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# An Efficiency Comparison of Regional Employment Offices Operating under Different Exogenous Conditions

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# An Efficiency Comparison of Regional Employment Offices Operating under Different Exogenous Conditions

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## **Résumé**

Ce papier analyse l'efficacité d'un panel d'Offices régionaux de placement en Suisse (ORP) sur la période comprise entre novembre 2000 et décembre 2001. L'analyse effectuée se base sur la méthode d'estimation stochastique d'une frontière de production. Les résultats montrent que les conditions exogènes auxquelles font face les ORP ont une influence significative sur leur performance. Toutefois, il est démontré que la composante managériale de l'efficacité est d'une grande importance et peut par conséquent grandement améliorer la performance des ORP. Finalement, le service produit par les ORP est caractérisé par des rendements d'échelle décroissants.

## **Mots-clés**

Offices régionaux de placement, efficacité, conditions exogènes, frontière stochastique, fonction de production

## **Summary**

This paper investigates the technical efficiency differences of a sample of regional employment offices (REOs) across Swiss cantons. The analysis is carried out by means of a stochastic production frontier model estimated on a panel of employment offices observed over the period between November 2000 and December 2001. The results show that the specific exogenous conditions exercise a strong influence over the technical efficiency of each employment office. Even though these conditions affect significantly the relative performance of REOs, the managerial efficiency component does remain important. Hence, REOs may improve their efficiency by adopting better managerial practices. Finally, the job placement process is characterised by decreasing returns to scale.

## **Keywords**

Regional employment offices, technical efficiency, exogenous conditions, stochastic frontier production function

# 1. Introduction

Since the surge of the unemployment rate in the 1990s, Switzerland has paid close attention to the recommendations of the Organisation for Economic Co-operation and Development Jobs Strategy (OECD, 1996) to tackle the unemployment problem. According to these recommendations, the balance of public spending on labour market policies was shifted from passive measures (unemployment benefits) to the so-called active labour market programmes (ALMPs). Active measures aim at helping unemployed workers to return to work by providing them with a range of employment services. Labour market training and subsidised employment are the measures that have been extensively analysed and evaluated in many countries.<sup>3</sup> However, according to Martin and Grubb (2001), a large part of existing literature on programme evaluation makes only a partial contribution to an assessment of the effectiveness of active labour market policies as a whole. Indeed, regular job assistance, registration and matching of unemployed workers with job vacancies are all important active measures which are often ignored in the evaluation literature.

In this paper, we carry out an evaluation of the Swiss public employment service which is part of the Swiss active labour market policies. This service aims at improving the match between vacancies and job seekers. The public placement system in Switzerland is constituted of about 160 regional employment offices (REOs) administered in a decentralised way by the cantons. Employment offices provide placement services to job seekers and employers and organise active labour market programmes, such as vocational training. The unemployed registered with an employment office meet regularly REO's job counsellors for an interview to discuss an individual action plan, to receive information about job vacancies known to the job counsellor, and to decide whether or not the unemployed will take part in labour market programmes.

The regional employment offices are currently monitored by the Swiss State Secretariat of Economic Affairs (seco). The main reason for implementing this monitoring system is to raise administrative or management efficiency of employment offices by rendering them accountable to federal authorities. As Martin and Grubb (2001) note, a necessary condition for doing so is the development of comparative performance indicators. Hence, there is a need for a model to evaluate the performance of Swiss public employment system. In this paper, we propose a stochastic production frontier model to evaluate the technical efficiency of regional employment offices, which is different from the model currently used by seco (see ATAG Ernst and Young, 1999). Our frontier model responds to the question of whether regional employment offices can improve the results of their activity of matching job seekers with vacancies. Due to the absence of a counterfactual situation which would tell us what the unemployment rate in Switzerland would be if it had no public employment service, we perform an evaluation of *relative* efficiency of employment offices. While the total impact of employment offices activities on the Swiss unemployment rate is difficult to assess, our evaluation allows the establishment of a ranking of offices according to their technical efficiency. This should motivate the offices to become more efficient and permit them to learn the most effective management practices from each other's experiences.

Our efficiency measurement model is characterised by the following features. First, it allows us to compute a technical efficiency score for each regional office. This score is comprised between zero and one and indicates the proportion of the maximum output that is produced

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<sup>3</sup> See Gerfin and Lechner (2000), Lechner (2002a, b) and Lalive et al. (2000), for Switzerland.

from the input set used by the office. Therefore, the score of one designates a fully efficient employment office and a score smaller than one designates an inefficient office. Second, the efficiency scores take into account the influence on efficiency of exogenous conditions in which the regional office operates. The importance of accounting for the exogenous conditions, such as the human capital characteristics of job seekers registered with the REO, is emphasised in the agreement between the Swiss federal authorities and cantons on the performance evaluation of the Swiss placement system (Accord ORP/LLMT/Autorité cantonale, 2000; 2003). Finally, the model allows to draw conclusions on the important issue of the nature of economies of scale in the placement service. This issue relates to the question of the optimal organisation of the public placement system with respect to the mean size and number of employment offices. In other words, we answer the question whether the placement system should be centralised or decentralised in order to enhance its productivity.

In Switzerland, the literature on the economics of public employment services comprises following studies.<sup>4</sup> ATAG Ernst and Young (see e.g. ATAG Ernst & Young, 1999) performs a yearly efficiency evaluation of regional employment offices using a variation of parametric non-stochastic Corrected Ordinary Least Squares (COLS) technique (Greene, 1993) applied to cross-section data. Sheldon (2003) and Vassiliev, Ferro Luzzi, Flückiger and Ramirez (2005) use the non-parametric non-stochastic Data Envelopment Analysis (DEA) technique in their cross-section studies. This paper completes the existing literature with a parametric stochastic (allowing for data sampling error) evaluation performed on a panel of Swiss employment offices. The model is estimated by the maximum likelihood method known to be statistically more efficient than COLS (Greene, 1993) and is less sensitive to the statistical noise than the non-stochastic (DEA, COLS) models.

The paper is structured as follows. Section 2 depicts the stochastic production frontier model appropriate for evaluating the technical efficiency, which incorporates exogenous variables beyond the control of REOs' managers. The data and the specifications of inputs, output and exogenous variables are described in Section 3. Section 4 presents the empirical results and Section 5 provides conclusions.

## 2. Methodology: Stochastic Production Frontier

Stochastic production frontier models have been widely used to analyse technical efficiency in the past two decades. The original model developed by Aigner et al. (1977) and Meeusen and van den Broek (1977) has been extended in several ways. One development has been to express inefficiency as an explicit function of firm-specific variables. Battese and Coelli (1993, 1995) proposed a model based on panel data that allows to estimate simultaneously the shape of the production frontier, the technical efficiency scores and the effects of exogenous conditions on efficiency. The model is specified as:

$$Y_{it} = a + X_{it}b + (V_{it} - U_{it}), \quad i = 1, \dots, N; \quad t = 1, \dots, T, \quad (1)$$

where

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<sup>4</sup> The international literature comprises the studies of Cavin and Stafford (1985) on cost efficiency of U.S. employment offices and Althi and Behrenz (1998) on technical efficiency of Swedish employment offices. Torgersen, Førsund and Kittelsen (1986) also consider the technical efficiency of Norwegian employment offices, but their empirical study mainly serves to illustrate the use of their new non-parametric technique of ranking of efficient units.

$Y_{it}$  is the scalar production output, or its transformation, of the  $i^{\text{th}}$  employment office in period  $t$ ;

$X_{it}$  is a  $k \times 1$  vector of inputs, or their transformations, of the  $i^{\text{th}}$  employment office in period  $t$ ;

$b$  is a  $k \times 1$  vector of input elasticities to be estimated and  $a$  is the intercept of the production frontier;

$V_{it}$  are i.i.d. random variables distributed as  $N(0, \sigma_v^2)$  and independent of  $U_{it}$ , representing the standard noise component;

$U_{it} \geq 0$  are i.i.d. normal random variables truncated at zero as  $N(Z_{it}d, \sigma_u^2)$ , reflecting technical inefficiency, or in other words, failure to obtain the maximum output from the input set used.

$Z_{it}$  is a  $1 \times p$  vector of variables which may influence the technical efficiency of a regional office.

$d$  is a  $p \times 1$  vector of unknown parameters indicating the impact of exogenous variables collected in  $Z_{it}$  on technical efficiency. A negative (positive) parameter indicates a positive (negative) influence of the variable on technical efficiency.

Each REO is confronted with a production frontier which is common to all offices in the sample; however, the distance from the frontier representing technical inefficiency varies due to factors that are not under the control of the office, and to managerial inefficiency. The technical inefficiency term,  $U_{it}$ , in equation (1) could be specified in equation (2),

$$U_{it} = Z_{it}d + W_{it}, \quad (2)$$

where the random part,  $W_{it}$ , is defined by the truncation of the normal distribution with zero mean and variance  $\sigma_v^2$ , such that the point of truncation is  $-Z_{it}d$ . As Battese and Coelli (1995) show, these assumptions are consistent with  $U_{it}$  being a non-negative truncation of the  $N(Z_{it}d, \sigma_u^2)$ -distribution. Hence, inefficiency is caused by both exogenous variables beyond the control of the REO's managers, and by mismanagement itself.

Predictions of technical inefficiency relies on the procedure of Jondrow et al. (1982) generalised by Battese and Coelli (1988). The prediction of technical efficiency score  $TE_{it}$  for the  $i$ -th employment office at the  $t$ -th period is defined by equation (3):

$$TE_{it} = \exp(-U_{it}) = \exp(-Z_{it}d + W_{it}). \quad (3)$$

These predictions are computed using conditional expectation of equation (3), given the composed error ( $V_{it} - U_{it}$ ) and evaluated using the estimated parameters presented in Section 4. Technical efficiency score  $TE_{it}$  is net of the effect of exogenous variables, and is comprised between 0 and 1 for each office and each time period. A score of 1 means full output efficiency, i.e. the office cannot increase the number of hires, unless it increases the input usage. A score smaller than 1, e.g. equal to 0.75, means that given the current use of inputs, the office produces only 75% of the possible output.

In this paper, we adopt the conventional Cobb-Douglas functional form to express the relation between the inputs and the output. So we use natural logarithms of output  $Y$  and inputs  $X$  and interpreting the coefficients collected in vector  $b$  as input elasticities. The sum of input elasticities provides an assessment of returns to scale: the value of this sum being smaller,

equal or larger to one corresponds to decreasing, constant and increasing returns to scale, respectively.

The parameters of the stochastic production frontier and the technical efficiency scores can be estimated by the method of maximum likelihood using the computer programme FRONTIER 4.1 of Coelli (1996). Instead of directly estimating  $\sigma_v^2$  and  $\sigma_u^2$ , FRONTIER 4.1 seeks estimates of  $\sigma^2 = \sigma_v^2 + \sigma_u^2$  and  $\gamma = \sigma_u^2/\sigma_v^2$ . If the null hypothesis  $\gamma = 0$  is accepted, this would indicate that  $\sigma_u^2$  is zero and thus the inefficiency term  $U_{it}$  should be removed from the model, converting the production frontier model into its production function version that can be consistently estimated by ordinary least squares (Coelli, 1996).

### 3. Data and Model Specification

The stochastic production frontier model described in the previous section is now completed by the choice of variables entering, alternatively, the production and efficiency functions. Model specification issues are simultaneously discussed. We began by discussing the variables entering the frontier production function. Currently, seco is monitoring the activity of regional employment offices by comparing several of their output variables (ATAG Ernst and Young, 1999). However, the stochastic production frontier model of Section 2 allows for only one output variable. In this paper, we use the number of exits from the PLASTA database<sup>5</sup> as the output of employment offices. We consider this variable as a proxy for the number of hires that occurred due to the job search assistance of employment office, i.e., the number of placements. Our choice of output variable may be criticised for at least two reasons. First, despite the fact that employment represents the main reason for exiting PLASTA system, nearly 22% of registered job seekers leave their REO and are deleted from PLASTA for a reason other than employment (Vassiliev, 2002). These may include inactivity, departure to a foreign country, etc. Hence, the job seeker leaving the PLASTA system is not necessarily helped by the REO to re-integrate the labour market. Second, even if the job seeker leaves PLASTA for employment, the hire may occur without the help of REO, i.e., it is not a placement by the employment office. However, all alternative output variables available from the REOs' database constituted by seco are subject to similar criticisms. Therefore, we use the number of exits from PLASTA database as a proxy for the number of placements, and we refer to this variable as to "the number of hires".

Almost all production-theoretic studies of the efficiency of labour markets are based on the matching function framework, which models hires as a function of the stocks of unemployed and vacancies.<sup>6</sup> Number of vacant places known to each employment office is a very useful indicator of the tightness of the local labour market, which obviously influences the flow of hires. Therefore, we include vacancies as an input into production frontier. However, as the number of vacancies is reported to seco by REO's managers themselves, the figures concerning this number may be easily modified by the management in order to make their REO appear more efficient. This might be achieved by reporting a lower number of vacancies for a given number of hires or registered job seekers. In order to propose an operational efficiency score avoiding this kind of problem, we also estimate an alternative model not including the vacancies in the input matrix. In this case, inputs are restricted to two variables described below.

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<sup>5</sup> The PLASTA database centralises the information on job seekers recorded by REOs in all cantons.

<sup>6</sup> See Petrongolo and Pissarides (2001) for a review of matching function literature.

In most empirical studies of production, conventional inputs include labour and capital. Regional employment offices employ different types of workers: job counsellors having direct contact with unemployed people, administrative staff, people involved in computer support, etc. The capital input consists of office space and computer terminals. Due to data limitations, not all of these elements can be incorporated into analysis. In particular, we only have access to data on the number of job counsellors employed by each office. Hence, we are constrained to assume that the number of administrative staff per job counsellor is the same for all Swiss employment offices. The number of job counsellors (in full working time equivalent) is our proxy for the labour input. Next, it is often argued that in the production of social services, labour represents the main input (see e.g. Kumbhakar and Hjalmarsson, 1995). Hence, assuming that the capital input is proportional to the labour input is not an unreasonable hypothesis. Therefore, capital does not appear in our production frontier model.

In the matching function literature, hires are function of the stock of unemployed people and vacancies. Therefore, the number of job seekers entitled to the unemployment insurance benefit and registered with the office is the next input variable in our production frontier. Note that including into production frontier the number of hires as an output and the number of job seekers registered with a REO as an input leads to an efficiency measurement model that credits with a large efficiency score the employment offices registering many hires for a given number of job seekers. These offices obtain a high exit rate to employment. An increasing exit rate from unemployment implies a shorter average unemployment duration, which is the main objective that the employment offices should achieve, according to *seco (Accord ORP/LMMT/Autorité cantonale, 2000; 2003)*. Hence, our choice of inputs and outputs is economically meaningful and corresponds to the objectives set by the Swiss federal authorities.<sup>7</sup> Finally, we chose to regress the monthly flow of hires in period  $(t - 1, t]$  on the stock of unemployed observed at the end of period  $t - 1$ , in order to avoid the simultaneous-equation bias (at the price of losing one month of observations). Therefore, the stock of unemployed appearing in the input matrix  $X_{it}$  of equation (1) corresponds to period  $t - 1$ , not  $t$ .

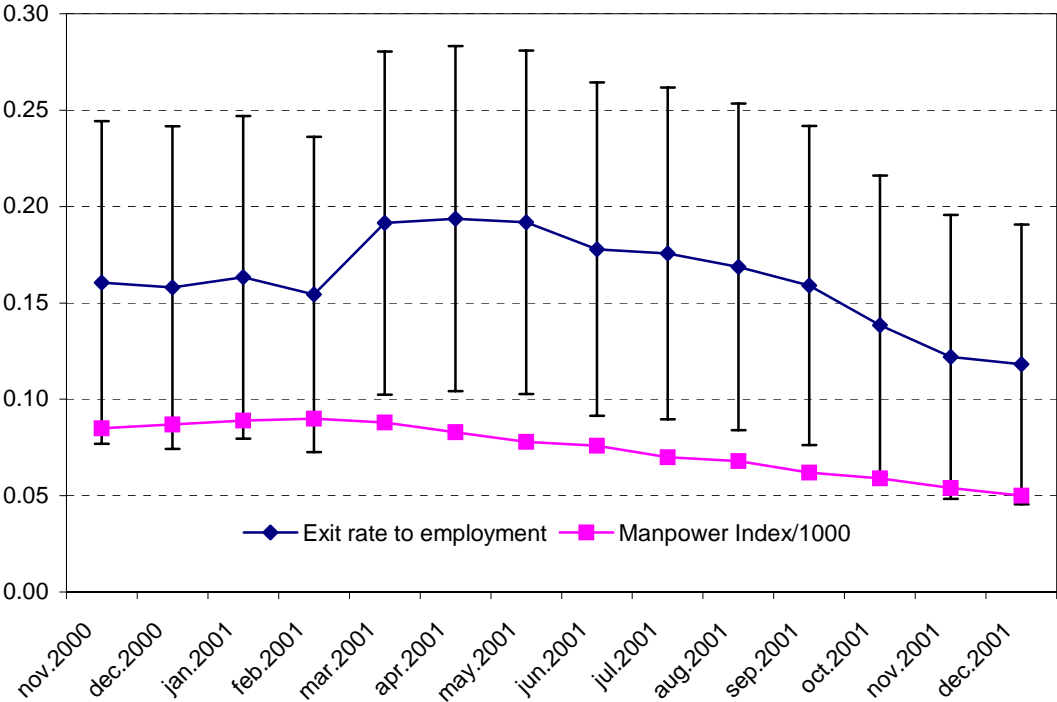
The variations in the ratio of number of hires to the number of job seekers registered with an employment office (i.e., the exit rate to employment) are illustrated in Figure 1. This ratio varies substantially among employment offices, as indicated by the important cross-section standard deviation observed for each month of observation period. A cyclical (yet not statistically significant) variation over the observation period is also observed. These mean values and standard deviations being purely descriptive, it is Section 4 that answers the question of how these variations may be explained by managerial inefficiency, the use of inputs by employment offices, their size, and finally the exogenous variables beyond the control of REOs' management.

Finally, the Swiss public placement system exists in its present form only since 1996, the year when more than 2,000 local placement offices were merged into about 160 regional employment offices. As compared to the earliest local offices, REOs received more generous financing directly from the federal government and became accountable to *seco* as to the result of their activities. In 2000, a monitoring system was introduced. This system, as well as macroeconomic changes that occurred during the observation period, may have affected the behaviour of REOs. Hence, we also include time as the last determinant of our production

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<sup>7</sup> Note also that a REO may report a large number of hires simply because of a large number of job seekers being registered with this office. In this case, the possibility of a low placement rate per job seeker is not ruled out. Including the number of job seekers as an input avoid having large REOs automatically appearing efficient.

frontier. This time variable influences the position of the production frontier across observation period and allows the productivity to vary from one period to another. It captures the joint effect on REO's productivity of monitoring system and the changes of macroeconomic conditions. Time may also account for the "learning by doing" and the experience accumulated by regional offices during the observation period. This experience may also be thought of as an input of employment offices.



**Figure 1: Variations in the exit rate to employment (with asymptotic 95% confidence intervals) and Monpower Index**

We next pass to the specification of technical efficiency function. In placement services, technical efficiencies are likely to be affected by a wide range of factors specific to regional employment offices. These embrace the human capital variables and general employability of the job seekers registered with the office. Four variables are available for your study: gender, nationality, hierarchical position of the job seeker in their last job, and an indication of whether the person has worked in a sector subject to cyclical fluctuation of economic activity. According to labour market literature, these variables often influence the duration of unemployment spells, and hence might affect the placement process. If the estimated coefficient of one of these variables carries a positive (negative) sign in the efficiency function, it means that the technical efficiency score of a REO is decreasing (increasing) when the value of this variable increases (decreases) (Battese and Coelli, 1995).

Our data pertain to a sample of 66 regional employment offices observed over the period beginning in November 2000 and ending in December 2001 (i.e. 14 months). The data were provided by seco which collects it on a monthly basis. The number of regional employment offices included in our estimations is smaller than the total number of employment offices that operated in Switzerland during the observation period. This is due to the problem of missing



input data that exists for some employment offices that were aggregated by seco. We only included in our estimations the non-aggregated REOs. The resulting data set represents a very slightly unbalanced panel.<sup>8</sup>

**Table 1: Descriptive statistics**

| Variables | Description  | Mean     | St. Dev. |
|-----------|--|----------|----------|
| HIRES     | Output, number of exits from the PLASTA database   | 82.4180  | 72.8345  |
| JOBSEEK   | Input, number of job seekers entitled to unemployment insurance benefit and registered with REO  | 525.7553 | 459.0525 |
| COUNSEL   | Input, number of job counsellors working at REO  | 8.2849   | 7.1272   |
| VACANCY   | Input, number of vacant places registered with REO   | 65.6068  | 73.7042  |
| HIGHPOS   | Number of job seekers registered with REO who have had a high hierarchical position in their last job*   | 0.5940   | 0.1291   |
| SWISS     | Number of job seekers with Swiss nationality*  | 0.6061   | 0.0986   |
| CYCLICAL  | Number of job seekers who worked in their last job in sectors subject to cyclical fluctuations of economic activity (construction, retail selling, hostelry, restaurants)* | 0.2065   | 0.0940   |
| WOMEN     | Number of women*   | 0.4720   | 0.0623   |

Notes: \* The values of these variables are divided by JOBSEEK.. N = 66 REOs.

A summary of the values of the output, inputs and exogenous variables entering the stochastic frontier model is listed in Table 1. Descriptive statistics show that compared to the mean values, standard deviations are quite large for all these variables. Hence, the Swiss employment offices are very different in size and operate under environmental conditions that vary substantially among employment offices and cantons.

## 4. Empirical Results

Table 2 presents the estimated parameters of equation (1). Two models were estimated: columns 2 and 3 of Table 2 present the model including the vacant places available at each REO (i.e., production frontier based on the matching function), and columns 4 and 5 present the model without this variable (i.e., classical production frontier). Results are very similar for both models.

According to the *t*-ratios, both empirical models are quite satisfactory. In particular, the null hypothesis  $\gamma = 0$  is rejected at the 1% significance level. Thus, it can be concluded that technical inefficiencies do exist in Swiss placement service. This implies that traditional production functions which do not account for technical inefficiencies are inadequate for modelling the job placement process. Next, the estimate for  $\gamma$  of 0.8085 (or 0.7767) means that 19.15% (22.33%) of the efficiency variation between REOs is due to random noise, implying that stochastic frontier represents a valuable improvement with respect to the non-stochastic efficiency measurement methods (COLS, DEA), which ignore random noise (ATAG Ernst & Young, 1999; Sheldon, 2003; Vassiliev et al., 2005).

The estimated mean technical efficiency score of 0.8399 for the first model shows that in average, employment offices generate 83.99% of the potential number of hires, given their

<sup>8</sup> The panel data model specified in Section 2 permits the use of unbalanced data (Coelli, 1996).

inputs usage and exogenous conditions. The standard deviation of technical efficiency score equals 0.0987 – hence, substantial differences do exist among employment offices with respect to their managerial efficiency net of the contribution of exogenous variables. Therefore, the efficiency of the public placement system can be improved by enhancing managerial practices.

Regarding the frontier production function, we notice that the inputs of employment offices – the number of their registered job seekers (JOBSEEK), the number of job counsellors (COUNSEL), and the number of vacant places (VACANCY) – all carry the expected positive signs. This empirical evidence confirms our expectations. Indeed, we expect the input elasticity for the number of job seekers to be positive because our output variable is only a proxy for the number of placements generated by REOs. Hence, if more job seekers register with a REO, some of them will find a job (or leave the PLASTA system) without being helped by REO's job counsellors. Therefore, a larger number of registered job seekers will increase the output, *ceteris paribus*, even if the job counsellors do not help newly registered unemployed in their job search. We also expect the input elasticity for the number of job counsellors to be positive, because more advice and information from the counsellors should increase the job search intensity of the unemployed. Finally, including the number of vacancies accounts for the tightness of the local labour market. Unsurprisingly, a larger number of vacancies corresponds to more hires.

The estimated coefficients of the time variables which appear in the production function shows a negative trend in REOs' productivity, suggesting that productivity has decreased over the observation period. As reported in Section 3, the time trend can capture the joint effects on REOs' productivity of the introduction of financial incentive system, of the accumulated placement experience, and of the changes in macroeconomic conditions. We cannot distinguish these effects; however, the latter is more likely to explain the decreasing productivity in the placement service. Indeed, in 2001 there was an economic downturn in Switzerland. In an economy slowing down, the number of vacant places decreases, as indicated by the Manpower Index, a vacancy indicator based on job advertisement spaces in newspapers and depicted in Figure 1. The Manpower Index was quite stable from November 2000 to February 2001; then, it started to decrease uninterruptedly and substantially until the end of our observation period. Placements becoming more difficult to realise, the production frontier of employment offices shifted downward between November 2000 and December 2001.

Another important result concerns the returns to scale. As mentioned in Section 2, the sum of input elasticities allows us to assess which type of returns to scale the estimated REOs' production function exhibits. This sum equals 0.8934 in the matching function frontier model (columns 2 and 3 of Table 2) and is statistically lower than one at the 1% significance level (similar conclusion pertains to the second model).<sup>9</sup> Thus, it can be concluded that returns to scale were decreasing over the observation period. Therefore, an aggregation of some REOs, which is regularly recommended by some Swiss policymakers, would not result in an increase of productivity *per se*.

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<sup>9</sup> Using the matrix of covariance of the estimated parameters, we compute a total variance of the sum of input elasticities and then apply a one-tail Student test to compare this sum to 1.

**Table 2: Joint estimates of the frontier production and efficiency functions**

| Variables                              | Model with vacancies |                 | Model without vacancies |                 |
|--|----------------------|-----------------|-------------------------|-----------------|
|  | Coeff.               | <i>t</i> -ratio | Coeff.                  | <i>t</i> -ratio |
| Frontier production function           |                      |                 |                         |                 |
| Intercept <i>a</i>                     | -0.6344              | -4.5876         | -0.6666                 | -5.6007         |
| December 2000                          | ref.                 |                 | ref.                    |                 |
| January 2001                           | 0.0150               | 0.2729          | 0.0006                  | 0.0110          |
| February 2001                          | 0.1089               | 1.9944          | 0.1070                  | 1.9598          |
| March 2001                             | 0.0444               | 0.8126          | 0.0431                  | 0.7909          |
| April 2001                             | 0.2762               | 5.0352          | 0.2789                  | 5.0859          |
| May 2001                               | 0.2462               | 4.4679          | 0.2473                  | 4.5117          |
| June 2001                              | 0.2761               | 5.0262          | 0.2767                  | 5.0125          |
| July 2001                              | 0.1700               | 3.0895          | 0.1601                  | 2.9705          |
| August 2001                            | 0.0945               | 1.6985          | 0.0926                  | 1.6618          |
| September 2001                         | 0.1356               | 2.4527          | 0.1278                  | 2.2883          |
| October 2001                           | -0.0448              | -0.8011         | -0.0521                 | -0.9360         |
| November 2001                          | -0.1533              | -2.7632         | -0.1617                 | -2.9098         |
| December 2001                          | -0.2526              | -4.5052         | -0.2668                 | -4.7767         |
| Ln(JOBSEEK)                            | 0.7738               | 27.1995         | 0.7908                  | 30.8466         |
| Ln(COUNSEL)                            | 0.1026               | 4.0146          | 0.1010                  | 4.0420          |
| Ln(VACANCY)                            | 0.0170               | 2.2879          |                         |                 |
| Variance parameters                    |                      |                 |                         |                 |
| $\sigma^2$                             | 0.3763               | 3.9171          | 0.3270                  | 4.0997          |
| $\gamma$                               | 0.8085               | 14.4359         | 0.7767                  | 12.7914         |
| Efficiency function                    |                      |                 |                         |                 |
| Intercept <i>c</i>                     | -6.6897              | -3.1612         | -5.8400                 | -3.3470         |
| HIGHPOS                                | 0.2081               | 0.8195          | 0.2865                  | 1.3284          |
| SWISS                                  | 5.0242               | 3.2200          | 4.2628                  | 3.4620          |
| CYCLICAL                               | -3.5393              | -4.2836         | -3.5622                 | -4.3222         |
| WOMEN                                  | 5.8395               | 3.7478          | 5.4906                  | 3.8785          |
| Log-likelihood                         |                      | -236.2635       |                         | -239.4932       |
| Mean technical efficiency score        |                      | 0.8399          |                         | 0.8399          |
| St. dev. of technical efficiency score |                      | 0.0987          |                         | 0.0992          |
| Number of observations (REOs)          |                      | 854 (66)        |                         | 854 (66)        |

The existing labour market literature reports some evidence on the factors determining the efficiency in the job placement process. In addition, the issue of whether the job matching function displays increasing or decreasing returns to scale has been broadly studied, as the article of Petrongolo and Pissarides (2001) attests. Lindeboom et al. (1994) found that the speed at which the vacancies known to public employment offices are filled in the Netherlands depends on the education level of the unemployed job seekers and on the region where the unemployment office operates. Ibourk et al. (2001) analysed the matching efficiency of regional labour markets in France and found that a large set of factors was

responsible of variations in the matching efficiencies across French regions. Ibourk et al. (2001) used the Beveridge curve approach<sup>10</sup> and concentrated on the matching efficiency of local labour markets rather than employment offices.

Our results show that the specific exogenous conditions exercise a strong influence over the technical efficiency of each employment office. Three factors (of four that are available) specific to the general employability of the job seekers registered with the office are statistically significant in both models.

The coefficient of the variable SWISS bears an unexpected positive sign, suggesting that the employment offices characterised by a large proportion of Swiss nationals among their registered job seekers have more difficulties to reach the efficient frontier than the offices with many foreign workers.<sup>11</sup> This seems unusual: the empirical labour economics literature often shows that the employability of foreigners is lower than the employability of nationals. Our result may come from the fact that Swiss unemployed workers are more demanding as to the characteristics of new jobs than foreigners, this resulting in a lower number of hires. Note that Ibourk et al. (2001) also found that a large proportion of nationals in a labour market region decreases the matching efficiency of this region. They explain this result by different degrees of "choosiness" between nationals and foreigners, i.e. in the same vein that is outlined above.

The efficiency of an employment office with respect to the number of hires increases if a large proportion of its registered job seekers comes from economic sectors that are subject to cyclical fluctuations of activity (these include construction, retail selling, hostelry and restaurants). Cyclical sectors are characterised by a high labour force turnover: both the layoffs and hires are frequent and employment spells are quite short. Hence, for an office where many unemployed persons from these sectors are registered, it is easy to achieve a large number of hires. We should note that these hires possibly result in unstable jobs with a high probability of returning into unemployment, but the aspect of re-entries into unemployment is not taken into account in our parametric single-output model.<sup>12</sup>

The last exogenous variable is the number of women registered with the office (WOMEN). This variable exercises a significant negative influence on technical efficiency. This result corresponds to the findings prevailing in empirical literature which usually show that for unemployed women it is more difficult to re-integrate the labour market than for men, either because of discrimination and/or because of the sector or type of jobs they are searching for. Finally, the coefficient of the variable HIGHPOS bears a positive sign in the efficiency function – however, this variable is not statistically significant.

## 5. Conclusion

The objective of this paper was to analyse the efficiency of the Swiss public employment system. We extend the literature analysing the characteristics of the job placement process by applying a production frontier approach. These characteristics include the technical

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<sup>10</sup> The Beveridge curve is presented extensively by Blanchard and Diamond (1989).

<sup>11</sup> Therefore, the higher is the value of this variable, the larger is the distance from the observed employment office to the efficient production frontier, and the smaller is the efficiency score.

<sup>12</sup> Sheldon (2003) and Vassiliev et al. (2005) take into account the re-entries into unemployment in non-parametric multi-output models.

efficiency, scale economies, and the effect of exogenous environmental conditions on the placement efficiency of regional employment offices. According to Martin and Grubb (2001), the effectiveness of a public employment system, which represents an important active labour market measure aimed at helping unemployed workers to get back into work, is seldom studied in the literature evaluating the ALMPs. Our paper fills this gap and contributes to the evaluation of the Swiss public employment system by adding to the existing non-parametric and non-stochastic cross-section empirical literature a parametric stochastic model estimated on panel data.

The estimation of a single-step stochastic production frontier for employment offices shows that there is considerable room for improving efficiency in the Swiss public employment service, which could lead to a lower level of unemployment. The efficiency measurement model allows us to rank the employment offices from more technically efficient to less efficient.<sup>13</sup> Such a ranking renders the REOs more accountable to the federal authorities and motivates them to search for more effective management practices.

The stochastic frontier production model allows to explore the important issue of scale economies in the placement service. The optimisation of the national network of employment offices is currently discussed by Swiss policymakers. Depending on the nature of returns to scale in job placement, the productivity of employment systems may be increased by scaling up or down the mean size of employment offices. Increasing (decreasing) returns to scale would appeal scaling up (down) of the mean size by merging (splitting) the REOs. We found that REOs exhibited decreasing returns to scale over the observation period. Thus, the quite common belief that large offices are more productive than smaller ones is not supported by the data. Hence, further centralisation of the Swiss placement system, which is sometimes proposed by policymakers, seems counterproductive.

Interestingly, the estimation results show that the productivity of REOs with respect to the number of hires decreased between November 2000 and December 2001. This downward shift of the production frontier corresponds to the economic slowdown in Switzerland and to the diminishing number of job vacancies that were observed in 2001.

Finally, the Swiss REOs operate in heterogeneous environments and the population of job seekers they face differs from one office to another. The analysis reveals the importance of the exogenous variables in explaining the efficiency differences among regional employment offices. The effect of some exogenous variables on REOs' efficiency corresponds to what may be expected (CYCLICAL, WOMEN), given the knowledge of labour market mechanisms provided by the empirical literature. However, some other variables influence the efficiency in quite an unexpected way (HIGHPOS, SWISS; still the effect of the former is not statistically significant). Hence, our results regarding the determinants of efficiency in the placement services do not always have a clear-cut economic interpretation. Nevertheless, the analysis of job placement efficiency by means of frontier functions is currently in its very beginning. Therefore, our analysis should be viewed as a necessary first step in determining the impact of exogenous operating conditions on the efficiency of employment offices.

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<sup>13</sup> The technical efficiency scores of the regional employment offices were predicted, but tables of these values are not presented in this paper because of the large number of values involved.

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