

# Challenges for Romania's employment policy in the Real Economy

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*According to the statistics released by the Romanian National Institute of Statistics, our country registered during the last years an increase of the unemployment rate. In this paper we try to establish if and how the world economic crises influenced this increase.*

*After a short review of the established theories and models in the field, our paper analyzes the evolution of the Romanian unemployment rate during the last years, in order to identify a number of factors which determined its evolution as well as in order to point out the importance of these factors.*

*The paper continues with a study of the employment policy promoted by the Romanian government and ends with a forecast of the unemployment rate for the immediate following period.*

**Keywords:** unemployment, policy, forecast.

## 1. Introduction

The economic development of a country or a region is correlated with many factors: natural and information resources, human resources. From ancient times, the man stood at the basis of the society development. Thus, by selling the most important resources that he owns (labour - physical or intellectual), the man, and tacitly the labour that he performs, represents the main economic development factor. However, within a market economy, there is no complete occupation, not all persons manage to get employed (either due to qualification or just because there aren't enough work places). Economic development is tightly connected with occupation, and the unemployment indicates an unbalance in the economy determined by the miscorrelation of the job offer (the said work performed by people) with job demand (work places existent on the market).

This essay has as purpose the aiming of certain macroeconomic problems, meaning employment in Romania. In the first chapter we intend to briefly treat the theoretical basic information regarding unemployment, and for this we shall offer several definitions in order to better explain this macroeconomic phenomenon. In the second chapter we shall deal with the unemployment dimensions and their measuring and with the analysis of the employment policy promoted by Romanian government following the financial crisis. In the third chapter we shall present the concept of natural rate of unemployment and the factors that determine it. In the last chapter, the most important one for this essay, we shall present an evolution of unemployment in Romania focusing mainly on the period 2000 – 2011.

## 2. The concept of unemployment

Before making a synthesis of the definitions that exist for unemployment in the literature, we must point out that, in the beginning, the concept of unemployment was synonymous with the concept of "inactivity". The word "unemployment" in Romanian language comes from the French word

“chomage”. The latter, derives from the Latin word “caumare”, coming from the Greek word “cauma”, which means “great heat”, due to which any activity ceased.

Unemployment is a negative state of the available active population which cannot find employment due to degradation of the relationship between economy development, as job demand sources, and the population evolution, as source of job offer, it represents a contemporary quality of the labour market which consists in the fact that job offer is almost always (or actually always) higher than the job demand (Popescu et al., 2007).

Unemployment is analysed from different angles, drawing up opinions which constitute the object of wider disputes, from which several types of definition result:

- in certain university manuals and handbooks, unemployment is analysed as cumulative value of all those persons that have the statute of unemployed. In this case, the problem passes towards the unemployed person. The most frequent used definition that the economists give to the unemployed person is: the person that searches for a paid job, and who does not have such a job currently (Dobrotă, 1997).
- the definition given by the *International Labour Office within the United Nations*, organisation which studies this phenomenon for elaborating fighting strategies, considers an unemployed person any person that has over 15 years old and who meets simultaneously the following conditions: is fit for work, does not work, is available for a salary or non-salary work, looks for a job. As regards the age, there are several opinions, thus in Romania, Law No. 1 of 1991 and Law No. 86 of 1992 establish the age limit to 16 years old (Roatiş, 2000).

According to the EUROSTAT definition, which follow the criteria of the International Labour Office (ILO) in the area, the unemployed is the person aged between 15 and 74 years old who meets simultaneously the following 3 conditions: does not have a job; is available to start work in the following 2 weeks; has been actively looking for a job anytime during the past 4 weeks (National Bank of Romania, 2010a).

### **3. Unemployment dimensions and its measuring. Romania’s employment policy.**

- a) Unemployment level, dimension or proportion constitutes a statistical indicator which reflects the number of unemployed persons compared to the total number of persons that are fit and want to work.

Unemployment level, dimension or proportion is measured either in absolute expression or in relative expression.

- In absolute expression – by the effective number of unemployed persons; They are expressed in “persons” (“thousands of persons”) and are determined for certain reference periods: monthly, quarterly or annually. The number of unemployed persons is calculated also in relation with certain demographic variables, such as: age, gender, marital status, but also considering the professional qualification, the level of studies and territorial allocation.
- In relative expression – by unemployment rate (Roatiş, 2000).

Unemployment rate is calculated as percentage ratio between:

- the number of registered unemployed persons and the number of active population:

$$Unemployment\ rate = \frac{Number\ of\ unemployed}{Active\ population} \cdot 100 \quad (1)$$

or

- the number of unemployed persons and the number of employed population:

$$Unemployment\ rate = \frac{Number\ of\ unemployed}{Employed\ population} \cdot 100 \quad (2)$$

Depending on the purpose of the unemployment analysis, at a certain period of time or during a certain period, either the active population or the employed population can be used as denominator.

Measuring unemployment must also take into account that the work force problem is both of economic and social type, thus the evaluation has a subjectiveness note, from which a certain phenomenon subvaluation or overvaluation approximation results. Sometimes, the social-political decision factors assert a trend or another (Popescu et al., 2007).

Unemployment subvaluation requires only the registration of the persons that receive unemployment benefit, excluding other categories such as: Persons that are temporarily out of work, young persons that finish an education cycle and do not find employment, persons under disguised unemployment, meaning they are under-occupied, that is, for example, for an activity which can be performed by four persons, five persons are employed instead, etc.

Unemployment overvaluation requires the registration as unemployed persons and of other rightless categories, such as: persons that, although they cash in unemployment benefit, however they intend to get employed, such as for example persons that take care of children, persons that have a job, but they claim that are unemployed, because they work illegally; persons that have several jobs at the same time, establishing the overvaluation of jobs by calculating unoccupied jobs due to lack of qualified persons, persons that do not want to work due to personal reasons, etc.

- b) Measuring unemployment in Romania Employed population, work force, unemployment are calculated, in our country, either based on the work force balance or based on investigations on the work force.

According to the "Investigation on work force in households", the *employed population* includes all persons over 15 years old and above that have deployed an economic or social activity that generates goods or services of at least one hour in the reference period (which has a week), with the purpose of achieving incomes in the form of salaries, payment in kind or other benefits.

Are considered unemployed persons the following: (Dobrotă, 1997)

- employees, meaning persons that perform the activity based on a labour agreement in an economic or social unit or for private persons in exchange of remuneration in the form of salary, paid in cash or in kind, in the form of commission;
- employers, persons that carry out the activity in their unit for which they have as employees one or several persons;
- independent workers, persons that deploy the activity either in their own unit or with the help of their own machine, either based on their professional qualification, but who do not have employees, and who could be helped or not by family member, unpaid;
- unpaid family workers, persons that deploy the activity in a family economic unit conducted by a family or a relative member, for which they are not paid in the form of salary or payment in kind;

- members of an agriculture company or of a cooperative, persons that have worked either as farm field owners in a company founded according to the law, either as member of a small scale cooperative or credit company.

Measuring unemployment implies taking into consideration unemployment intensity (Crețoiu, 2007):

- total unemployment – by total loss of the job and complete termination of the activity;
- partial unemployment - reducing the duration of the work week;
- disguised unemployment – many persons deploy an apparent activity, with a reduced work productivity WL.

- c) Employment duration can be defined as the period passed since the loss of employment, or since the reduction of the work week (in case of partial unemployment), until the moment of the normal reprise of activity or until they are employed. Duration of unemployment influence the unemployment rate, because the shorter the average unemployment duration is, the higher will be unemployment input and output flows (Băcescu and Băcescu-Cărbunaru, 1998).

There is a series of factors on which the duration of unemployment depends, such as (Băcescu and Băcescu, 1993b):

- demographic structure of work force;
- number and type of available jobs;
- wish and ability of unemployed persons to continue searching for a better job;
- organization of labour market meaning that there are some employment agencies and special offices for employing young persons, etc.

- d) Measuring the unemployment implies also the structure evaluation. The unemployment structures must be calculated and registered systematically by fields of activity, training levels, specialization and crafts, by age, gender, etc. (Roatiș, 2000).

Unemployment frequency shows how often, on average, workers become unemployed during a certain period of time (Băcescu and Băcescu, 1993b).

- e) Romania's employment policy

Unemployment prevention and reduction have become major concerns of all social forces (employees, trade unions, employers' associations). Taking into consideration the inveterate existence of a high-level unemployment, ample *measures* have been drafted and promoted in order to ensure certain decent existence conditions for unemployed persons. By their content, *anti-unemployment measures* have direct and indirect effects upon the economy. The policies used against unemployment are (Popescu et al., 2007):

- *Passive policies* emphasize the protection of unemployed persons, especially through the unemployment benefit (aid) and the certainty of certain active persons to withdraw from the labour market. The most important passive policy measures are: Reduction of work duration, reduction of retirement age, increase of the mandatory schooling period; increase the number of jobs with reduced and atypical daily schedule; discouragement of the feminine employees activities; restricting or forbidden immigrations, etc.
- *Active policies* imply a set of measures, methods, procedures and tools with which the increase of employment level is aimed at.

*A better distribution of the total work fund* could be a first group of measures, which can be obtained through: reduction of the work week duration; decrease of retirement age; increase of the schooling duration of young persons; increase of the time dedicated to the qualification; extension of jobs with reduced program and/or part-time jobs (Dobrotă, 1997).

The second group of measures refers to *the removal from the labour market of certain groups of bidders*, such as: discouragement of feminine employees work, deportation or return of foreign immigrants workers un-naturalized yet, interdiction of immigration or its restriction to the maximum extent, etc (Roatiş, 2000).

*Creation of new jobs based on investments* must be made especially in those fields and sector with chances for future development. Even though, the most motivated to invest are the companies with high profits, the agencies with availability towards the increase of number of employees must be supported as well.

*Programmes deployed towards training and qualifying unemployed persons* refer to the just highlight of chances for reemployment considered by dismissed persons. They imply granting, by the state or private sector, of funds for the deployment of specialization courses, organized in order to increase the professional qualification and training in areas for which there are chances to find employment (Ciobanu, 2006).

Another group of measures aim *the increase of active population mobility*. Such a process can be encouraged by: improving the education curricula content, ensuring its adequate structure, professional orientation of young persons towards the most dynamic areas of social-economic activities; adoption of complex measures which would ease people mobility towards new jobs in the area that is to be developed with high priority (Dobrotă, 1997).

Anti-unemployment policies can also be completed with the following policies: a) *Income policies* – are applied when there are governmental control forms over salaries, such as: A maximum allowed percentage for the increase of salary rate; establishing a national average salary, etc. b) *Levy and taxation policies* – are income policies on the indirect mechanisms. Macroeconomic stabilization policies include the three types: anti-cyclic, anti-inflationary and anti-unemployment policies. Combining them in efficient political mixture requires a careful examination of the effects they have on the economy by using stabilization patterns. Specific to this type of political mixtures is the fact that their components can exercise the effects on different periods of time.

In 2009, the Romanian Government adopted 28 anti-crisis measures among which maintaining the unemployment rate within acceptable limits, keeping the flat tax at 16% and VAT at 19% and the allocation of approximately 20% of the investment budget.

Hoping to reduce the unemployment rate and to alleviate the effects of the economic crisis, the Romanian Government adopted the Emergency Ordinance no. 13/2010 which provides that employers who hire the unemployed in 2010 will be exempted for six months from social security contributions related to them. Employers benefit from this feature only if the unemployed people are registered with employment agencies for at least 3 months prior to the hiring decision and had no relationships with those employers in the last 6 months prior to employment.

This measure was part of the package of anti-crisis measures adopted at the beginning of 2010 together with the provision of facilities for young people under 35 years who set up companies, replacing the minimum tax with a flat rate, reducing the number of tax return declarations to be completed by persons legal, compensation of reimbursed VAT with recovered VAT, the initiation of public-private partnership law, and the postponement in 2010 of income tax payment. The measures continued also with reducing the wages of public employees by 25%, the pension fund by 15% and with increasing VAT by 4 percentage points. All this was accompanied by massive layoffs in the public sector so that from 2009 until present days 200,000 public servants remained jobless.

Unfortunately, many of these measures had a negative impact on unemployment. Thus, the flat tax led to the closure of many microenterprises, cutting wages and pensions reduced product demand, and therefore the enterprises' activity, generating job losses.

We can say therefore that the actions of the Romanian Government in the context of the economic crisis were not sufficient in reducing or even maintaining the unemployment rate.

#### 4. The natural rate of unemployment

The normal operation of the work market takes place when there is a natural unemployment whose rate corresponds to the entire use of the workforce (Băcescu and Băcescu, 1993a). The natural rate of unemployment is a rate that ensures the macroeconomic balance. The unemployment may be considered excessive, in any country, if it exceeds its natural level (Băcescu and Băcescu-Cărbunaru, 1998).

Some economists define the natural rate of unemployment as the rate for which the vacant working places are equal with the number of unemployed persons. According to other authors the natural rate of unemployment is the rate at which the wages as well as the inflation are either constant, or at acceptable levels. Another definition states that the natural rate of unemployment is the level of unemployment to which any growth of the aggregate demand doesn't influence the unemployment reduction. According to this definition, the natural rate of unemployment is the rate to which all unemployed people are volunteers, meaning there is only a cyclical unemployment and, possibly, a seasonal one. James Tobin states that the natural rate is the rate of unemployment where its level is unchanged and the existing fluctuations within the mass of unemployed people, as well as the period of unemployment are normal (Țigănescu and Roman, 2001).

The natural rate of unemployment is influenced by certain specific factors. One of the factors that determine the natural rate of unemployment is the *structure and migration of the population of that particular country* (in any country the unemployment rate is calculated as a weighted mean of the natural rates of unemployment in the different demographic groups). Another factor is the *existence of the national wage*, wage that has as purpose the assurance of a decent level of emolument for all the working people and which is regulated by each country's legislation.

Third, the natural unemployment may be influenced by the *level of the growth rates in the different areas of activity*. The *unemployment benefit* may be considered as a fourth factor that influences the natural rate of unemployment; this is due to the fact that not all unemployed people have the right to the unemployment benefit, as well as to the fact that the unemployment benefit cannot be granted forever. Fifth, the *power of unions*, which is different from one country to another, may influence the natural rate of unemployment through their power of negotiation with the time fluctuations. The taxes are another element influencing the work market (Băcescu and Băcescu-Cărbunaru, 1998).

The economists have two different modalities of estimating the natural rate of unemployment. The first method stands in determining an equation through which they correlate the aggregate unemployment to the inflation rate; and the second method of estimating the natural rate of unemployment is based on the history related to the unemployment rate for long periods of time. This data is different according to the demographic groups (Țigănescu and Roman, 2001).

The natural rate of unemployment is analyzed also from the point of view of the connection between the unemployment and the inflation: When the inflation rate is stable, constant, we speak of the natural

rate of unemployment, also called NAIRU-“ Non Accelerating Inflation Rate of Unemployment” (Băcescu and Băcescu-Cărbunaru, 1998).

## 5. The evolution of the unemployment rate in Romania. Models and forecasts

The evolution of the unemployment rate is registered in a constant reduction trend, visible since 2000, due to the following causes:

- the continuous economic growth;
- the consistency in the efficient implementation of the measures provided by Law no. 76/2002 regarding the unemployment insurance system and the stimulation of workforce occupation, which have constantly created great occupation opportunities on the work market;
- the continuous construction activities, including the winter period, through the works developed by the Mistry of Transportation and Housing on building houses, sports arenas, the infrastructure.

Moreover the rate of unemployment during the analyzed period registers, starting with 2008, higher and higher values, growth that is due to the layoffs that have been the choice of many commercial societies following the international economic crisis.

For the analysis of the evolution of the unemployment rate in Romania during 2000-2010, we used the data present in the B.N.R. Monthly Bulletins:

**Table 1: The evolution of the unemployment rate in Romania during 2000-2010**

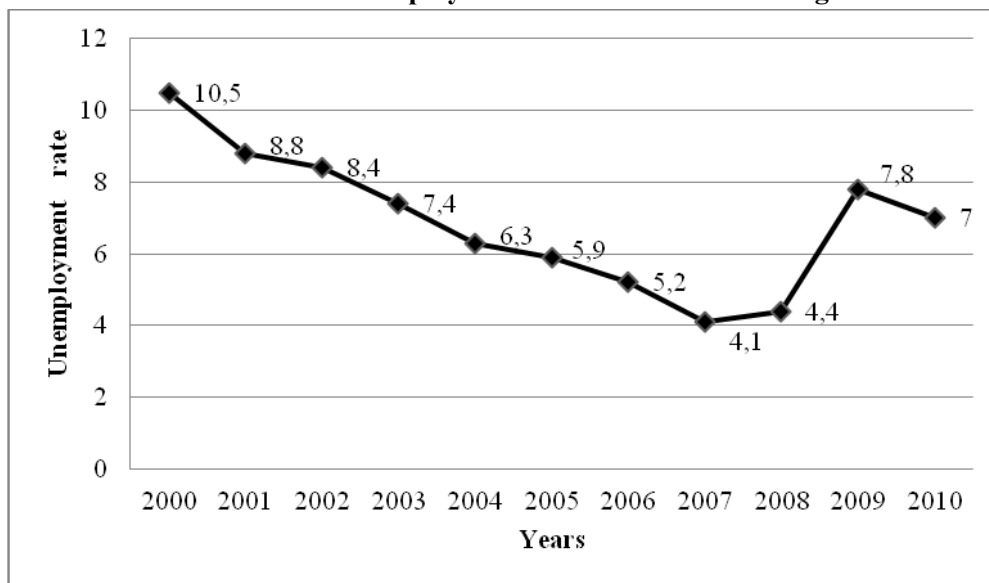
Year	Total number of registered unemployed people (thousand people)	Registered unemployment rate (%)	Total number of BIM unemployed people (thousand people)	BIM unemployment rate (%)
2000	1007,1	10,5	775	6,9
2001	826,9	8,8	711	6,4
2002	760,6	8,4	845	8,4
2003	658,9	7,4	692	7
2004	557,9	6,3	799	8
2005	523,0	5,9	704	7,2
2006	460,5	5,2	728	7,3
2007	367,8	4,1	641	6,4
2008	403,4	4,4	575	5,8
2009	709,4	7,8	699	6,8
2010	626,9	7,0	725	7,3%

Source: National Bank of Romania (2005, p. 15; 2007, p. 18; 2010b, p. 14) and data from National Institute of Statistics, Tempo-online (2010).

During 2000-2007, the unemployment registered in Romania reached a maximum level of 1007,1 (thousand people) in 2000, followed by a descendent evolution, reaching a minimum level of 367,8 (thousand people) in 2007. The unemployment rate has registered a continuous decrease starting with 2000 until 2007, the following year, 2008, registering a higher value with 0,2 percentual points, and in 2009 this rate increases in a faster way than the previous year, the increase being of 3,4 percentual points.

Regarding the BIM unemployment, this one starts decreasing only in 2002, with respect to the registered unemployment, which decreases starting with 2000. Analyzing the evolution of unemployment, while we acknowledge the fact that on national level the situation in 2009 is similar to the one in 2001 and 2002. The rate of the registered unemployment represents the report between the the number of unemployed people (registered to the workforce occupation agencies) and the civil active population (unemployed people and civil occupied population, defined according to the methods of the workforce balance). The statistical data do not reflect entirely the real situation in the work market.

**Figure 1: The evolution of the unemployment rate in Romania during 2000-2011 - Total**



Source: Based on the data in Table 1

The evolution of the unemployment rate shows that in Romania, starting with 2000 this index has followed a decreasing trend, registering smaller and smaller values during the analyzed period, from 10,5% in 2000 to 4,0% in 2007, and next year in 2008 this unemployment rate will grow, reaching in 2009 an equal percentage with 7,8.

The unemployment rate registered between 2000-2010 has experienced the following evolution by sex and origin environments:

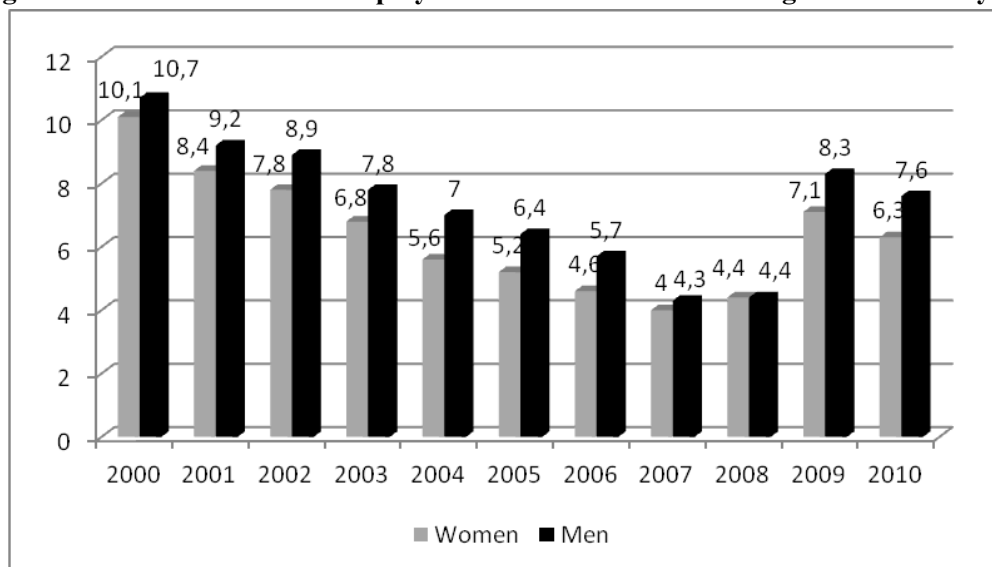


**Table 2: Evolution of the unemployment rate in Romania during 2000-2010 by sex and origin environments**

Year	Unemployment rate (%)				
	Total	Women	Men	Urban	Rural
2000	10,5	10,1	10,7	11,1	3,1
2001	8,8	8,4	9,2	10,4	2,8
2002	8,4	7,8	8,9	11,2	5,4
2003	7,4	6,8	7,8	9,5	4,3
2004	6,3	5,6	7	9,5	6,2
2005	5,9	5,2	6,4	8,8	5,2
2006	5,2	4,6	5,7	8,6	5,6
2007	4,1	4,0	4,3	7,7	4,9
2008	4,4	4,4	4,4	6,8	4,6
2009	7,8	7,1	8,3	8,2	5,2
2010	7,0	6,3	7,6	9,1	5,0

Source: National Bank of Romania (2005, p. 15; 2007, p. 18; 2010b, p. 14) and data from National Institute of Statistics, Tempo-online (2010).

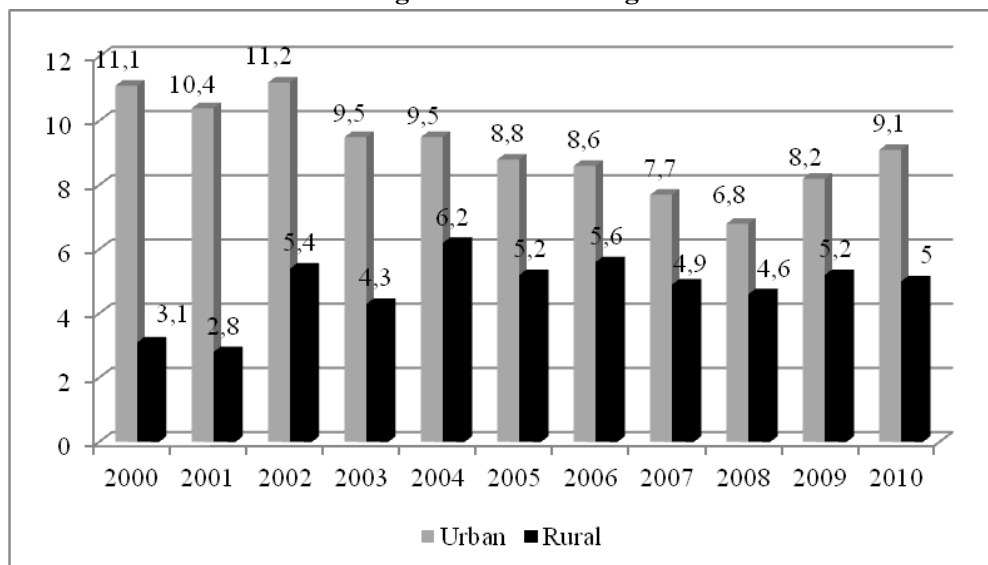
Regarding the unemployment rate by sex, the spread between the two rates has reached, during the analyzed period a mean of 0,9 percentage points, and on origin environments 4,4 percentage points.

**Figure 2: Evolution of the unemployment rate in Romania during 2000-2010 – by sex**

Source: Based on the data in Table 2

For the female population, unemployment rate was decreasing between 2000-2007, when it decreased by 6.1 percentage points from a rate of 10.1% in 2000 to one of 4.0% in 2007, and starting with 2008, this rate was higher by 0.4 percent over the previous year. The same declining trend is met for the male population, as male unemployment rate in 2000-2007 decreased from 10.7% in 2000 to 4.3% in 2007, and for the female population, this indicator's value starts to increase in 2008 up to almost doubling in 2009 compared to the lowest level (from 4.3% to 8.3%) met in 2007. Statistical data show a smaller number of unemployed women than unemployed men, but less fluctuation over the years, 10.1% to 10.7% in 2000, namely 7.1% to 8.3% in 2009.

**Figure 3: Evolution of the unemployment rate in Romania between 2000 and 2009 – presented according to different backgrounds**



Source: Based on the data in Table 2

Depending on the residence location, in the period 2000-2009, the most significant changes in unemployment rates were registered in urban areas. Unemployment declined from 11.2% in 2002 to 6.8% in 2008, for urban, while rural unemployment had a fluctuating evolution from 5.4% in 2002 to 5.2 % in 2009, excepting 2000 and 2001, where the unemployment rate recorded the lowest level in the period under review.

## 6. Econometric models and forecasts

*Boianovsky and Presley* (2009) start from exploring the connection between the natural rates of unemployment and interest, which was first studied by Dennis Robertson in the 1930s. They deduce a relation between the monetary base, the interest rate, the real wages and the unemployment rate, starting by the differences between the Robertson and Keynes theories regarding the unemployment, who look at the interest rate, which has an impact on savings, consuming, and finally on the unemployment rate.

*Cook and Korn* (1991) in their empirical research provided evidence that market interest rates responded more strongly to the unexpected component of the employment report in the latter half of the 1980s and the early 1990s than they the finding of the money announcement literature generally did in earlier years. They use a regression analysis to identify the strong reaction of interest rates to the employment report in that period. *Koors* (2006) identifies in his research those macroeconomic variables that have a significant effect on the unemployment rate and he estimates a multiple regression model for unemployment rate, using GDP, the discount rate, the budget deficit, the inflation rate, and the nominal wages.

*Croitoru* (2010) begins from a neo-keynesian model in order to identify the implications that inflation and the real income have on unemployment. The first model implies a negative relation between the real income and the unemployment rate, showing that this relation is temporarily interrupted at two moments: when the companies give up the norms and pass from the Nash negotiation to an alternative mechanism of establishing the income, and the second model introduces nominal rigidities as rigid

prices and derives a negative relation between inflation and the unemployment rate, showing that the unemployment rate answer to a stance modification of the monetary policies is relatively high. Also, *Fitzenbergern and Garloff* (2008) who analyze the problems of the labor market in Germany, come to the conclusion that the major reason of the high unemployment rate is the low wage dispersion.

In order to investigate the relation between the unemployment rate (RSSA), interest rate (RDSA), net wage (CSMSA) and import (ISA) in Romania, we used monthly deseasonalized data for 2000:01 – 2011:10 collected from the Monthly Bulletins of the Romanian National Bank (National Bank of Romania, 2000-2011) and the INSSE Tempo-online series available online on Romanian Statistical Institutes website (National Institute of Statistics, Tempo-online, 2010).

We shall employ the multiple regression in order to identify the relation between the variables mentioned above. The dependency between the economical variables can take different forms. For identifying the most plausible function we represented the scattered with the purpose of analyzing the connection between the endogen variable, that was deseasonalized and each of the explicative variables piece by piece that were deseasonalized as well. Based on these graphic representations we observed that between each exogen and endogen variable there is a possible linear connection. Therefore, after having tested several multiple linear regression models displaced in time, the best for studying the unemployment rate has the following form:

$$RSSA_t = C(1) + C(2) * RDSA_t + C(3) * CSMSA_t + C(4) * ISA_t + C(5) * RSSA_{t-1} + \epsilon_t \quad (3)$$

**Testing the regression models validity.** Following the testing of colinearity with the help of the matrix correlation we can conclude that the presence of colinearity at the level of this model of regression is missing. We shall further analyse the estimation of the general linear regression model's parameters.

**Estimating the parameters of the multiple model of regression.** In the case of the multifactorial model the parameters can be estimated through several methods. In order to determine the models parameters we shall use the Ordinary Least Squares method. In order to estimate the validity of the hypotheses on which the classic model is based various statistic tests shall be used.

**Table 3: Multiple linear regression models displaced in time**

Dependent Variable: RSSA (Unemployment rate seasonally)				
Method: Least Squares				
Sample(adjusted): 2000:02 2011:10				
Included observations: 140 after adjusting endpoints				
RSSA=C(1)+C(2)*RDSA+C(3)*CSMSA+C(4)*ISA+C(5)*RSSA(-1)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.497190	0.276839	1.795953	0.0747
Interest rate	0.012148	0.006855	1.772077	0.0786
Net wage	0.000585	0.000168	3.482429	0.0007
Import	-0.000233	7.35E-05	-3.171131	0.0019
Unemployment rate(-1)	0.911546	0.025918	35.17038	0.0000
R-squared	0.977217	Mean dependent var		6.939216
Adjusted R-squared	0.976546	S.D. dependent var		2.205617
S.E. of regression	0.337780	Akaike info criterion		0.701975
Sum squared resid	15.51699	Schwarz criterion		0.806541
Log likelihood	-44.48924	Durbin-Watson stat		1.223776

Source: Authors' calculations

The results connected to the five parameters of the models indicate that the model is valid because the values of the Student statistics (t-statistic) calculated for the five parameters are bigger in absolute value than the tabel value equal to 1.64 for a significance threshold (prag) of 10% (Andrei Tudorel et al., 2008). Therefore we can conclude that the null hypothesis H0 is rejected for all the parameters of the regression equation, these being significantly different from zero, the exogen variables are significant for the total population. Also, the probabilities of these coefficients are smaller than the significance threshold equal to 0,1.

In order to measure the intensity of the endogen variables dependency on the regression factors the determination coefficient must be established. Based on the obtained results, at the specimen (esantion) level between the endogen variable – the deseazonised unemployment rate and the exogen deseazonised variables there is a high intensity connection. A definition of  $R^2$ , which depends on the number of observations  $T=140$  (because we applied the mobile averages method for the sezonalisation of the series, 2 data were lost) and the number of exogen variables  $p=4$  is

$$\overline{R^2} = 1 - \frac{t-1}{t-p}(1 - R^2) = 0.97 \quad (4)$$

this having adjusted the definition of the correlation rapport. We can affirm, therefore, that between the variables there is a connection of medium intensity. In order to study the size of  $\overline{R^2}$  in the total population, the Fisher test is used.

In oder to study the size of  $\overline{R^2}$  in the total population, the Fisher test is used. Because  $F_{calc} = 1417 > F_{tab} = 4$  it results that the null hypothesis is rejected, therefore the influence of the exogen variables on the endogen variables is significant, which indicates a strong intensity of the connection between the unemployment rate and the variables that influence it.

Following the testing of the hypothesis regarding the models aleatory variable it resulted that the independence hypothesis of the errors is not verified. Therefore, in order to eliminate the autocorrelation of the errors we applied the Cochrane-Orcutt procedure (Andrei and Bourbonnais, 2008).

The new model based on the identification of the a relation between the unemployment rate and the exogen variables mentioned above has the following content:

$$RSSA_t - (0.4 * RSSA_{t-1} = C(1) * (RDSA_t - 0.4 * RDSA_{t-1}) + \cdot + C(2) * (CSMSA_t - 0.4 * CSMSA_{t-1}) + C(3) * (ISA_t - 0.4 * ISA_{t-1}) + C(4) * (RSSA_{t-1} - 0.4 * RSSA_{t-2}) + u_t \quad (5)$$

We verify the qualities of the new model by repeating the same stages as for the previous model. The parameters of the linear model of regression with values displaced in time were estimated through the method of the smallest squares.

**Table 4: Cochrane-Orcutt model**

Dependent Variable: $RSSA-(0.4 \cdot RSSA(-1))$				
Method: Least Squares				
Sample(adjusted): 2000:03 2011:10				
Included observations: 140 after adjusting endpoints				
$RSSA-(0.4 \cdot RSSA(-1))=C(1) \cdot (RDSA-0.4 \cdot RDSA(-1))+C(2) \cdot (ISA-0.4 \cdot ISA(-1))+C(3) \cdot (RSSA(-1)-0.4 \cdot RSSA(-2))+C(4) \cdot (CSMSA-0.4 \cdot CSMSA(-1))$				
	Coefficient	Std. Error	t-Statistic	Prob.
Interest rate	0.033163	0.008652	3.833180	0.0002
Import	-0.000123	7.28E-05	-1.683964	0.0045
Unemployment rate(-1)	0.880453	0.029104	30.25231	0.0000
Net wage	0.000673	0.000225	2.993482	0.0033
R-squared	0.946382	Mean dependent var		4.127400
Adjusted R-squared	0.945199	S.D. dependent var		1.318371
S.E. of regression	0.308625	Akaike info criterion		0.514778
Sum squared resid	12.95394	Schwarz criterion		0.598824
Log likelihood	-32.03443	Durbin-Watson stat		1.816051

Source: Authors' calculations

The results regarding the five parameters of the new model show that values of the Students statistics calculated for the five parameters are bigger in absolute value than the table value equal to 1.64 for a significance threshold (prag) of 10% (Andrei et al., 2008). Therefore we can conclude that the null hypothesis  $H_0$  for all the parameters of the regression equation, these being significantly different from zero, the exogen variables are significant also at the total population level.

The positive and negative signs of the independent variables are those expected: the interest rate, net wage and the unemployment rate of t-1 period increase the value of the unemployment rate, while the import decrease the unemployment rate.

In order to measure the intensity of the endogen variables dependency on the regression factors is determined by the determination coefficient. At the sample (esantion) level between the endogen variable and the exogen variables there is a connection of very strong intensity, because the coefficient is equal to 0.94. In order to determine if this intensity is kept also at the total population level, we shall use the Fisher test. Because  $F_{calc} = 1233 > F_{tab} = 4$  it results that the null hypothesis according to which between the variables there would not exist any connection, is rejected, therefore the exogen variables influence over the endogen variable is significant.

#### Testing the fundamental hypothesis regarding the aleatory variable $u_t$

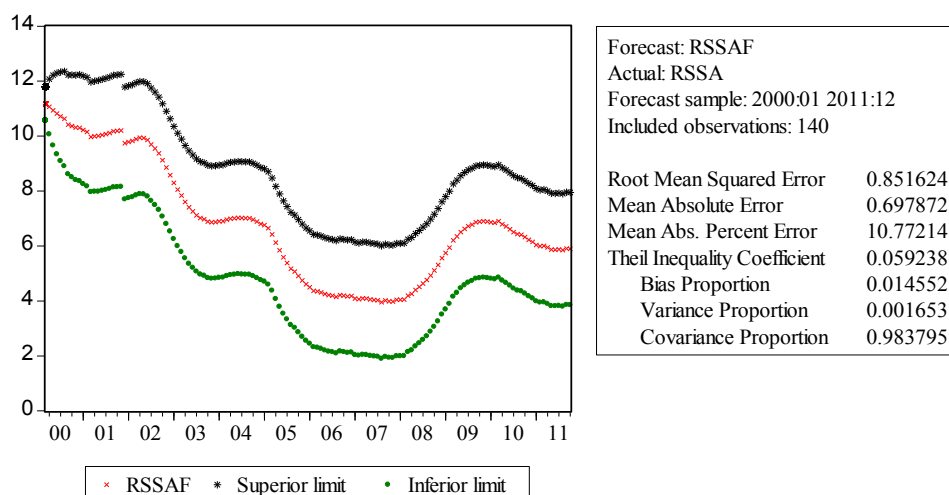
**The independence hypothesis of the  $u_t$  residual variable's values.** In order to detect the residual variables autocorrelation we shall use the Durbin-Watson test. This time we shall start from the relation:  $u_t = \rho u_{t-1} + \omega_t$ . The following hypotheses are emitted  $-H_0: \rho = 0$ , with the alternative  $H_1: \rho \neq 0$ . In this case, the Durbin-Watson statistic is equal to 1.816051, therefore  $d_2 = 1,76 < DW_{calc} = 1,816051 < 4 - d_2 = 2,24$ , therefore we can conclude that the errors are independent, the errors independence hypothesis is verified.

**The homoscedasticity hypothesis of the  $u_t$  residual variable.** In order to verify the homoscedasticity hypothesis we employed the White test. Because the probability associated to the Fishes test equal to zero is smaller than the significance threshold (prag), 0,05, the  $H_0$  hypothesis is accepted as being true, meaning that the model is homoscedastic.

**Testing the normality of the aleatory variable's distribution.** Due to the importance of the normal distribution in modeling of the various statistics, different special tests of concordance have been developed to analyze the normality of the various distribution. One such method of verifying the hypothesis of error normality of various distribution is the Jarque-Berra test, which is asymptotical, valid in the case of a large volume sample, which follows a chi-square distribution with 2 degrees of freedom. Because  $JB_{calc} = 3.80 < \chi_{tab(a;5)}^2 = 5.99$  it results that the error normality hypothesis cannot be rejected at the total population level, the errors being distributed normally. Because all three hypotheses referring to the aleatory variable have been verified, it results that the model is valid; therefore it can be used to emit predictions.

Therefore, starting from the multiple linear regression model with time displacement onto which the Cochrane-Orcutt procedure was applied the unemployment rate values were predicted for November and December 2011 time period. The predicted values of the unemployment rate, obtained based on the above mentioned model, are of 5,8% in November 2011 and 6,2% in December 2011.

**Figure 4. Unemployment rate forecast 2000:01-2011:12**



Source: Authors' calculations

Based on the econometric model estimated above, it was observed that the unemployment rate in Romania is influenced by the evolution in time as well as a number of other macroeconomic factors, namely, net wage, import and interest rates. The predicted values with the multiple linear Regression model with time displacement onto the Cochrane-Orcutt procedure for the next period shows that the unemployment rate will increase by 14% in November 2011 compared to October 2011 and 22% in December 2011 compared to October 2011. To determine the reliability of this forecast, it must be validated or invalidated by real values.

## 7. Conclusion

Regarding unemployment during these years of transition, size, dynamics, forms and characteristics of unemployment in our country have evolved differently from year to year and from month to month.

Although unemployment affects all categories of labor, it focuses mainly on workers. Unemployment has affected workers primarily because of declining industrial sector where there were numerous layoffs due to restructuring.

The increasing share of unemployed with secondary and higher education is caused by high school graduates and those with higher education, which first entered the labor market and did not find a job corresponding to their training. For our country, there is a tendency for professional categories with lower levels of education to be more vulnerable to unemployment. Those with higher education, as we have seen, are the least affected, the risk that they work in areas other than those for which they specialize is lower.

Among the main causes of youth unemployment, perhaps the most important is the lack of correlation of education and qualification system of education products, with market demands. Transition from school to labor market integration of youth is one of the most critical and pressing problems of the labor market, with particularly strong impact on economic and social levels.

The data analysis presented in the last chapter leads us to the conclusion that unemployment is specific trend within this period of economic recession. Based on the econometric model, we observed that the unemployment rate in Romania is influenced by the evolution in time as well as a number of other macroeconomic factors, namely, net wage, import and interest rates. The predicted values for the next period shows that the unemployment rate will increase by 14% in November 2011 compared to October 2011 and 22% in December 2011 compared to October 2011.

An important role in filling those registered with the agency and in harmonizing actions at the micro and macroeconomic level is represented by the measures and initiatives of the local operators and local administrative bodies. Also, in order to ensure a balance between supply and demand on the labor market, the media coverage of the measures public employment service is implementing will be intensified.

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