

Models for the analysis of the labor market in Romania

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Abstract. *During the transition to a market economy put the urgent problem of using labor and unemployment. Increasing labor resources has been accompanied by a continued reduction in employment and a rise in unemployment. The government tried to initiating programs, including external funding, job creation, but compared to the massive layoffs that occurred following the restructuring of sectors, the number of new jobs created has proved insufficient. A significant aspect is given by the increase of population employed in agriculture, characteristic of underdeveloped countries. Modalities of intervention in support of reducing unemployment and increasing employment can be active and passive character.*

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REL Codes: 12B, 12E.

1. Introduction

In an era of rapid technological change, exchanging information and developing knowledge-intensive industries, it is difficult to be able to identify future labor market requirements. Rising unemployment in the Member States of the European Union and developing countries in Eastern Europe, combined with technological change may lead to continuously changing labor market requirements, taking into account that educational provision should be appropriate in accordance with job requirements on labor market. European Union member states have investigated several methods for forecasting employment to identify future needs for labor related factors accounting for sectoral, occupational, educational and training that affect supply and demand for jobs.

Some Eastern European countries are interested in developing such models in order to provide employees with adequate training required on labor market. Considering the single labor market demands and increasing international mobility, states must develop models to the forecast for the training and qualification that can be comparable with that ones existing Member States. This objective requires regular medium-term outlook will extend in the time horizon of the decision makers that can be applied throughout the national economy, taking into account factors such as future investment in the economy, forecasts of income and productivity work and, of course, technological exchanges. The development of such predictions will require the use of quantitative and qualitative methods that systematically will organize and integrate data and analyses relating to education and training, as well as sectoral and occupational needs.

2. State of art

Generally, when we talk about labor market we believe it is the meeting place of labor supply and demand.

As a first step in the analysis of employment and skills shortages, we need to define the purpose of the labor market under consideration. There are three relevant dimensions to characterize the labor market:

- Occupation and/or competence;
- Sector and
- The geographical area (regional, national and European).

Demand for labor force represent the necessary number of employees in different occupations and qualifications in a particular geographic area and period of time.

Global demand for labor is labor market needs expressed by businesses within the national economy. The businesses understand persons or groups of persons active in various sectors of the national economy using production elements that are at their disposal (including labor) to get a certain quantity of goods or provide certain services in higher amounts and at lower costs. This category includes credit and insurance institutions, government or private Romanian companies employing foreign labor in Romania (Jigău et al., 1998, p. 8).

Demand for labor depends on a number of variables: the growth rate, the demand for goods and services, investment rate, technical progress, labor cost etc. Ideally, having a perfectly competitive labor market would be possible only with a very good communication system characterized by informational decentralization, giving individuals the opportunity to choose between different options, but taking into account the disadvantages of risk. In general, in Romania, due to a deficient information system on labor market it is possible only to estimate the total demand and the activities at a particular time, given the population of working age and labor force population.

The indicators used to assess the type and volume of demand for labor force can be structured into two categories:

- Level indicators (total number of persons who applied for a job, total number of people who have found a job and, respectively, the number of people who have not found a job) and
- Structure indicators (these indicators are structured according to different criteria: age, sex, industry, profession, level of education).

Labor supply is the number of working age people able to work, looking for a job and ready to start work as soon as they find a job corresponding to their level of training.

Indicators used to analyze labor supply are:

- Number and structure of unemployed (by gender, age, level of education, profession, his time as looking for a job);
- Number of people employed (in search of a new job and can start work immediately and people who are looking for a new job but which can not start immediately to work);
- The number of people employed and their structure by age and sex, by level of education;

- The number of high school graduates, respectively, university and structure by gender, by level of education and training.

Once you have defined the labor market, we must develop definitions of different types of employment deficit. For the purposes of basic labor scarcity occurs when employees request in a specific occupation exceeds offer employees who are skilled, trained and looking for a job (Visco, 2001, p. 4). Under this definition, we can distinguish two types of employment deficit (Boswell et al., 2004, p. 5): aggregate employment deficit and the deficit of employment due to labor market asymmetries.

Aggregate labor deficit occurs where is full or nearly full occupancy and is manifested generally by a difficulty finding qualified and skilled and competent workers to fill vacancies then existing labor market.

Asymmetry in the labor market.

It is important to note that this deficit due to mismatches in the labor market can coexist with significant levels of unemployment. Amount of inadequacy and its development over time can be synthesized by the Beveridge curve, which is a graphical inverse relationship between unemployment rate and vacancies. The unemployment rate is defined as the proportion of unemployed people registered in total employment and vacancy rate as the ratio of vacancies in total employment in total employment force. A high vacancy rate indicates a low unemployment and vice versa.

Estimates of the current deficit of manpower and skills are essential for defining the relationship between demand and supply of labor in a given time in the labor market. The deficit can be measured by absolute numbers for specific occupations, sectors or regions or unemployment rates or vacancy differentiated by sectors or regions.

When we begin to predict, we must take into account the future development of the supply and demand for labor.

Determinants of supply and demand for labor force can be derived from economic theories as well as from empirical studies. A detailed analysis of the factors influencing supply and demand in the labor market is not necessarily required to make deficit projections of employment, but the crucial point is the definition of labor policies (Wilson, 2008, pp. 9-35).

There are two different levels of employment deficit approach when analyzing it causes. First, we conceptualize the term “employment deficit” in the microeconomic perspective. In this case, the deficit can be explained in terms of a less rapid and persistent increases in labor demand that outpaces the ability of the labor market to provide workers. Alternatively, it may be due to a decrease in supply which is greater than the corresponding decrease

in demand. In both cases, it results imbalance in the labor market (Meagher et al., 2000). Very important is the increasing economic sectors due to the fact that the composition of labor demand varies significantly across economic sectors. In the future, we expect to continue structural changes in Europe, a decline in employment in agriculture and manufacturing field and an increase in service sector (Neuart, Shomann, 2002, p. 3). Structural changes expected in the new EU member states may involve serious labor market problems. Less skilled workers may lose their jobs when expanding service sector, which is likely to meet current skills shortages here. Structural changes across economic sectors can be caused by several factors, including demographic changes, changes in consumer preferences and the international division of labor. At the origins of demographic change lies age, which is an important factor. Since the demographic structure of European societies are changing, the demand for specific products and services will increase in the elderly age group (for example, in the health sector and tourism). Meanwhile, demand for products and services that are directly related to the younger generation will be in decline (eg, education). Trendences resulting from changing consumer preferences and general economic conditions will also have an impact on the balance between supply and demand for labor. While the trend is constant for goods and services, other areas will be marked by strong fluctuations. Changes in the international division of labor will also have an impact on the demand for skills in European companies. It is important to remember that it can achieve growth in these sectors in the EU if they do research in those areas, thereby increasing the number of skilled workers. One of the most important factors that generate employment deficit is reluctant resident workers who are poorly qualified and badly paid. In some countries, for example, jobs in the public sector have become less attractive because they are poorly paid and due to low social status. In Britain, for example, this tendency manifests itself among doctors and teachers. Several studies have indicated that there are labor flows from new EU member states, following the restriction of access to the labor market after a transitional period of two, five or seven years (Boeri, Brucker, 2000, p. 4).

3. Determinants of employment

For further analysis of the link and dependence of socio-economic phenomena, elementary statistical methods are often inadequate. Therefore, analysis of the links between factors determining GDP growth, investment, employment, etc. can be exemplified by use of regression and correlation. The

links between mass economic phenomena is characterized by the fact that one phenomenon or another varies under the influence of a range of factors, some of which are essential, while others are secondary.

Determining the most powerful factors influencing the development of the analyzed phenomenon, one can design and implement practical measures to ensure optimal conditions for its development, increasing the influence of positive factors, eliminate or mitigate the influence of unfavorable factors.

In case of complex relationships, where along with the dependent variable emerge several independent variables the calculation of correlation can not be limited only to variables pairs, but must include other independent variables with significant influence on the dependent variable analyzed. Joint influence of these variables is measured by multiple correlation indicators.

However, in the multiple links, factor variables have different influences on the resulted variable, some exerts a significant action on the phenomenon effect and must be taken into calculations of regression and correlation, while others have a share less important action and can be neglected. Correlation methods have the effect of simplifying the calculations and conclusions, because it is very difficult to quantify the set of all causal factors acting on a socio-economic process or phenomenon. Measurement methods and statistical techniques, factor analysis, estimation and testing are represented by an extensive and varied lot of procedures and statistical and mathematical tools. The most significant of these tools and procedures are applied, in one form or another, to input available for explicitness factor and therefore the separation of information necessary to support decisions for action. For further analysis of the evolution of the main macroeconomic indicators which reveal employment; in the following we will verify the hypothesis of the existence or nonexistence dependence (correlation) between: population and total number of employees in public administration. Analyzing data from the Romanian Statistical Yearbook (2009 and 2010), it appears that the employed civilian population had a decreasing trend in 1990-2009 and the number of employees in the branch of government during 1990-2009 had an increasing trend due massive employment made in this business after the Revolution. In the analyzed period, the number of employees in public administration increased by 181.25%, but employment fell (-22.4%). Let's see if between developments in the two indicators could be a connection and to what extent employment decline was due to the increase in the total number of employees in public administration.

The model reflects the relationship between employment (endogenous variable) and total number of employees in public administration (exogenous

variable). In the last 20 years after the Revolution, in the state sector a large number of employees was employed. These employees are those who do not produce value added economy. The employees of this branch of the national economy must be qualified. If the number of employees in public administration will increase by a thousand people, employment will decline by 11 thousand people, because their salaries are quite expensive, so the investments are reduced. T calculated are compared with the theoretical value of the Student distribution table corresponding to the level of significance $\alpha = 0.05$ (5%) and with a number degrees of freedom $n-2$ (as 18):

$$t_{\alpha;n-2} = t_{0,05;18} = 2.101.$$

Because $|t_{calc}| > |t_{teoretic}|$ it results that the previously determined estimator is statistically significant. Validity of linear regression model can be tested using the F test in the form: $F = 13.92$. Both estimators are significant statistical.

In comparison with the theoretical value of the Fisher-Snedecor distribution table corresponding to the significance level $\alpha = 0.05$ (5%) and a number of degrees of freedom equal to $r-1$: $F_{\alpha;r-1;n-r} = F_{0,05;1;19} = 4.38$ and how $F_{calculated}$ is higher than $F_{critical}$ it results that the model used is valid, correctly identified statistically and can be used for making predictions for the future. It follows, therefore, that 43% from variation of the total population employed in Romania is determined by the variation in the total number of employees in public administration, and the remaining 57% is the influence of other factors (investments, earnings). The results shown were obtained with EVIEWS. As such, the model that describes the relationship between phenomena is analyzed:

$$\begin{aligned} \hat{Y}_i &= 11567 - 11x_i; & R_{y/x} &= -0.66 \\ (461.62) & (3.088) & s_\varepsilon &= 506.94. \end{aligned}$$

The relationship between population and total number of employees in the branch of public administration is an indirect link (reverse), medium intensity, as $R_{y/x} = -0.66$.

Table 1

Dependent Variable: POP_OCUPATA
 Method: Least Squares
 Date: 09/07/11 Time: 20:46
 Sample: 1990 2009
 Included observations: 20
 POP_OCUPATA=C(1)+C(2)*SALARIATI_AP

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	11567.46	461.6280	25.05797	0.0000
C(2)	-11.52319	3.088293	-3.731248	0.0015
R-squared	0.436129	Mean dependent var		9897.750
Adjusted R-squared	0.404803	S.D. dependent var		657.1034
S.E. of regression	506.9488	Akaike info criterion		15.38934
Sum squared resid	4625947.	Schwarz criterion		15.48891
Log likelihood	-151.8934	Durbin-Watson stat		0.912665

Source: calculations of authors.

A more appropriate modeling of the relationship between two variables can be achieved by using the parable of degree 2.

$$Y_i = \beta_0 + \beta_1 x_i + \beta_2 x_i^2 + \varepsilon_i$$

Correlation ratio that shows the intensity of the relationship between variables will be $R_{y/x} = -0.68$, resulting in an indirect connection, medium intensity, the total number of employees in public administration and employment affecting 47% the variation in employment. To verify the model we calculated the significance of the F test, whose value is 7.55. In comparison with the theoretical value of the Fisher-Snedecor distribution table corresponding to the significance level $\alpha = 0.05$ (5%) and a number of degrees of freedom equal to $r-1$: $F_{\alpha; r-1; n-r} = F_{0,05; 2; 19} = 3.52$ and because $F_{calculated}$ is higher than $F_{critical}$ it results that the model used is valid, correctly identified the statistically and can be used for making predictions for the future. In conclusion, we can say that the model is correctly specified, that the variable total number of employees in public administration employment is a significant factor because the estimator is significantly different from zero and correctly identified as the model explains most of the variation in employment. It follows that for a change of $\pm 1,000$ persons employed in public administration, employment will undergo a change of 32,000 people. As such, the model that describes the relationship between the phenomena considered are:

$$\hat{Y}_i = 13124 - 32x_i + 0.069x_i^2; \quad R_{y/x} = -0,68$$

$$(1552.4) \quad (20.6) \quad (0.066) \quad s_e = 505,51.$$

4. Conclusions

Presentation of the overall employment schedule aimed to identify the general features of the labor market in order to determine areas where they can take actions to improve the quality of Romanian education system for increasing the qualification of the labor force. Given the observation that Romania has the lowest level of spending on education as a percentage of GDP, accounting for only 3-4% compared with the average of 5.22% calculated for the remaining member states of the European Union, our recommendation would be to increase the percentage of spending by at least 5% in the near future. Resources must be targeted at equipping faculty with advanced technique laboratories containing latest equipment capable of conducting courses encourage practical application.

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Annex 1

Table 1

**Evolution of the total number of employees in public administration branch,
the total employed population during 1990-2009**

Year	Adjusted values with linear model (thousand persons)	Adjusted values with nonlinear model (thousand persons)
1990	10646	10931
1991	10496	10659
1992	10396	10410
1993	10300	10338
1994	10150	10119
1995	10069	10011
1996	10127	10088
1997	10069	10011
1998	10023	9953
1999	9943	9856
2000	9862	9765
2001	9920	9829
2002	9874	9778
2003	9816	9716
2004	9781	9681
2005	9643	9554
2006	9551	9480
2007	9286	9317
2008	9078	9240
2009	8975	9219

Source: Romanian Statistical Yearbook, 2010, National Institute of Statistics.