechner, Wiehler (2007a,b) point out that the various labour market programs have no significant employment and unemployment effects for men during 32 months after program entry. However female participants experience an increase in employment rates for active job search, qualification measures, course subsidies and for measures in socioeconomic enterprises. Considering the unemployment effects for women only course subsidies reduce unemployment at the end of the observation period.

One of the basic assumptions of such microeconomic evaluation studies is the stable unit treatment value assumption (SUTVA, cf. Rubin (1980)). This implies that one individual's treatment effect is independent of other individuals' treatments, which excludes spillover effects between participants and non-participants. This might hold true in countries where ALMP plays a minor role, like in the United States. In Europe, however, where spending on ALMP is very high, the SUTVA may not be completely justified. It is often suspected that individual effects on participants are weakened or even reversed by indirect effects at the macroeconomic level.

Recent evaluation literature commonly distinguishes between deadweight, substitution and displacement effects (cf. Calmfors (1994)). These effects are mainly associated with wage subsidies and job-creation schemes. Deadweight losses occur e.g. when an employee would also have been hired without wage subsidies. The substitution effect means that subsidised employment changes relative wage costs and simply redistributes employment opportunities between different groups of job-seekers. Finally, when firms improve their competitiveness by reducing labour costs due to subsidised employment, they displace other firms that do not use this measure. What all of these effects have in common is that even if there were a positive effect on participants, it could disappear at the aggregate level. Thus, the positive effects of job subsidies on participants which are found in the micro-economic studies for Austria could only take effect at the expense on negative indirect effects on non-participants.

To get a complete picture about the effectiveness of ALMP it is sensible to complement the microeconomic studies by taking into account these spillovers and indirect effects on non-participants and analyse the net effects of ALMP on the whole economy. Motivated by the seminal work of Calmfors, Skedinger (1995), a wide range of international studies on the macroeconometric effects of ALMP has been published. In this paper we conduct the first macroeconometric evaluation study of Austrian ALMP.[2] The macroeconometric framework allows us to measure net effects that consist of direct treatment effects on participants as well as indirect effects on non-participants and on the economy as a whole. However, in

[2] An exception is an analysis on the macroeconomic level that uses a simulation model and finds particularly strong effects of wage subsidies to increase the number of persons in employment and reduce the number unemployed people (cf. Lutz, Mahringer, Pöschl (2005)).

general it is not possible to distinguish between these different components such as the direct treatment effect, the substitution effect, etc. To look inside this “black box” of net effects, we consider two different aggregate labour market outcomes, the number of matches in a region and the regional job-seeker rate, and analyse how they are affected by the participation of job-seekers in eight programme categories. By analysing the differences of the estimation results for both outcome variables, we are able to present statements on the tendency of the different effects. This permits a more in-depth view of the functionality of ALMP.

A central question is how to measure the extent to which changes in the number of participants in an ALMP instrument affect the region’s outcome. Since there is a wide range of factors that can exert an influence on an outcome like the regional job-seeker rate, it is essential to isolate real causal effects. The “gold standard” would be a random experiment where a causal effect would be equal to the difference in outcomes (cf. Fertig, Schmidt (2000)). Since this is hardly feasible, the best alternative in this context is a linear regression model. Instead of searching for “statistical twins” like in a matching approach, all other regions serve as a region’s control group. Controlling for regional characteristics, the regression coefficients can be interpreted as *ceteris paribus* effects of how a change in a region’s number of participants in an ALMP instrument affects the regional outcome. The use of panel data makes it possible to take into account unobserved heterogeneity as well as persistence of unemployment and temporally delayed effects. Our analysis draws on a unique panel data set which has been constructed from process data of the AMS, exclusively for the purpose of this evaluation study. This extensive data comprises information on the structure of all job-seekers and ALMP participants in 86 regional branch office districts of the AMS in the quarters of 2001 to 2007.

As Hujer, Rodrigues, Wolf (2009), we also consider the spatial dimension of these effects. Since regions are subject to manifold spatial interrelations, ignoring the neighbourhood or proximity of regional labour markets could lead to a severe bias in estimation results. This problem is aggravated by the fact that administrative districts do not coincide with functional labour market regions. Thus, effects may very well operate across regional borders. We use contemporaneous GMM and quasi-ML estimation techniques to take persistence and adjustment mechanisms into account.

The remainder of this paper is structured as follows: section 2 presents the theoretical framework for modelling the effects of ALMP on regional labour markets and particularly the effects on the matching process and the job-seeker rate. Section 3 introduces the institutional background of ALMP in Austria, while section 4 describes the data basis of the empirical analysis. Sections 5 and 6 present the estimation approach and the results of the matching function and the Beveridge curve respectively. Section 7 provides a summary of the results and section 8 concludes.

2. Theoretical considerations

When ALMP is evaluated at the macroeconomic level, it is essential to take into account the broad range of effects that are caused by these policy measures, i.e. direct effects on the participants as well as indirect effects on non-participants which can be either positive or negative. Modifying the labour market model of Layard, Nickell, Jackman (1991), Calmfors (1994) developed an extensive theoretical model, which has formed the basis for a large number of evaluation studies from various countries. We follow the same line of argumentation but extend the models in some places to include recent developments.

Basically, ALMP programmes can affect the process of matching job-seekers and vacancies, can increase the welfare of the unemployed, but also their competition, and can motivate people to participate in the labour market in the first place. It can increase labour productivity and finally lead to a decrease in unemployment. In this paper we analyse the effects of ALMP on the matching process and its impact on the regional job-seeker rate.

To analyse the effects of AMLP on the matching process we use an extension of the standard matching function as theoretical approach to model frictions on the labour market. It uses the hypothesis that filling a vacancy follows a production process. The output "number of new matches" M of job-seekers and firms during a given period of time is a function of two inputs: the stock of job-seekers S and vacancies V at the beginning of the period (cf. Pissarides (1990)):[3]

$$M = A \cdot m(S,V), \tag{1}$$

where A represents the matching technology that varies between regions and periods but does not depend on S and V. The number of matches rises along with the number of job-seekers and vacancies respectively ($m_S > 0$ and $m_V > 0$). Generally a Cobb-Douglas approach is assumed as an empirical specification:

$$M = A \cdot S^{\alpha} V^{\beta}. \tag{2}$$

Holding the number of job-seekers and vacancies constant, a higher number of matches can also be obtained when, for example, job-seekers' profiles are adjusted to suit the vacancies by means of ALMP, such as training programmes. In order to include explicitly the potential effects of ALMP on the matching process, it is necessary to assume that job-seekers are not homogenous but can differ in their search effectiveness and intensity. Following Lehmann (1995) and Puhani (1999), we use the following extended matching function:

$$M = A \cdot (cS)^{\alpha} V^{\beta}, \tag{3}$$

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[3] For a discussion of whether stocks – like here and in the traditional version – or entries of job-seekers and vacancies are relevant for the matching function, cf. e.g. Coles, Smith (1998) or Coles, Petrongolo (2002).

where c is the average search effectiveness of job-seekers. ALMP P is included in the model by defining c as,

$$c = \mu(1 + s_P P), \tag{4}$$

where μ is the average search effectiveness of unemployed individuals (with no active labour market policies) and s_P is the influence of ALMP on the search effectiveness. Thus, $s_P > 0$ implies that ALMP increases the search effectiveness of programme participants. This can be due to a reduction in sectoral, regional and qualification mismatch, improved information on job-seekers or an increase in the search intensity (cf. Calmfors (1994)).

To reduce qualification mismatch, training programmes are used, while mobility assistance can reduce regional imbalances. ALMP can serve as a screening function to improve information on the job-seekers, which also increases the matching efficiency. An employer can use wage subsidies to obtain an on-the-job impression of a job-seeker's skills. This reduces the uncertainty of a future non-subsidised contract. Another advantage is that a job-seeker can improve his/her chances of finding a job when applying while in an employment relationship rather than while unemployed. Eriksson, Lagerström (2006) find evidence that this indeed increases the probability of a successful application. However, it remains unclear whether this simply means a redistribution of job opportunities from participants and the regular unemployed or if there is really increased competition with job-to-job changers.

Finally, to improve the search intensity, specific short-term measures can provide job-seekers with training on how to write a promising application or teach basic skills to socially challenged people. However, many other measures such as full-time training courses or subsidised full-time employment are rather time-consuming. For the duration of the measure, participants are "locked in" (cf. Kluve (2006)). Instead of increasing their search efforts, they might postpone job search until the measure is finished. Thus, when the effects of participants in ALMP measures are analysed, there might be a time lag until positive effects become visible. If some participants would have found a job without the measure, the effect of the number of current participants can even be negative. If, on the other hand, participants accept job offers during the participation, one could expect that this is not because of the treatment effect and would also have happened without participation. In an empirical analysis, this would lead to insignificant results.

Equation (3) serves as the basis for a large number of empirical evaluation studies at the macroeconomic level (e.g. Hujer, Zeiss (2003)). An alternative model to include ALMP in the standard matching function has been developed by Wapler, Werner, Wolf (2008). They explicitly include two separate groups of job-seekers as input factors:

$$M = m(U + s_P P, V) \qquad \text{where} \qquad S = U + P \quad . \tag{5}$$

s_P is the search effectiveness of programme participants P, while the search effectiveness of registered unemployed people U is normalised to one. Here, $s_P > 1$ implies that a larger share of job-seekers participating in an ALMP programme increases the aggregate matching effectiveness. Holding the numbers of job-seekers and vacancies constant, a higher number of transitions from job search to employment can be achieved. This approach makes it possible to extend the number of groups of job-seekers even further. Following Wapler, Werner, Wolf (2008), we distinguish between job-seekers that are currently participating in ALMP programmes, those that participated in the past and others that have never participated. In this way we can take into account the fact that search effectiveness is not increased until a participant has finished a measure, while participants are "locked in" for the duration of the measure.

Using a matching function as theoretical framework, we focus on how ALMP affects different types of job-seekers, e.g. if ALMP helps to increase the outflows from unemployment into employment. However, there could also be other effects of ALMP that affect not only job-seekers, but the (regional) labour market as a whole. The possibility of participation in an ALMP measure increases the wellbeing of job-seekers and thus reduces the disutility of becoming or remaining unemployed. In the framework of wage determination models (such as bargaining or efficiency wage theories) this strengthens employees' bargaining position, thus increasing wage pressure. This effect would lead to a reduction in employment and an increase of unemployment. Other effects can also lead to a decrease in wage pressure. ALMP could make outsiders "fit" for competing with other workers ("competition effect", cf. Calmfors, Lang (1995)) or motivate people to participate in the labour force in the first place (i.e. reduce the "discouraged worker effect"). This increase in the labour supply might lead to lower wages, which would result in higher employment according to the underlying labour market model. Since both employment and the labour supply increase, the effect on the equilibrium rate of unemployment remains unclear. However, newer models at the individual level show that ALMP can also have negative effects on the participation rate. Being forced to attend a measure might be perceived as a "leisure tax" which reduces the utility from unemployment. One result of this changed utility function might be a complete withdrawal from labour market participation (cf. Büttner (2007) and Rosholm, Svarer (2008)), which leads to a decrease in labour supply and therefore also to a decrease in unemployment.

ALMP can also change aggregate labour demand. Job training can increase labour productivity and prevent or slow down the depreciation of human capital during longer periods of unemployment (cf. Calmfors (1994)). Improving the matching process also reduces hiring costs, which might lead to an increase in the number of vacancies (cf. Pissarides (1990)).

We consider these potentially positive or negative effects by analysing the effects of ALMP on the regional job-seeker rate. To this end, the standard Beveridge curve serves as the un-

derlying theoretical framework. This is an inverse, convex relation of unemployment and vacancies (cf. Beveridge (1945); and e.g. Blanchard, Diamond (1989)). All points on the Beveridge curve represent a state of equilibrium where hirings and lay-offs are balanced. When the stocks of both job-seekers and vacancies are quantitatively equal, a state of full employment could be assumed. However, even in this case, there are several mechanisms that prevent market clearing. Since it almost always takes some time for an individual to find a new job after having been laid off, there will be frictional unemployment. As this might lead to a more efficient allocation of workers, it may even be desirable. Another reason for market clearing not being achieved is a qualitative incompatibility between supply and demand. This might be due to a mismatch in the regional economic structure, qualification mismatch or mobility barriers. The location of the Beveridge curve represents the magnitude of this mismatch. Time-series or panel data can be used to produce an aggregate or regional Beveridge curve empirically (cf. Börsch-Supan (1991); Wall, Zoega (2002)). When considering a Beveridge curve at the regional level, regional resource endowments must be taken into account. To take the variation in the size of the regions into account, both the number of job seekers and the number of vacancies are divided by the size of the labour force. This serves as a starting point for the macroeconomic evaluation of ALMP. *Ceteris paribus*, effective ALMP decreases the mismatch, thus reducing unemployment while keeping the number of vacancies fixed (cf. Bleakley, Fuhrer (1997)).

3. Institutional background: ALMP in Austria

Austrian labour market policies are organised by the AMS, a public enterprise which is subdivided into one federal organisation, nine state organisations and 104 regional branch offices. One of its tasks is to organise and finance the instruments of ALMP. The AMS employs a wide range of different instruments, which can be classified as training, employment and assistance schemes. Since the aim of assistance schemes as well as some others is financial coverage rather than the transition into non-subsidised employment, none of the instruments in this group is considered in this study. Other instruments are very small and thus unlikely to exhibit effects at the aggregate level. The nine remaining instruments, which are considered in this study, are briefly described in this section.

Active Job Search / Aktive Arbeitssuche (AA):

This is a relatively short training measure aimed at people who have been unemployed for a short time or have recently become employable. The topics are how to write a job application and curriculum vitae, training for job interviews etc. The aim is prompt re-employment.

Job Training / Arbeitstraining (AT):

This measure is specifically designed for long-term unemployed or people with social disadvantages. It aims to provide psychological and physical stability and impart a proper attitude to work, e.g. punctuality or reliability.

Orientation / Orientierung (OR):

This programme is intended to provide the qualifications for a reasonable further occupational guidance, participation in a further training measure or to make career decisions. The target group is young job-seekers or people who are having difficulties in defining job perspectives.

Vocational training / Aus- und Weiterbildung (AW):

Concerning this programme category the AMS distinguishes between initial vocational and further training. Their aim is to provide a vocational qualification or an additional qualification. Participants are intended to benefit from new, further or better qualifications and quickly find a new job after completing the measure. Considered over the whole observation period, this measure has the highest number of participants.

Allowance for course costs / Kurskosten (KK):

This labour market instrument grants allowances for the costs of promising vocational training schemes at private agencies to individuals who would otherwise not be able to participate in such a measure. The initiative for participating in these courses comes from the unemployed persons.

Wage subsidies / Eingliederungsbeihilfe (EB):

This measure is a wage subsidy for the hiring of long-term unemployed individuals. The aim is to integrate the long-term unemployed, to promote employment in the low-wage sector and to increase labour demand. Remarkably, employers are not legally obliged to continue the employment after the subsidy has expired.

Job schemes in non-profit organisations and socioeconomic enterprises / Gemeinnützige Betriebe und Sozialökonomische Betriebe (GB/SÖB):

Both of these programmes are intended to provide employment that is relatively close to the regular labour market to long-term unemployed and other problem groups. To avoid displacement of regular employment, these jobs have to be in non-profit fields of activity.

Apprenticeships / Lehrstellen (LE):

This measure provides apprenticeship training positions to challenged young persons. It has gained in importance, especially since 2006, and had become the largest measure by the end of the observation period.

Table 1 **around here**

Figure 1 **around here**

4. Data basis

This analysis uses a unique data basis from the Austrian Federal Ministry of Labour, Social Affairs and Consumer Protection and the Public Employment Service Austria (AMS). The origin of the data is the daily monitoring of the employment histories of all individuals subject

to Austrian social security. Further processing of the raw data was carried out by our cooperation partners from Joanneum Research, Graz. In a first step, a basic table of stocks of relevant job-seekers on the reference dates (the last day of each quarter) was generated. Then the job-seekers were subdivided into distinct groups.[4] Current participants are those who were taking part in one of the relevant ALMP programmes as of the reference date. Former participants were not participating as of the reference date, but had completed participation at some time during the previous two quarters. Unemployed persons are the residual group of all job-seekers with no (current or previous) participation in any of the relevant programmes. Additionally, "soon-to-be former" participants were identified. These are current participants who concluded their participation within one half of our matching period after the reference date. This group is subtracted from the current participants and added to the former participants, since it can be assumed that they are comparable to the group of former participants. Their search intensity might be already increased at the end of the participation period and they already have a better qualification level than at the beginning of a measure. Finally, matches are identified as transitions from one of the previously mentioned groups into non-subsidised employment. This follows a stock-flow approach, where matches are only taken into account if they occur from the stock of relevant job-seekers.

The data set is aggregated to 86 regional branch offices (the delineation of 2001) and the quarters from January-March 2001 to October-December 2007. For the estimation of the Beveridge model, data on employment in the place of residence are needed to calculate job-seeker and vacancy rates. Since these data are only available from 2004, the data set had to be reduced to the years 2004 to 2007.

To control for further influences on the variables of interest, data on the structure of job-seekers and the general regional economic structure are added. Regarding the vacancies, this variable is flawed by the fact that only reported vacancies can be counted in the process data, which constitute only a fraction of all actual vacancies. Since there is no information on how the penetration rate varies between regions and over time, we do not attempt to correct this figure. Instead, we use the number of registered vacancies that are available immediately or soon as a proxy.

5. Matching function

5.1 Specification and estimation

To provide a differentiated view of the effects of ALMP on regional labour markets, two models are analysed. The first is how ALMP improves the matching process. The starting point to

[4] Note, that these data deviate from those officially released by the AMS. This is because the definitions of unemployment, participation, etc. are adjusted to conform to the needs of the theoretical models.

derive an empirical model is the matching function from section 2. Writing the model in logs, we obtain:

$$\ln M_{rt} = a + \alpha \ln S_{rt-1} + \beta \ln V_{rt-1} + d_t + d_r + \varepsilon_{rt} \tag{6}$$

The observational unit is the regional branch office r ($r = 1,\ldots,R$) at time t ($t = 1,\ldots,T$). M_{rt} represents the transitions of job-seekers to dependent, non-subsidised employment (matches) during a certain time period. S_{rt-1} is the number of job-seekers and V_{rt-1} the number of reported vacancies at the end of the previous period.[5] Furthermore, we include fixed effects for regions (d_r) and periods (d_t), to allow for variations in the matching technologies between regions and periods. The fixed region effects also capture structural features of the regions, while the time effects include macroeconomic effects like the business cycle as well as seasonal fluctuations.

As described in section 2, it is necessary to divide job-seekers into groups that differ in their search effectiveness. Previously, only unemployed people and current participants were distinguished (e.g. Hujer, Rodrigues, Wolf (2009)). To take into account delays of the positive impact due to lock-in effects, several temporally lagged values were also included. Following Wapler, Werner, Wolf (2008), we take a more direct approach. At all times, participants are subdivided into current and former participants. To implement this in the model, the number of effective job-seekers is defined as $X = U + s_P P + s_Q Q$ where s_P and s_Q are the search effectiveness of current and former participants respectively (cf. Hynninen, Lahtonen (2007) and Ibourk et al. (2004)). The search effectiveness of the other job-seekers is normalised to one. Substituting X for S in equation 6, we obtain the following empirical model after some transformations:

$$\ln M_{rt} = a + \alpha \ln S_{rt-1} + \alpha_P \tilde{P}_{rt-1} + \alpha_Q \tilde{Q}_{rt-1} + \beta \ln V_{rt-1} + d_r + d_t + \varepsilon_{rt} \tag{7}$$

where $S = U + P + Q$, $\alpha_P = \alpha(s_P - 1)$, $\alpha_Q = \alpha(s_Q - 1)$, $\tilde{P} = P / S$ and $\tilde{Q} = Q / S$. Since current and former participants are measured as shares of all job-seekers, the structural parameters α_P and α_Q represent the partial effects of a change in these shares. Assuming $\alpha > 1, \alpha_P < 0$ would mean that the search effectiveness of current participants (s_P) is smaller than one, i.e. this group has a smaller search effectiveness than other job-seekers. On the other hand, $\alpha_Q > 0$ would mean that the search effectiveness of former participants

[5] Job-to-job changers are not considered at all. I.e., they are neither counted as job-seekers, nor do we count their matches. Cf. Burgess (1993) for an analysis of job-to-job changes within the framework of a matching function.

(s_Q) is greater than one. A positive effect on individual participants would then be visible at the aggregate level as well, and negative indirect effects are significantly smaller than positive treatment effects.

Of course, effects can vary between different programmes. Thus, we extend equation (7) by including the shares of the individual programmes ($k = 1,\ldots,K$). To model adjustment mechanisms, we choose a dynamic specification and thus include a serially lagged dependent variable:

$$\ln M_{rt} = a + \rho \ln M_{rt-1} + \alpha \ln S_{rt-1} + \sum_{k=1}^{K} \alpha_{kP} \tilde{P}_{krt-1} + \sum_{k=1}^{K} \alpha_{kQ} \tilde{Q}_{krt-1} + \beta \ln V_{rt-1} + d_r + d_t + \varepsilon_{rt} \qquad (8)$$

The autoregressive parameter ρ shows how quickly the number of matches adjusts to altered conditions. The higher this coefficient, the longer these adjustment mechanisms take.

To solve the problem of endogeneity in the dynamic panel model, we use the GMM estimator of Arellano, Bond (1991). This estimator uses a first differenced equation to eliminate the fixed effects and uses lagged levels of the dependent variable in earlier periods to provide internal instruments.

Up to now, regions have been treated as independent units in space. Especially when a small level of regional aggregation is used, this assumption might not hold true. Branch office districts are not defined as functional labour market regions but are delineated for administrative purposes. Hence, nearby regions could not only be affected by common exposure to exogenous shocks, but influences on the matching process in one region could also directly affect the matching process in others. To take this cross-border influence into account, a spatially lagged dependent variable is included in the model (cf. Anselin (2002) for the general interpretation of a spatial lag model):

$$\begin{aligned} \ln M_{rt} = {} & c + \rho \ln M_{rt-1} + \lambda W \ln M_{rt} + \\ & \alpha \ln S_{rt-1} + \sum_{k=1}^{K} \alpha_{kP} \tilde{P}_{krt-1} + \sum_{k=1}^{K} \alpha_{kQ} \tilde{Q}_{krt-1} + \beta \ln V_{rt-1} + d_r + d_t + \varepsilon_{rt} \end{aligned} \qquad (9)$$

Matrix W is the $R \times R$-dimensional spatial weights matrix. The coefficient of the spatial lag λ quantifies the strength of regional interrelations. An alternative specification would be to allow the error terms of nearby regions to be correlated. However, this would mean that regions could be hit by common shocks, but that direct effects could not reach beyond a region's border. Conducting a macroeconomic evaluation study, Fertig, Schmidt, Schneider (2006) use robust Lagrange Multiplier tests to determine that a spatial lag model is the more appropriate one in a cross-sectional regression. Since respective tests are not available for a dynamic panel data regression, we rely on their finding and also estimate a spatial lag model. Since the spatial lag is also correlated with the error term, the estimation becomes more

complicated. Conditioning on the first observation, Lee, Yu (2010) provide a quasi maximum likelihood estimator that solves the endogeneity of both (serial and spatial) lags.

5.2 Empirical results

The starting point of the following empirical analysis is the simple matching function, where the log number of matches is regressed on the log number of job-seekers and the log number of vacancies as well as dummy variables for regions and periods. The results are displayed in the first column of Table 2. The coefficients of the log linear model can be interpreted as elasticities. Their sum is greater than one, which means that the Austrian matching function has increasing returns to scale in the observation period of 2001 to 2007. This can be explained by externalities in the search process, caused by a larger pool of potential matches for the firms to choose from (cf. Münich, Svenjar, Terrell (1998)). The coefficient of the vacancies is rather small, which is in line with the findings of other studies that use matches of unemployed individuals instead of all hirings as the dependent variable.

Table 2 **around here**

A first step to analyse the effects of ALMP is to extend the simple matching function to include the aggregate shares of current and former participants in any of the considered programmes (second column of Table 2). We also control for further influences of the structure of a region's job-seekers and the regional labour market as a whole. These are the shares of different age and qualification groups as well as the shares of female and long-term job-seekers and the share of job-seekers with a migration background. The regional labour market is represented by the participation rate and the share of employees in the tertiary sector. We find that regions with large shares of both job-seekers younger than 25 and job-seekers older than 50 achieve significantly fewer matches, *ceteris paribus*. The same applies to regions with large shares of female and long-term job-seekers.

The coefficients of the accommodation ratios have the expected signs: a larger share of current participants reduces the number of matches. However, this effect is not significant. Thus, the individual lock-in effect for participants, which was found in microeconometric studies, cannot be observed significantly at the regional level. Some of the "locked-in" participants can presumably be replaced by other job-seekers that are not participating in an ALMP programme. Due to this positive substitution effect, the aggregate number of transitions into employment is not affected and ALMP only changes the composition of the job-seekers that find a job.

The share of former participants has a positive but insignificant effect. There are two possible explanations for this finding: first, there could be no positive effect at the individual level after participation, i.e. ALMP does not increase the individual likelihood of finding a job. When

there is no effect at the individual level, one cannot be expected at a higher level. Second, the absence of a positive effect could be explained by the negative indirect effects described in section 1. In this case, there are positive effects at the individual level, which are balanced out by negative substitution effects. Former participants increase their prospects after completing their programme in comparison with other job-seekers. Again, the number of matches is not affected, while the chances of finding employment are redistributed among job-seekers.

However, another possible explanation for not finding a positive effect is that different ALMP programmes are not considered separately. The heterogeneous nature of the programmes suggests that their effects on the number of matches should vary considerably. To take this into account, we include the shares of current and former participants in eight different programme categories. By including a serial lag, we also control for temporal adjustment mechanisms. Table 3 displays the results of this model. The first column is calculated by GMM and does not take spatial dependence into account. The second column represents the model with a spatially lagged dependent variable. The spatial lag is generated using a weights matrix based on driving times between regions. The raw matrix has ones where two regions are no more than one hour's driving time apart and zero otherwise.[6] The weights matrix is then row-standardised, i.e. each row adds up to one. This way, the spatial lag is the weighted average of the dependent variable of all related regions. The results of the two models do not differ substantially. However, since the coefficient of the spatial lag is significantly larger than zero, we restrict the interpretation to the coefficients of this model.[7] The positive coefficient of the spatially lagged variable means that there are effects that originate in some regions and take effect across borders in other regions. A consequence is that regions with similar numbers of matches are geographically clustered. This effect should not be interpreted as a regional reaction function to the dependent variable itself. It rather suggests the existence of unobserved factors that influence the number of matches similarly in nearby regions (cf. Fertig, Schmidt, Schneider (2006)). If this spatial lag is not included, omitted variable bias might be the consequence.

Table 3 **around here**

Taking a look at the diagnostic tests of the non-spatial model, we find that the Sargan test does not reject the null hypothesis that the instruments are valid at any level of significance.

[6] Alternatives such as a simple contiguity matrix have been tried and lead to basically the same results.

[7] The results displayed are contemporaneous effects. Due to the small effect of the serial lag, long-term results are only slightly larger.

This strongly supports the assumption that the accommodation ratios of the ALMP programmes are not endogenous. It seems appropriate to assume that the number of participants in a given period does not depend on the matches in the subsequent period (cf. Hujer, Zeiss (2005) or Fertig, Schmidt, Schneider (2006)). Another important requirement for the instruments to be valid is the absence of higher order autocorrelation in the error terms. While first order autocorrelation arises by construction due to first differencing, the Arellano-Bond test does not indicate the presence of an AR2 process. Regarding these results, we are confident that further instrumenting of the accommodation ratios is not necessary in this context.

A first look at the effects of ALMP supports the findings of the aggregate analysis above. The accommodation ratios of the current participants have negative effects in most cases, while three of them are even significant. Both job schemes in non-profit organisations and apprenticeships are programmes with comparatively long durations. The individual lock-in effect is very likely to increase with the duration of the programme, which in turn increases the chances of detecting this effect at the aggregate level. Other job-seekers do not seem to be adequate substitutes for the “locked-in” participants. Thus, regions with relatively large shares of participants in job schemes in non-profit organisations and in apprenticeships achieve smaller numbers of matches, *ceteris paribus*. This negative effect is also particularly strong for the share of participants in active job search. At first sight, this seems surprising since this is a rather short programme. However, this finding can be explained by the nature of this programme: active job search is aimed at people who have been searching for a job for a relatively short time period. Short-term unemployed have the best prospects of finding a new job anyway. Yet these prospects are decreased because of the lower search intensity during participation. Another explanation is that this programme is often used as an instrument for screening a job-seeker’s willingness to work. If this test is passed, in many cases the participant is offered a subsequent programme such as vocational training. The remaining programmes do not exhibit significant effects for current participants. Since microeconometric studies find lock-in effects for these programmes, we can assume that there are positive substitution effects. Thus, other job-seekers replace the participants and consequently the aggregate number of matches does not depend on the share of current participants.

Turning to the former participants, we recognise the patterns found in the aggregate analysis. However, three programmes have significantly positive effects. Regions with a large share of former participants in wage subsidies achieve a higher number of matches, *ceteris paribus*. This indicates that after completing the programme there are favourable effects for the participants which are at least not entirely counterbalanced by negative effects on non-participants. This result is remarkable since this particular kind of programme is often suspected of causing strong negative indirect effects. Apprenticeships and job schemes in non-

profit organisations and socioeconomic enterprises also have significantly positive effects on the matching efficiency. Due to their long duration, the positive effects of these programmes would not have been discovered if the analysis had not distinguished between current and former participants.[8]

By considering some examples which are typical for the respective ALMP programmes, we try to get an idea of the actual magnitude of the effects obtained previously. For each programme, we select a region whose job-seeker rate and accommodation ratio of the respective programme are close to the national averages. Then we calculate the counterfactual effect on the number of job-seekers if the number of current and former participants is increased by 10 percent. These effects are displayed in Table 4. In the district of Leoben, for example, there are 53 current and 35 former participants who have received wage subsidies on 31st March 2007. A counterfactual increase of 10 percent means that the number of current and former participants rises by 5.3 and 3.5 persons respectively. The increase in the number of current participants has only a very small expected effect on the number of matches of 0.27. The effect of the increase in the number of former participants is remarkably stronger: we expect an increase of one match.

Table 4 **around here**

6. Beveridge curve

6.1 Specification and estimation

The second approach to analyse the effects of ALMP on regional labour markets is the Beveridge curve. If ALMP is effective at the macroeconomic level, the intensity of programmes should decrease unemployment, *ceteris paribus*. We model the log job-seeker rate as a function of the log vacancy rate, the intensity of ALMP programmes, control variables and fixed effects for both regions and periods.[9] The intensity of the ALMP programmes is measured by their accommodation ratio, which is defined as the stock of participants in a certain programme relative to the number of job-seekers (Calmfors, Skedinger (1995)).

Again, a serial lag of the dependent variable is needed to take adjustment mechanisms into account. Compared to the matching function, we expect these mechanisms to be slower because of the high persistence of unemployment due to hiring and firing costs, labour hoard-

[8] Finally, the coefficient of former participants in job training is significantly smaller than zero. However, this effect is very unstable and disappears when the regions in the state of Upper Austria are excluded from the estimation.

[9] We cannot use the unemployment rate as the dependent variable since programme participants are not counted as unemployed. This leads to a tautology where participation always reduces unemployment.

ing and insider-outsider behaviour (cf. Hamermesh (1993), Layard, Nickell, Jackman (1991)). Hence, it could be some time before the job-seeker rate reacts to shifts in the intensity of ALMP. Consequently, we add several lags of the dependent variable. Furthermore, due to the lock-in effect, it could also be some time before the desired (and undesired) effects of the programmes become visible. Thus, we also add several lagged values of the accommodation ratios.

$$\ln(JSR_{rt}) = \alpha_0 + \alpha_1(L)\ln(JSR_{rt-1}) + \alpha_2(L)\ln(VR_{rt}) + \sum_{k=1}^{8}\beta_k(L)\ln(accr_{rt}^k) + \sum_{j=1}^{J}\delta_j x_{rt}^j + \varepsilon_{rt} \qquad (10)$$

Again, the unit of observation is the regional branch office r at time t. JSR_{rt} is the job-seeker rate (unemployed people and programme participants relative to the labour force) and VR_{rt} is the vacancy rate. x_t is a vector of control variables and fixed time and regional effects. $accr_{rt}^k$ is the accommodation ratio of programme k. $\alpha_1(L)$, $\alpha_2(L)$ and $\beta_j(L)$ are polynomials in the lag operator, i.e. each of the respective variables is not only included at time t, but also with its values of the L previous quarters. In the following analysis, we use four lags to take into account a whole year, thus controlling for seasonal fluctuations. Again, the lagged dependent variable is endogenous. In contrast to the matching model, we do not use the Arellano, Bond (1991) GMM estimator. In cases where the autoregressive parameter is large (but still significantly smaller than unity), further lagged values of the dependent variable are weak instruments for the lagged dependent variable in the first differenced equation. So we use the Blundell, Bond (1998) system GMM estimator, which uses a second equation in levels to provide an additional set of internal instruments.

In this approach, the possible endogeneity of the accommodation ratios poses an additional problem. Empirical studies show that the ALMP spending of different countries is positively correlated with the unemployment rate (cf. Grubb (1994), OECD (1994)). If this is the result of a policy reaction function, the causal direction is no longer clear, which leads to simultaneity (cf. Calmfors, Skedinger (1995)). This problem might be less severe in Austria compared to other countries. Beginning in 1995, the AMS strongly extended its spending on ALMP nationwide, not taking into account the variation of development of the unemployment rate in different regions. However, it could also be assumed that regional branch offices adjust the mix and intensity of their programmes to the situation on the local labour market. For example, wage subsidies seem to be a better choice in tight labour markets than vocational training schemes (cf. Hujer et al. (2006)). However, valid instruments are difficult to find. Calmfors, Skedinger (1995) argue that the number of seats held by conservative parties in the government might be a good instrument. Yet, since these data do not vary within states and between quarters, it is still not a useful instrument in our setting. We thus rely on further

lagged values of the accommodation ratios as internal instruments. To fully utilise the relatively small number of periods, all available lags are used as instruments.

6.2 Empirical results

Table A 1 displays the structural parameters of the system GMM estimator for the Beveridge curve. The Sargan test again does not reject the null hypothesis that the instruments are valid. Higher order autocorrelation in the error terms is not indicated by the Arellano-Bond test, either. We are therefore confident that the endogeneity of the accommodation ratios is successfully accounted for and the interpretation of causal effects is possible.

The serial lags of the dependent variable add up to 0.91. Though about 3.5 standard deviations smaller than unity, this value is large enough to support the assumption that unemployment is very persistent and adjustment mechanisms take much longer than just one quarter. Only three of the control variables show a significant effect on the job-seeker rate. Regions with large shares of young and highly qualified job-seekers have lower job-seeker rates, *ceteris paribus*. This can be explained by the perception that many firms remunerate their employees according to the seniority principle, which makes it cheaper to hire young applicants, while vocational training commonly reduces the chances of being unemployed. The negative coefficient of the share of long-term job-seekers should not be interpreted as a causal effect. However, there is a very plausible explanation: regions with low unemployment rates often have a large share of long-term job-seekers. When the situation on a labour market is favourable for a longer period of time, it can be expected that only job-seekers with particular employment handicaps will remain without employment.

Table 5 **around here**

To summarise the results for the ALMP programmes, contemporaneous effects and steady state effects are displayed in Table 5.[10] Half of the contemporaneous effects of ALMP programmes are not significant. This is in line with the assumption that job-seekers reduce their search intensity during participation in a programme. This does not affect the job-seeker rate since the individual lock-in effect does not change the aggregate number of job-seekers. Job training and job schemes in non-profit organisations even have significantly negative effects. Note that this does not necessarily mean that there is a favourable effect at the individual

[10] The steady state effects that take temporal adjustment mechanisms into account are calculated as $\alpha = \frac{\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4}{1-(\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4)}$, where $\beta_k, k = 0,...,4$ are the structural parameters of the respective accommodation ratio and its lags and $\gamma_m, m = 1,...,4$ are the structural parameters of the lags of the dependent variable. Uncertainty estimates are calculated using the delta method.

level since participants remain in the group of job-seekers during participation in an ALMP programme. It is more plausible to assume that there are indirect effects caused by the programmes themselves. The target group of job training is people who have generally poor prospects of finding a job. In order to carry out such a programme, intensive supervision of the participants is necessary. An increase in the number of participants could create new jobs for supervisors and thus reduce the unemployment rate. While this effect is very volatile,[11] the same argument could apply for job schemes in non-profit organisations. Here, the reduction of labour costs could also create a favourable effect. The positive but small effect of orientation indicates the presence of a lock-in effect. If participants would also have found a job without participating in this programme, then an increase of the accommodation ratio would result in an increase in the rate of job-seekers, compared to other regions.

In the long run, both active job search and orientation have significantly positive effects. Note however, that participants in these programmes are not intended to find a job directly after participation. Instead, these programmes are meant to prepare job-seekers for participation in other programmes like wage subsidies. Thus, this effect could be explained by job-seekers who participate in a subsequent programme. The negative effect of job training persists in the long run. Aside from the job-creating effect there could also be matches for job-seekers who would not have had any chance of finding a job without participating in this programme. The negative effect of job schemes in non-profit organisations vanishes in the long run. This could be due to a displacement effect caused by competition between subsidised and non-subsidised establishments on the regular labour market. The favourable effects could be counterbalanced in the long run and thus the regional job-seeker rate is not reduced. Neither of the two kinds of vocational training programmes nor apprenticeships have a long-term effect on the job-seeker rate. It can be argued that these programmes were successful at the individual level and increased the participants' employability. However, after completing the programme, they just became perfect substitutes for other job-seekers. Since they all compete for the same number of vacancies, any macroeconomic effect is again counterbalanced. Finally, wage subsidies show the expected effect. After a lock-in in the short run, former participants seem to find jobs without reducing other job-seekers' chances. This can be explained by the acquisition of firm-specific human capital during participation in the scheme and the ability to apply for a job while in a state of employment. This even allows the participants to compete with job-to-job changers.

Due to the high persistence in unemployment, it can take a long time until the steady state equilibriums are reached after a change in an accommodation ratio. To consider the impacts within more realistic periods of time, we calculated response paths as the cumulated effects within twelve quarters (cf. Greene (2008), p. 686), presented in Table 6. We can see that it

[11] Again, it disappears when Upper Austria is excluded from the estimation.

must take substantially longer than the displayed 12 periods for the effects to reach their steady states.

Table 6 **around here**

In the empirical analysis of the matching function in section 5.2, the weighted average of the dependent variable in nearby regions has been included. This has been done to take into account the spatial interdependencies between the nearby regions. However, for the estimation of the Beveridge curve we do not use a spatial approach. To test the robustness of our specification, we add a spatially lagged dependent variable to this model and again use the quasi-ML estimator of Lee, Yu (2010) for spatial dynamic panel data. The results are displayed in Table A 2. Again, there is no substantial difference from the findings of the original model. Remarkably, the coefficient of the spatial lag is not significant. This indicates that it is not necessary to take spatial interdependencies into account in this model. This is surprising since it is very plausible that the share of job-seekers has a strong effect on nearby regions. However, the residual spatial variation in the development of the job-seeker rate, which has not been captured by the model, particularly by the serial lags, could be small due to the high persistence of this variable. It thus seems that the original model is the efficient one and we restrict our inference to this one.

Again, the interpretation of the actual magnitude of these effects is not trivial. In this log linear model, a coefficient can be approximately interpreted as an elasticity, i.e. the change in the job-seeker rate as a percentage due to a one-percent change in an accommodation ratio. To permit a clearer impression of the extent to which an increase in an accommodation ratio changes the number of job-seekers, we also calculate counterfactual effects for the same typical branch offices as in section 5.2. Table 7 displays the calculative change in the number of job-seekers that would occur after 12 quarters if the number of participants were increased by ten percent. We assume that these participants are taken out of the set of job-seekers and consequently that the denominator of the job-seeker rate does not change. Regarding the example of Leoben, we see that there are 2173 job-seekers and a job-seeker rate of 8.47 percent. There are 82 participants who receive wage subsidies. Increasing this number by ten percent or roughly eight persons would cause a decrease in the regional job-seeker rate of 0.04 percentage points to 8.43 percent. This corresponds to a decrease in the number of job-seekers by 10.

Table 7 **around here**

7. Comparative analysis

In the previous two sections, the effects of ALMP on two important labour market outcomes have been analysed separately. In each model, only the net effect of a programme could be considered, and it is not possible to distinguish between the direct individual treatment effect and the indirect effects at the macro level. To provide a more in-depth view of the channels of functionality of ALMP, the findings of the matching function and the Beveridge curve for each programme are considered simultaneously in this section.

Vocational training and allowance for course costs

There is no evidence that either of these programmes has an effect either on the matching process or on the job-seeker rate at the regional level. Considering the high number of participants, this finding is rather disappointing. However, it was not unexpected since microeconometric evaluation studies also found only small effects on the employment opportunities of former participants and the duration of their unemployment spells (cf. Lutz, Mahringer, Pöschl (2005), Lechner, Wiehler (2007a, b).[12] Since there is no favourable treatment effect at the individual level, it is not surprising that no macro effect is observed either. The individual lock-in effect does not emerge at the macro level for current participants. Obviously, there is a positive substitution effect that leads to a redistribution of employment opportunities from participants to non-participants.

Wage subsidies

Wage subsidies are the most successful measures of the programmes considered. In regions with large shares of (former) participants in this programme a higher number of matches and a lower job-seeker rate are expected. While the observed net effect can still be supposed to be a combination of the treatment effect and possible indirect effects, the favourable effects seem to dominate. Since the effect on the number of matches is positive, former participants do not simply substitute other job-seekers. Moreover, the negative effect on the job-seeker rate suggests that participants do not replace other workers, nor is there a displacement of non-subsidised establishments. However, no information can be gained to quantify deadweight losses, i.e. the employment of former participants that would have happened even if the person concerned had not participated in this programme.

Active job search and orientation

These two programmes seem to induce the strongest adverse effects. While the number of current participants in active job search reduces the number of matches, there is no positive effect from former participants in either of the programmes. Obviously there is no increase in

[12] Lechner, Wiehler (2007a) find for three labour market programs positive employment effects between 3 and 5% and for one measure an effect of about 10% for women only. However, since it is difficult to separately consider male and female participants in this framework, the positive effect on women does not confer to the macro level.

the job-seekers' productivity due to the short duration. Since these programmes are meant to prepare participants for subsequent programmes, a lock-in effect does not evolve before the end of the programme. Hence, a small increase in the job-seeker rate can be observed in the subsequent quarters.

Job schemes in non-profit organisations and socioeconomic enterprises

These programmes are suspected not only of creating strong indirect effects but also of stigmatising the participants themselves. However, microeconometric evaluations for Austria found either positive or insignificant effects. The same can be observed at the macro level. At first, the accommodation ratio of current participants significantly reduces the number of matches. This can be explained by a lock-in effect due to the long duration. Afterwards, the matching efficiency is improved; in regions with large shares of former participants in these programmes significantly higher numbers of matches can be achieved.

A converse picture appears with regard to the effects on the job-seeker rate: an increase in the accommodation ratios reduces the job-seeker rate in the short run. This cannot emanate from the participants themselves due to the lock-in effect but rather comes from favourable indirect effects on non-participants. Enterprises of this type have a lower labour cost structure due to public aid, which can also increase the demand for non-subsidised labour. This effect persists for longer than three years but vanishes after all adjustment mechanisms have been terminated. This finding points towards a displacement effect which has not been considered in the matching function. In the long run, establishments that employ participants in these programmes seem to compete with other establishments on the regular labour market. Hence the effects cancel each other out, and from a regional point of view, no effects can be observed any longer.

Job training

This programme is dedicated to job-seekers with particularly severe employment handicaps. It is geographically concentrated in Upper Austria, a fact that shows up clearly in the results. There is no effect of current participants on the matching process. Obviously, there is no lock-in effect because participants would only have had a slight chance of finding a job anyway. There is a small negative effect of the share of former participants. However, this effect is very volatile and seems to come from Upper Austria alone. The same applies to the negative effect on the job-seeker rate. Since there was no effect on the number of matches, this effect most probably stems from an indirect effect on non-participants. Participants are generally individuals with severe problems, and the need to mentor them could increase demand for supervisors.

Apprenticeship

The promotion of apprenticeships steadily gained in importance during the observation period. The number of participants has grown particularly strongly since September 2005, when

the “Blum-Bonus” provided financial incentives for establishments to train people beyond their current needs. Due to the long duration of this programme, we observe the expected lock-in effect of current participants. Obviously, other job-seekers are no adequate substitutes for the “locked-in” apprentices. After completing the apprenticeship, participants seem to benefit from the programme: a large share of former participants increases the number of matches. This suggests that the programme is successful in helping participants to find a job without reducing other job-seekers’ chances.

The effects on the job-seeker rate are somewhat contrary. A large share of participants directly lowers the job-seeker rate. This is most probably due to a reduction in labour costs since subsidised apprentices are comparably inexpensive. Moreover, the need for monitoring by experienced staff could also increase labour demand. This short-run effect decreases over time and eventually becomes insignificant. This can be explained by establishments taking on more apprentices than needed because of the “Blum-Bonus”. After participation, apprentices increase their chances of finding non-subsidised employment. However, this simply makes them perfect substitutes for non-subsidised apprentices. In the end, both groups have to compete for a constant number of vacancies and therefore any effect on the job-seeker rate vanishes.

8. Conclusions

Austrian unemployment rates have been fairly moderate compared to other European countries. Nevertheless, the Austrian government recognises the importance of labour market policy and has steadily increased its spending on programmes of active labour market policy. This makes Austria a particularly interesting country for analysing the effects of ALMP. The study at hand intends to provide insights into whether a range of eight programme categories has favourable effects on labour market outcomes and which of them are particularly successful.

Most studies of ALMP, and especially the previous ones looking at Austria, are microeconometric analyses that measure the direct treatment effects on programme participants. Since no aggregate effect can be expected when individual participants do not benefit from a measure, a microeconometric analysis must always be the basis of any evaluation study. However, this approach does not take into account that there can be manifold effects on non-participants. Instead of looking at the effects on individual performance, the macroeconometric approach analyses whether ALMP represents a net gain for the whole economy.

In the present study, we determine the impact of ALMP on the number of matches and the regional job-seeker rate as two important aggregate labour market outcomes. One major finding is that the individual lock-in effect of most programmes is compensated by positive substitution effects. Participants who reduce their search intensity thus seem to be replaced by other job-seekers. In the long run, only a few programmes result in favourable effects.

Regions with large shares of former participants in socioeconomic enterprises, wage subsidies and apprenticeships have significantly higher numbers of matches. However, only wage subsidies have a negative impact on the regional job-seeker rate. The other programmes seem to be subject to substitution or displacement effects where participants are enabled to compete with other job-seekers and subsidised establishments displace non-subsidised ones.

It must be borne in mind that only economic outcomes were considered in this study. ALMP programmes are carried out for several other reasons as well. The present framework is not able to analyse psychological or sociological dimensions. Being unemployed increases the probability of mental and physical health problems (e.g. Linn, Sandifer, Stein (1985)) and reduces life expectancy (e.g. Moser, Goldblatt, Fox, Jones (1987)). In times of high unemployment, these individual effects add up to a severe problem at the aggregate level. Taking part in an ALMP programme might give participants a perspective and dampen these adverse effects. Another important aspect of ALMP programmes is that they could slow down or even prevent the depreciation of human capital during prolonged spells of unemployment. We can thus conclude that while there is evidence that supports the effectiveness of several ALMP programmes on two relevant economic labour market outcomes, the importance of other measures should not be denied prematurely.

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Table 1: Yearly averages of job-seekers and participants

Year	2001	2002	2003	2004	2005	2006	2007
Unemployed	223764	251033	263000	265496	276047	263645	248590
Sum of all participants	41753	43722	48114	50049	60587	81872	80108
Active job search	5056	5139	6437	5003	2637	1971	1978
Job training	1073	1109	980	988	1073	941	963
Orientation	2561	3552	3065	2801	4142	4371	4266
Vocational training	11723	13342	16226	20047	24660	30780	24693
Allowance for course costs	2943	3852	4727	4650	6314	8761	5758
Schemes in non-profit organisations	3452	4077	4559	4545	5541	7203	7638
Wage subsidies	11358	9137	8665	8097	8512	10275	9094
Apprenticeships	3588	3514	3455	3919	7709	17569	25720

Table 2: Results for the matching function (aggregated ALMP)

Dep. var: **log number of matches**	*Simple matching function*	*Extended matching function*
Log number of job-seekers	1.198 ***	0.994 ***
Log number of vacancies	0.113 ***	0.110 ***
Share of (current) participants		-0.344
Share of (former) participants		0.196
Share of long-term job-seekers		-1.198 ***
Share of js younger than 25		-2.003 ***
Share of js older than 50		-0.680 **
Share of js with migration background		-0.313
Share of low-skilled js		0.859 ***
Share of high-skilled js		0.254
Share of female js		-1.422 ***
Participation rate		0.059
Share of employment in tertiary sector		-0.972 ***
Observations	2408	2408
Groups	86	86

levels of significance: *** 1%, ** 5%, *10%
(based on heteroskedasticity robust standard errors)
all models estimated with both regional and time fixed effects

Table 3: Results for the matching function (disaggregated ALMP, with and w/o spatial component)

Dep. variable: **log number of matches**	*Without spatial component*		*With spatial component*	
Spatially lagged log matches			0.270	***
Serially lagged log matches	0.085	***	0.101	***
Log number of job-seekers	1.318	***	0.912	***
Log number of vacancies	0.136	***	0.082	***
Active job search				
current	-1.602	**	-1.657	***
former	0.379		0.066	
Job training				
current	3.061	**	0.332	
former	-0.365		-2.011	***
Orientation				
current	-0.562		-0.394	
former	0.220		-0.003	
Vocational training				
current	0.161		0.086	
former	0.208		0.146	
Allowance for course costs				
current	-0.110		-0.266	
former	-0.167		-0.169	
Non-profit organisations				
current	-0.205		-0.903	**
former	0.037		1.487	***
Wage subsidies				
current	0.287		-0.280	
former	2.045	***	1.349	***
Apprenticeships				
current	-1.293	***	-0.446	**
former	2.302	***	3.101	***
Share of long-term job-seekers	-0.881	***	-0.933	***
Share of js younger than 25	-1.759	***	-1.835	***
Share of js older than 50	-1.083	***	-0.883	***
Share of js with migration background	0.585		-0.191	
Share of low-skilled js	0.128		0.674	***
Share of high-skilled js	-0.740		-0.025	
Share of female js	-0.926	***	-1.317	***
Participation rate	-0.430		0.286	
Share of employment in tertiary sector	-0.936	***	-0.863	***
Observations	2236		2236	
Groups	86		86	
AR1 test	-6.20	***		
AR2 test	-0.59			
Sargan test	46.58	(p = 1)		

levels of significance: *** 1%, ** 5%, *10%
(based on heteroskedasticity robust standard errors)
all models estimated with both regional and time fixed effects

Table 4: Counterfactual effects of a 10% increase of current and former participants in selected branch offices in the 2nd quarter 2007

Programme	Branch office	Matches	Current participants	Increase in persons	Effect in persons	Former participants	Increase in persons	Effect in persons
Active job search	Braunau	520	10	1.0	-0.41	6	0.6	0.01*
Job training	Liezen/Gröbming	417	9	0.9	0.07*	8	0.8	-0.36
Orientation	Spittal/Drau	580	10	1.0	-0.11*	90	9.0	-0.01*
Vocational training	Oberpullendorf	243	57	5.7	0.10*	212	21.2	0.64*
Allowance for course costs	Ried im Innkreis	343	10	1.0	-0.07*	32	3.2	-0.14*
Non-profit organisations	Bregenz	844	109	10.9	-2.28	23	2.3	0.79
wage Subsidies	Leoben	505	53	5.3	-0.36*	35	3.5	1.16
Apprenticeships	Bludenz	430	189	18.9	-2.13	53	5.3	4.15

* effect is statistically insignificant

Table 5: Contemporaneous and steady-state effects for the Beveridge curve

Dependent variable: log job-seeker rate					
Job-seeker rate			**Vacancy rate**		
			contemporaneous	-0.012	*
Steady state	0.910	***	steady state	-0.188	
Active job search			**Allowance for course costs**		
contemporaneous	0.000		contemporaneous	0.001	
steady state	0.073	***	steady state	0.001	
Job training			**Non-profit organisations**		
contemporaneous	-0.003	*	contemporaneous	-0.037	***
steady state	-0.040	*	steady state	-0.059	
Orientation			**Wage subsidies**		
contemporaneous	0.003	**	contemporaneous	-0.007	
steady state	0.065	**	steady state	-0.203	*
Vocational training			**Apprenticeships**		
contemporaneous	0.003		contemporaneous	-0.049	***
steady state	0.197		steady state	-0.071	

all explanatory variables are in logs
levels of significance: *** 1%, ** 5%, *10%
(based on heteroskedasticity robust standard errors)
all models estimated with both regional and time fixed effects

Table 6: Cumulative effects of the accommodation ratios

	Active job search	Job training	Orientation	Vocational training	Allowance for course costs	Non-profit organisations	Job-creation schemes	Apprenticeships
t	0.000	-0.003 *	0.003 **	0.003	0.001	-0.037 ***	-0.007	-0.049 ***
t+1	0.002 *	-0.003	0.004 **	-0.008	0.007 **	-0.021 ***	0.003	-0.014
t+2	0.004 **	-0.002	0.005 **	0.018	0.007 *	-0.028 ***	-0.011	-0.011
t+3	0.005 ***	-0.004 *	0.008 ***	0.030 **	0.003	-0.019 ***	-0.005	-0.005
t+4	0.007 ***	-0.006 **	0.009 **	0.023	0.002	-0.035 ***	-0.023 **	-0.042 ***
t+5	0.009 ***	-0.006 **	0.010 **	0.017	0.006	-0.027 ***	-0.020	-0.023 *
t+6	0.011 ***	-0.006 **	0.012 **	0.035	0.006	-0.030 ***	-0.029 *	-0.017
t+7	0.012 ***	-0.008 **	0.014 **	0.046 *	0.003	-0.025 ***	-0.027	-0.016
t+8	0.014 ***	-0.010 **	0.015 **	0.041	0.002	-0.035 ***	-0.040 **	-0.040 **
t+9	0.016 ***	-0.010 **	0.016 **	0.038	0.005	-0.031 ***	-0.040 *	-0.029
t+10	0.017 ***	-0.010 **	0.017 **	0.051	0.005	-0.032 ***	-0.046 **	-0.023
t+11	0.018 ***	-0.011 **	0.019 **	0.060	0.003	-0.030 ***	-0.047 *	-0.024

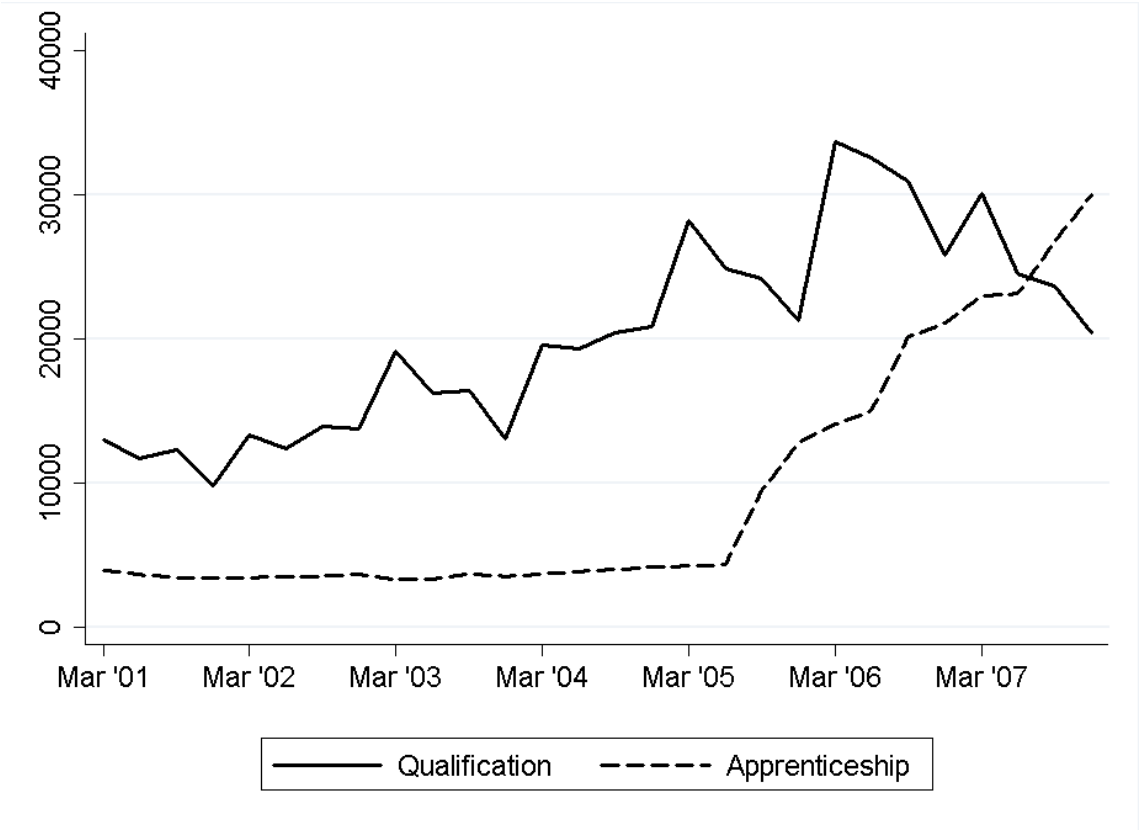
levels of significance: *** 1%, ** 5%, *10%

Table 7: Effects 12 quarters after a 10 percent change in the number of participants in selected branch offices in the 2nd quarter 2007

		Job-seekers			Effect	
Programme	Branch office	Number	Rate	Participants	% Points	Persons
Active job search	Braunau	2348	6.35	11	0.01	4
Job training	Liezen und Gröbming	2437	7.32	10	-0.01	-3
Orientation	Spittal/Drau	2638	8.52	49	0.02	5
Vocational training	Oberpullendorf	1212	7.89	97	0.05*	7*
Allowance for course costs	Ried im Innkreis	1493	6.24	16	0.00*	0*
Non-profit organisations	Bregenz	4065	8.04	112	-0.02	-12
Wage subsidies	Leoben	2173	8.47	82	-0.04	-10
Apprenticeships	Bludenz	2050	8.03	239	-0.02*	-5*

* effect is statistically insignificant

Figure 1: Number of participants in the most important programmes at federal level



Appendix

Table A 1: GMM results for the Beveridge curve

Dependent variable: log job-seeker rate						
Variable	coeff.		s.e.	Variable	coeff.		s.e.
Job-seeker rate				**Vacancy rate**			
t-1	0.139	***	0.020	t	-0.012	*	0.006
t-2	-0.013		0.029	t-1	-0.015	***	0.005
t-3	0.092	***	0.022	t-2	-0.009		0.006
t-4	0.691	***	0.026	t-3	0.000		0.006
				t-4	0.019	***	0.007
Active job search				**Allowance for course costs**			
T	0.000		0.001	t	0.001		0.002
t-1	0.002	**	0.001	t-1	0.005	***	0.002
t-2	0.001		0.001	t-2	0.000		0.002
t-3	0.001	*	0.001	t-3	-0.004	*	0.002
t-4	0.002		0.001	t-4	-0.002		0.002
Job training				**Non-profit organisations**			
T	-0.003	*	0.002	T	-0.037	***	0.008
t-1	0.001		0.002	t-1	0.022	***	0.007
t-2	0.000		0.002	t-2	-0.011		0.007
t-3	-0.001		0.002	t-3	0.014		0.009
t-4	0.000		0.002	t-4	0.006	*	0.004
Orientation				**Wage subsidies**			
T	0.003	**	0.001	T	-0.007		0.005
t-1	0.001		0.001	t-1	0.011	**	0.005
t-2	0.001		0.001	t-2	-0.016	***	0.005
t-3	0.003	**	0.001	t-3	0.009		0.006
t-4	-0.002		0.001	t-4	-0.016	***	0.006
Vocational training				**Apprenticeships**			
T	0.003		0.008	t	-0.049	***	0.010
t-1	-0.011		0.008	t-1	0.041	***	0.010
t-2	0.027	***	0.010	t-2	-0.002		0.010
t-3	0.008		0.006	t-3	0.010		0.009
t-4	-0.010	*	0.006	t-4	-0.007		0.008
Share of long-term job-seekers	-0.389	***	0.08				
Share of js younger than 25	-0.252	***	0.09				
Share of js older than 50	-0.122		0.12				
Share of js with migration back-ground	-0.023		0.09				
Share of low-skilled js	0.043		0.10				
Share of high-skilled js	-1.569	***	0.38				
Share of female js	0.047		0.07				
Participation rate	-0.114		0.23				
Share of employment in tertiary sector	0.005		0.06				
Intercept	-0.061		0.17				

Observations	1032	
Groups	86	
Period	2005 - 07	
AR1 test	-5.71	***
AR2 test	-0.71	
Sargan test	17.73	(p = 1)

all explanatory variables are in logs
levels of significance: *** 1%, ** 5%, *10%
(based on heteroskedasticity robust standard errors)
all models estimated with both regional and time fixed effects

Table A 2: Results for the Beveridge curve, considering spatial dependencies

Dependent variable: log job seeker rate		
Job seeker Rate		
spatial lag	0.026	
steady state	0.796	***
Vacancy rate		
contemporaneous	-0.010	*
steady state	-0.076	
Active job search		
contemporaneous	0.000	
steady state	0.030	**
Job training		
contemporaneous	-0.004	**
steady state	-0.027	
Orientation		
contemporaneous	0.003	**
steady state	0.030	*
Qualification		
contemporaneous	0.006	
steady state	0.172	*
Allowance to course costs		
contemporaneous	0.001	
steady state	0.041	
Charitable establishments		
contemporaneous	-0.035	***
steady state	-0.062	
Job creation schemes		
contemporaneous	-0.012	**
steady state	-0.182	**
Apprenticeship		
contemporaneous	-0.043	***
steady state	-0.004	
Observations	1032	
Groups	86	
Period	2005 - 07	

all explanatory variables are in logs
levels of significance: *** 1%, ** 5%, *10%
all models estimated with both regional and time fixed effects