THE ROLE OF EDUCATION FOR THE DURATION OF UNEMPLOYMENT

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Abstract

In this paper are presented some of the results of research within ASO grant "The Role of Education for the Duration of Unemployment". The paper starts with a presentation of the main characteristics of unemployment in Romania in between 1998-2006. Special attention is paid to the structures of the unemployed by gender, age, and level of education. After evidencing the structure of unemployment in Romania, the results of empirical analysis for one county from Romania, namely Gorj County, are presented. Using techniques to estimate models for duration data, like the Kaplan Meier method and Cox's proportional hazard model, the influence of the level of education, gender and age are analyzed.

Key words: ***unemployment, education level, labor market, gender***

JEL Classification: J64, J21

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1. Structure of the Unemployment in Romania

The unemployment phenomenon in Romania was officially acknowledged starting with the year 1991 when the Law no. 1/1991 came into force, concerning the social protection and professional reintegration of the unemployed. The disequilibria caused by the transition to free enterprise and the registered economic decline determined a real explosion of the unemployment during the first years of transition culminating with the year 1994 when the unemployment rate reached 10.9%. After this year a period of unemployment rate decrease followed and at the end of the year 1997 it increased, consequence of the process of reorganization or closeout of unperformable economic units (especially the mining field), culminating with a rate of 11.8% at the end of the year

1999. At the end of the fourth quarter of the year 2005 the unemployment rate reached the level of 6.8%, and at the beginning of the first quarter of the year 2006 the unemployment rate was of 7.8%.

The evolution of the total number of ILO unemployed during 1998-1st quarter of 2006, registered increases in 1999 and 2000, reaching a maximum point in 2002 (845 thousand persons), after which it significantly diminished in 2003 (692 thousand persons), only to increase again and to reach 763 thousand persons in the 1st quarter of 2006. In the matter of the unemployment rate, it reached 7.8% in the first quarter of the year 2006, with 1.7% more than the beginning year of our analysis, 1998; for the analysed period the female unemployment rate also presents increases, reaching in 2006q1 a level of 7%, with 0.9% more unlike 1998. (Table 1)

Table 1: ***Unemployment evolution during 1998-1q2006 in Romania (thousand persons)***

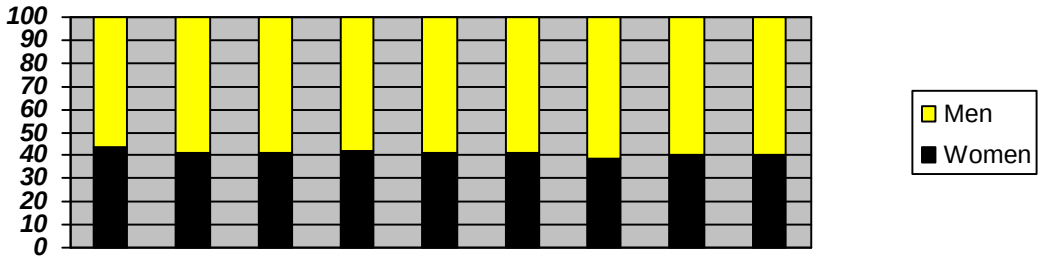
ILO unemployed –thou persons-	1998	1999	2000	2001	2002	2003	2004	2005	2006q 1
Total	688	745	775	711	845	692	799	704	763
Male	386	438	456	414	494	408	491	420	454
Female	302	307	319	297	351	284	308	284	309
Total unemployment rate	6.1	6.6	6.9	6.4	8.4	7.0	8.0	7.2	7.8
Male unemployment rate	6.3	7.2	7.5	6.9	8.9	7.5	9.0	7.7	8.4
Female unemployment rate	5.9	5.9	6.1	5.8	7.7	6.4	6.9	6.4	7.0

Source of data: Statistical Year Book of Romania 2005 and Labour Force in Romania: Employment and unemployment – 1q 2006.

In order to portray structural characteristics of unemployment in Romania during 1998-first quarter of 2006 we shall first pay attention on unemployment by sex, and especially unemployment among women. At the beginning of the '90s women had the main weight among the unemployed in Romania. Subsequently women's weight among the unemployed reduced, as a result of collective dismissals started in 1997 that mainly aimed at activities of construction, mining and metallurgy, branches with preponderantly male employees. Another factor that contributed to unemployment decrease among women was represented by the growth of confections, clothing and footwear industry where labour force is mostly made out of female.

During 1998- first quarter of 2006, women's weight in the total number of ILO unemployed decreased from 43.89% in 1998 reaching the level of 40.49% in the first quarter of 2006 (Figure 1).

Figure 1: ***ILO unemployment structure by sex in Romania 1998-1q2006 (%)***

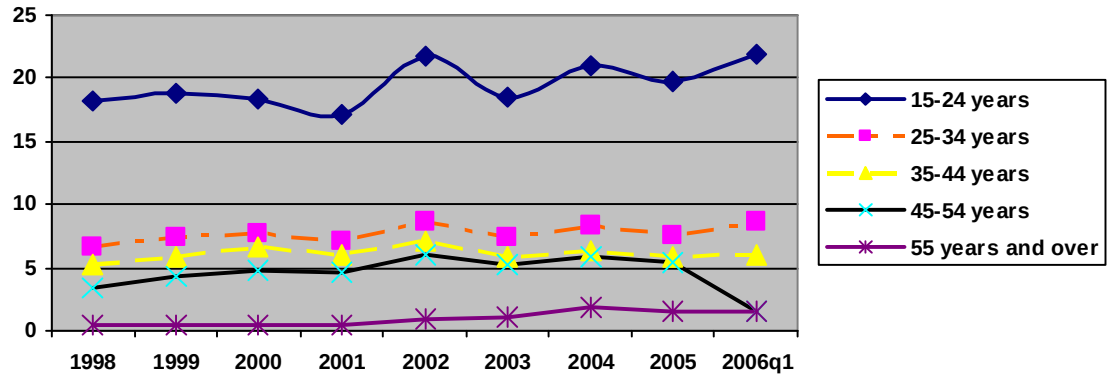


	1998	1999	2000	2001	2002	2003	2004	2005	2006
Men	56,1	58,79	58,84	58,22	58,46	58,96	61,45	59,66	59,5
Women	43,9	41,21	41,16	41,78	41,54	41,04	38,55	40,34	40,5

Source of data: Statistical Year Book of Romania 2005 and Labour Force in Romania: Employment and unemployment 2005 and 1q 2006.

In the matter of unemployment structure by age group, the most affected age group in 2006q1 was 25-34 years, with a number of ***232856 ILO unemployed***, followed by the age group 15-24 years with ***211968 ILO unemployed*** and the age group under 35-44 years with ***154195 ILO unemployed***. For the ILO female unemployment, the highest rate belongs to the age group 15-24 years (19.6%), followed by the group 25-34 years (6.6 %) and for the ILO male employment highest rate belongs to the age group 15-24 years (17.2%), followed by the age group 25-34 years (6.8%).This is not a surprise if we take into account the fact that on the Romanian labour market the greatest difficulties are encountered by the young age group new to the labour market and by the age group close to retirement.

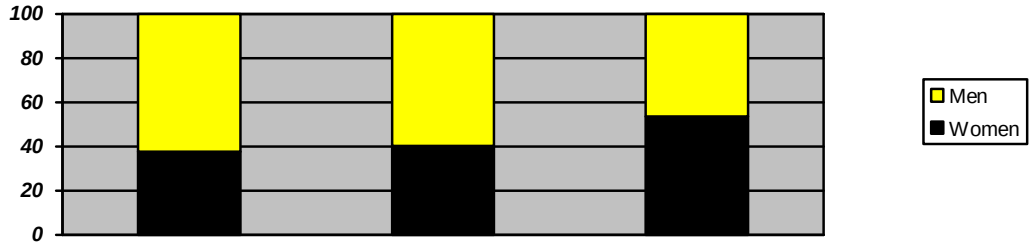
Figure 2: ***The ILO unemployment by age during 1998-1q2006 (%)***



Source of data: Labour Force in Romania -Employment and Unemployment 1q2006.

Regarding the variable ***level of education***, from the total ILO unemployed registered by the end of the first quarter of 2006, 6.4% (53.5% women) were university graduates, 69.61% belonged to high school graduates (high school, post high school, vocational, complementary or apprenticeship, 28.03% women) and 23.99% had a poor educational level (graduates of secondary school, of primary school or without graduated school, 37.87% women). During 1998-2006q1, the share of unemployed with primary and secondary school has gradually increased, the share of unemployed with high-school or post-high-school has decreased (especially in 2004 and 2005) and the share of unemployed with university degree remained approximately constant (Figure 4).

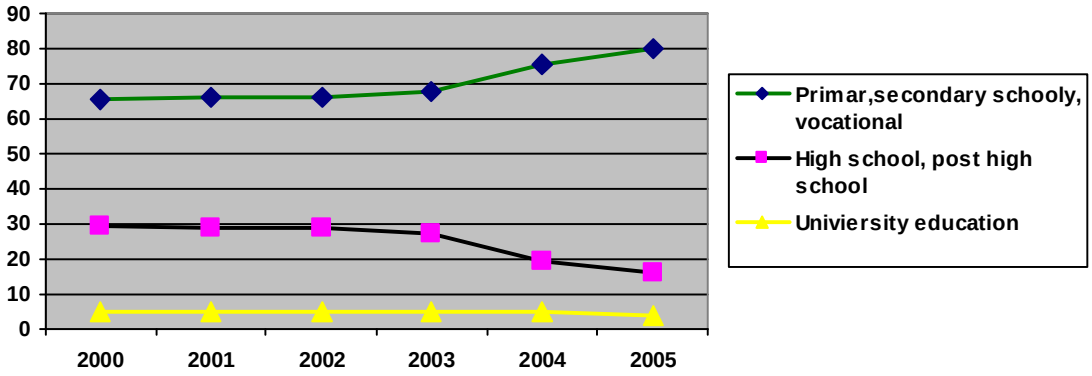
Figure 3: ***Unemployment structure by educational level in Romania 2006q1 (%)***



	Primary, secondary school	High school, post high school	University
Men	62,13	59,74	46,52
Women	37,87	40,26	53,48

Source of data: Labour Force in Romania- Employment and Unemployment 1q2006 pp.82.

Figure 4: ***Registered Unemployed by educational level, 2000-2005 (%)***

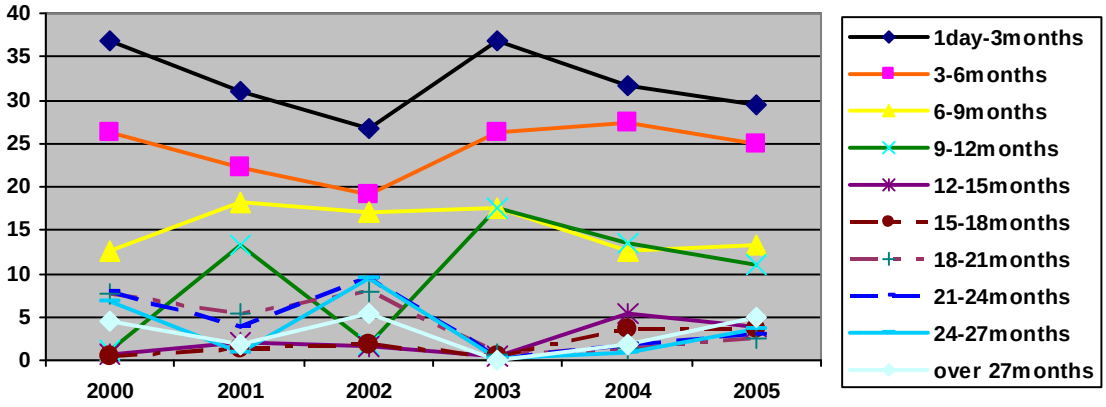


Source of data: Calculations based on data provided by the Ministry of Labour, Social Solidarity and Family. http://www.mmssf.ro/website/ro/statistici/somaj53.pdf.

If we analyse the unemployment from the point of view of its ***duration***, by the end of the 1st quarter of 2006 the average duration of the total ILO unemployment was of

18.5 months, the average duration of the male unemployment was of 20 months and the average duration of the female unemployment of 17.9 months. By area, the average duration of unemployment in urban area was of 16.2 months and in the rural area of 19.6 months. 33.47 % of the ILO unemployed registered by the end of the 1st quarter of 2006 had been unemployed for less than 6 months, 12.80% had been unemployed for 6-11 months, 20.02% had been unemployed for 12-23 months and 20.91% had been unemployed for 24 months and over[1].

Figure 5: ***Unemployment structure by its duration 2000-2005, NEA data (%)***

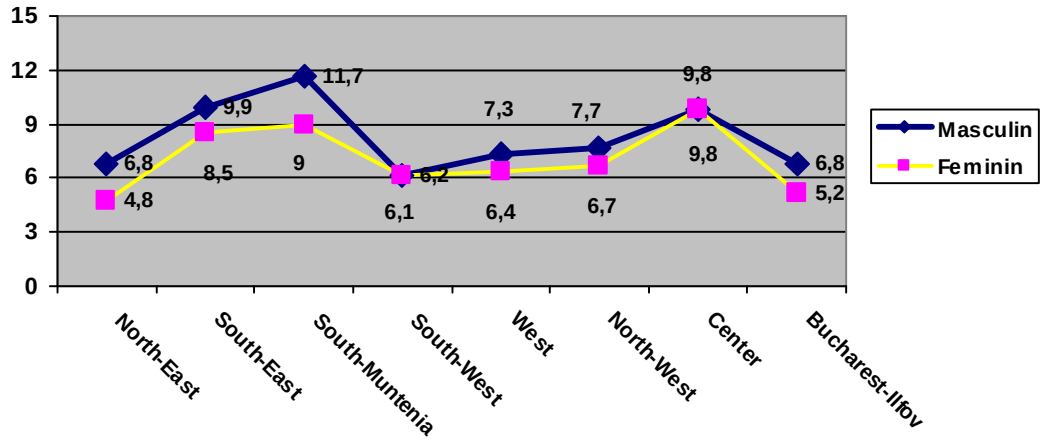


Source of data: Calculation based on data from Statistical Year Book of Romania 2003, 2004 and 2005, and data provided by MLSSF

The unemployment variation at regional level shows oscillations of the ILO unemployment total rate in the 1st quarter of 2006 registered between 5.8% (North-Eastern region) and 10.5 (South –Muntenia region). The ILO female unemployment rate presents values included between 4.8% (North-Eastern region) and 9.8% (the Central region). By area, the greatest ILO unemployment rate in the urban area belongs to the South –Muntenia region (12.1) and the smallest ILO unemployment rate belongs to the region of Bucharest-Ilfov (5.8); whereas the greatest unemployment rate in the rural area belongs to the Central region (10.7) respectively the South-Western region (2.8).

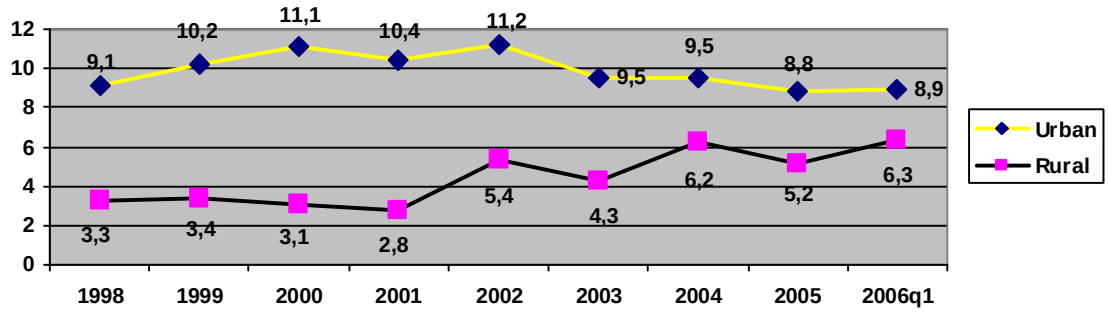
[1] Data provided by Romanian National Institute of Statistics, Labour Force in Romania – Employment and Unemployment 1q2006, pp. 32.

Figure 6: ***ILO rate of unemployment by regions and by gender, first quarter of 2006 (%)***



Source of data: Labour Force in Romania- Employment and Unemployment 1q2006, pp. 39.

Figure 7*: ILO unemployment rate by area 1998-1q2006 (%)*



Source of data: Labour Force in Romania- Employment and Unemployment 1q2006, pp. 55.

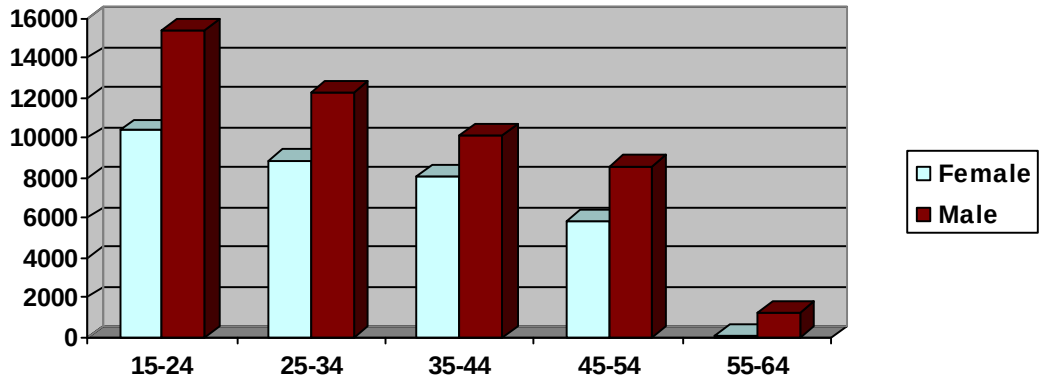
2. Empirical analysis

For the empirical analysis we used data offered by the National Agency for Employment of Romania. Although the Romanian research team filed an application to NAE in June 2006, in order to obtain data for the whole country, at the end of August 2006 we received only the database for one county, the Gorj County.

The database has individual information about all the subjects registered at NAE during January 1, 2002- August 31, 2006. The sample contains 80961 registrations, with information concerning the start date and end date of the unemployment spells, sex, age, educational level and the reason of unemployment leaving for each registered person. Among the 80961 subjects, 33270 are women (41.1%) and 47691 men (58.9%). In figure

8 there is presented the distribution of the subjects in the database by sex variable and by age.

Figure 8: ***The unemployed registered in the database for the analyzed period by sex and age (years)***.



The minimum duration of unemployment spells, in months is 0 and its maximum duration of 57 months, with an average of 8.8 months and median of 6 months. We can notice in table 2 and figure 5 that for the analyzed period, 53.6% of the total of registered persons (with the date of unemployment end) were in short and average duration of unemployment, 0-6 months, 34.3% of the registered persons being in long duration of unemployment.

Figure 9: ***Histogram for the variable duration of unemployment spells (months)***

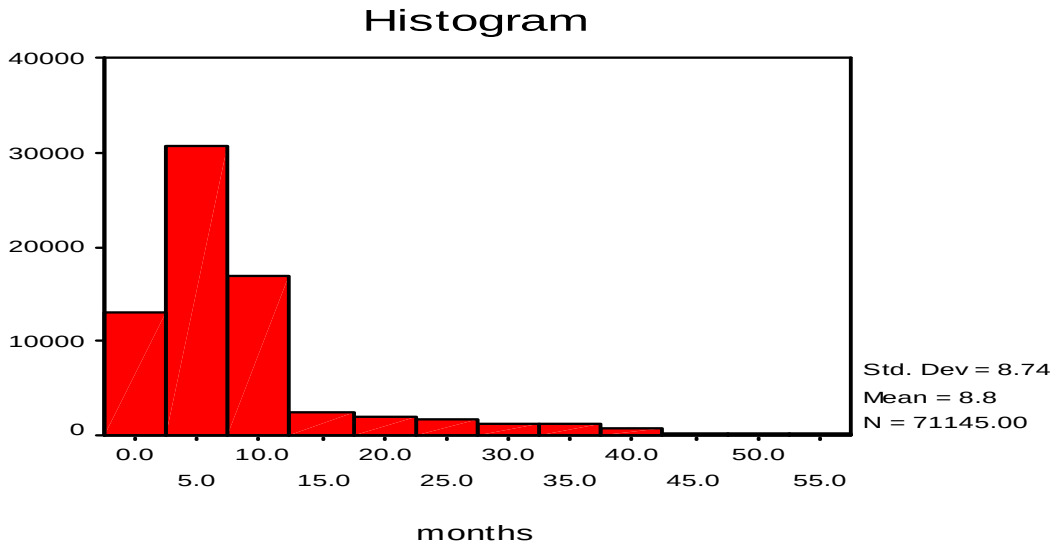
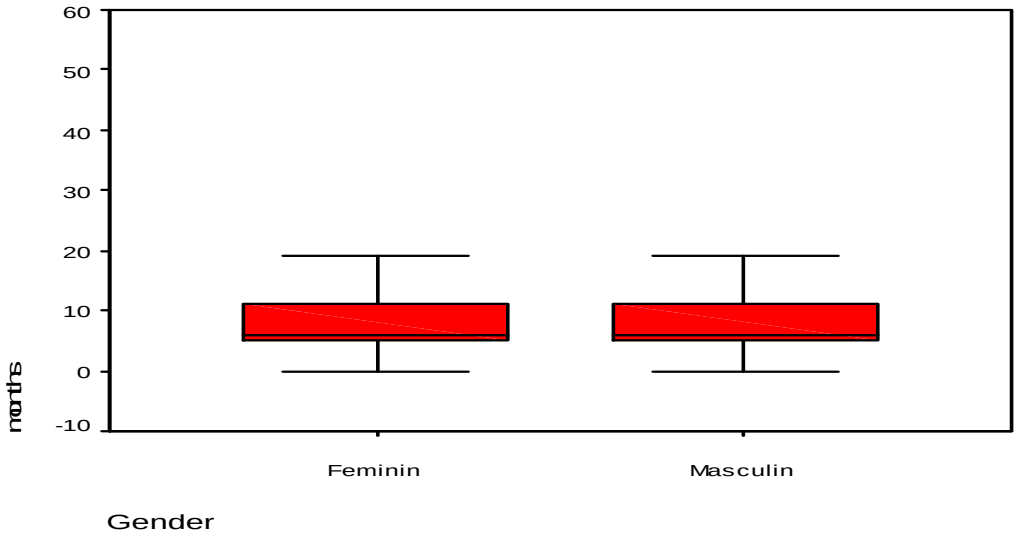


Figure 10: ***Box plot depicting the duration of unemployment spells (months) for both sexes***



As we can notice the male unemployment in Gorj County for the analyzed period is higher than the female unemployment, and for the unemployed men it lasts longer than for women (the more the unemployment period lasts, the more differences between male and female unemployment increase). Taking into account the fact that the number of women in Gorj County that are able to work is higher than the number of men, we draw the conclusion that differences between the number of women registered as unemployed and the number of men are a direct consequence of the continuous reorganisation, after 1992, of the mining sector, thermo energetic and oil tanker in the Gorj County area, with negative effects on men belonging to all educational levels, employed in these jobs. As can be seen, both from figure 10 there is a slight difference between the duration of unemployment of male and female; male have to wait approximately 9 months to get employment and women 8 months.

The average age of the persons registered in the database is of 32.58 years, and the median is of 32 years. As one can notice in figure 7, most of the unemployed registered in the database are aged between 15-35 years; the youngest subject is 15 years and the oldest is 62. The high number of young unemployed registered in Gorj County shows that young people cannot find a job after finishing their studies, as the labour market in the county is not ready to receive them. The age distribution is positively skewed (Figure 11).

Figure 11: ***Histogram for the variable age of unemployed***

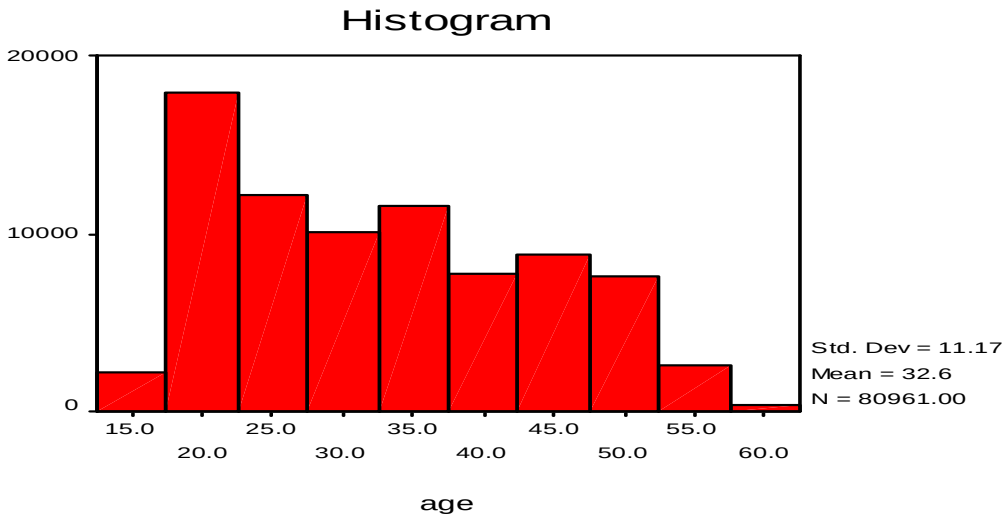
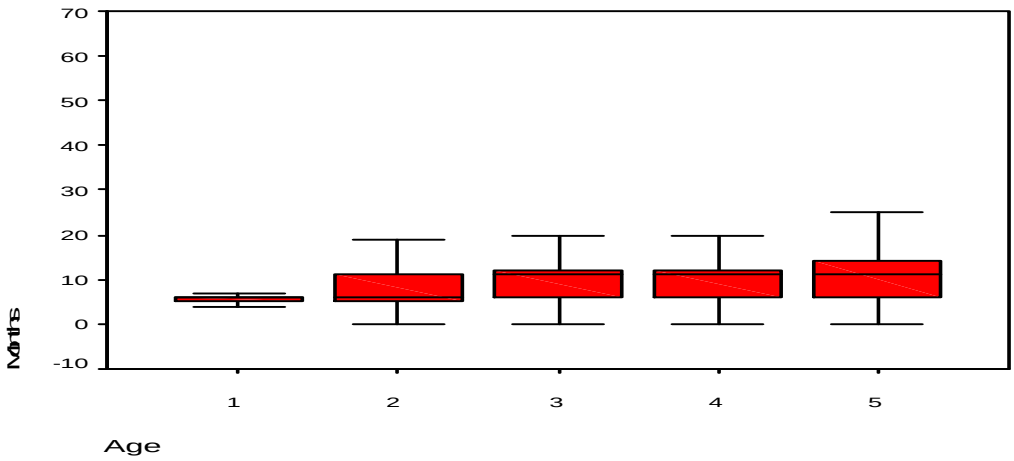


Figure 12 presents the duration of unemployment spells for five age groups. The median duration of unemployment spells increases with the age increasing. As it can be seen, the interval of duration of the unemployment spells becomes wider with age increasing: 6.03 month for 15-24 years, 9.30 for 25-34 years, 10.53 for 35-44 years, 11.17 for 45-54 years, 12.47 for 55-64 years.

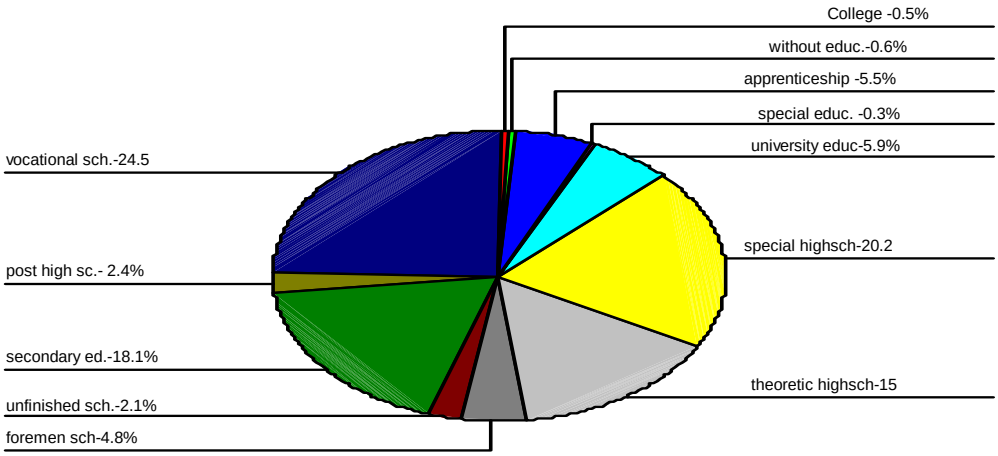
Figure 12: ***Box plot depicting the duration of unemployment spells (in months) for five age groups***



Regarding the educational level, 4816 persons (5.9%) registered in the database are university graduates, 369 (0.5%) registered persons have college as educational level, 1982 (2.4%) graduated from post high school, 16390 (20.2%) graduated from speciality high school, 12165 (15.0%) graduated from theoretical high school, 221 (0.3%) are

special education graduates, 19849 (24.5%) have vocational school, 3856 (4.8%) graduated from foremen school, 4437 (5.5%) are apprenticeship complementary education graduates, 14653 (18.1%) graduated only from secondary school, the educational level for 1703 (2.1%) is unfinished secondary school, and 520 persons (0.6%) are without education. (Figure 13)

Figure 13: ***Pie for the variable level of education***.



In Romania, the number of study years corresponding to these educational levels is: graduated secondary school – 8 years, graduated vocational school – 10 years, graduated foremen school – 14 years, graduated post high school (sanitary, economic, industrial) – 14 years, graduated theoretical high school – 12 years, graduated special education for disabled persons - 10 years, graduated speciality high school (vocational, music, sports, plastic arts high schools, pedagogical high schools, industrial high schools, agricultural high schools) – 12 years in present, but for the persons registered in the database that are aged over 40 years the number of the years of study for this education form is of 13 years, because at that time 5 years were needed in order to graduate such a high school, graduated college – 15 years, graduated tertiary education – 16 years or 17 years, according to the specialization; 5 years of study are necessary for the technical university education in Romania. We have also in our database persons registered with unfinished secondary school, with les than 8 years of study, situation in which, in the statistical analysis we have rated them with 6 years of study. There are also persons declared without education, these registrations being ascribed the value 0 for the years of study. Unfortunately the received data do not provide information about the registered unemployed post university education graduates, (master's or doctorate graduates). In data processing we have grouped persons by their educational level in 5 groups: group 0 - without graduated school, group 1- unfinished secondary school, secondary school, vocational school, apprenticeship complementary education, special education, with the

maximum number of 10 years of study, group 2- theoretical high school, speciality high school, with 12 respectively 13 years of study, group 3 – foremen school and post high school with 14 years of study and group 4 corresponding to university education, (with short form – college), with 15, 16 and respectively 17 years of study. In table 2 there is presented the distribution of the persons registered in the database by age (years) and the educational level.

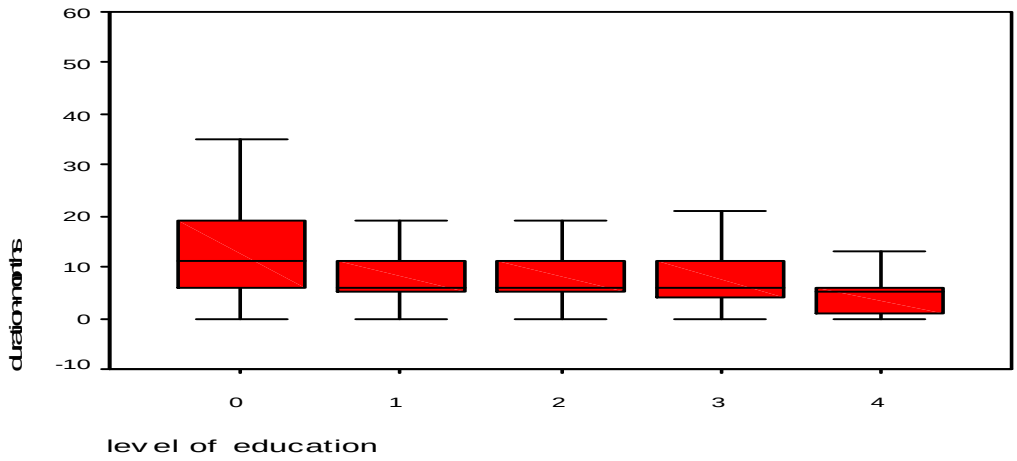
Table 2: ***Distribution of unemployed by age and educational level***

Age	Groups by educational level					Total
	0	**1**	**2**	**3**	**4**	
15-24	106	13002	9482	893	2293	25776
25-34	142	10121	8428	877	1570	21138
35-44	108	9128	7612	699	678	18225
45-54	151	8027	2764	2964	546	14452
55-64	13	585	269	405	98	1370
Total	520	40863	28555	5838	5185	80961

We can notice from the table that most of the unemployed (51.11%) are people with low educational level, (maximum 10 years of study), followed by high school graduates (theoretical or speciality high school)-35.27%. From the total of the persons registered as unemployed in Gorj County for the analyzed period, only 6.40% is represented by university graduates, education playing an important part in finding a job. Young people aged between 15-34 years and a low or average educational level register the highest values; high values are also registered by persons aged between 45-54 years and a low educational level, of maximum 10 years of study.

In order to use the box-plot as a visual aids, we have grouped educational levels as it follows: group 0 - without education; group 1: unfinished secondary school, secondary school, vocational school and apprenticeship complementary education and special education; group 2: theoretical high school, speciality high school, group 3: foremen school and post high school; group 4: college, university education. It is obvious that the duration of unemployment is higher for the lower levels of education and lower for the higher levels of education. The highest mean length of unemployment spells for the unemployed without education is approximately 13 months and the lowest mean registered is for the level four, university education, only 5 months .

Figure 14: ***Box plot depicting the duration of unemployment (in months) for different levels of education.***



In table 3 we have descriptive statistics for the duration of unemployment spells in months and the variables sex, educational level and age.

Table 3: ***Descriptive statistics for the duration of unemployment spells (in months)***

	N	Mean	Std.Dev.	95% confidence interval for the mean
Total	71145	8.82	8.74	(8.75, 8.88)
		Factor Sex		
Male	47691	9.32	9.56	(9.23-9.41)
Female	33270	8.03	7.17	(7.94, 8.11)
		Factor: Education		
Level 0 – without education	440	12.78	9.26	(11.92-13.65)
Level 1 Unfinished secondary school, secondary school, vocational school and apprenticeship complementary education Special education	35683	9.16	8.53	(9.08-9.25)
Level 2 Theoretic high school, speciality high school	25456	8.77	9.01	(8.66-8.88)
Level 3 Foremen school	5012	9.69	10.16	(9.41-9.97)

and post high school				
Level 4 college, university education	4554	5.05	5.44	(4.89-5.21)
	Factor: Age			
15-24 years	24015	6.03	6.27	(5.95-6.11)
25-34 years	18960	9.30	9.38	(9.17-9.44)
35-44 years	15338	10.53	9.31	(10.38-10.68)
45-54 years	11727	11.17	9.46	(11-11.35)
55-64 years	1105	12.47	10.56	(11.84-13.05)

We used the non-parametric Kruskal-Wallis test in order to test the null hypotheses that the mean duration of unemployment spells is the same for each of the levels of the factors sex, age and level of education. The null hypothesis is strongly rejected for each of the factors since the p-values are lower that 10^{-6}.

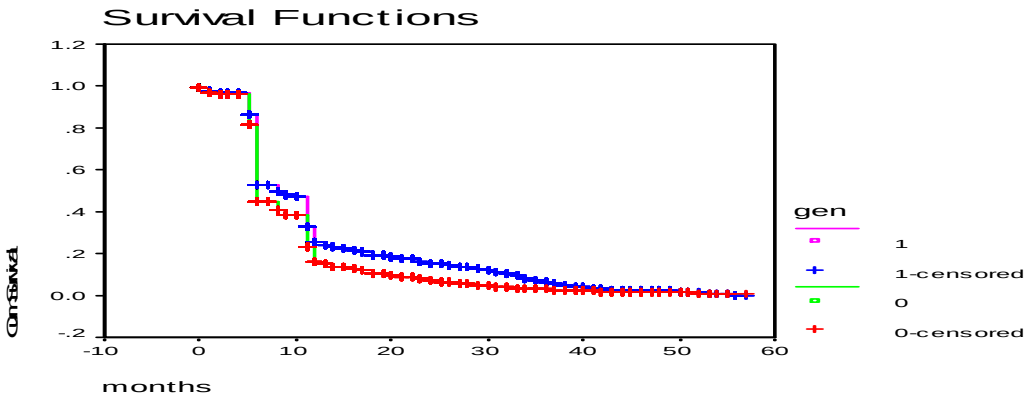
3. Kaplan Meier survival analysis

The Kaplan-Meier method is a nonparametric (actuarial) technique for estimating time-related events (the survivorship function). The Kaplan-Meier technique is usually only useful as a method of preliminary evaluation, since it is purely a descriptive method for the evaluation of one variable. The survival curve of this method is scalariform because the proportion of subjects who have the chance to continue observation without the occurrence of the pre-established event changes exactly at the moments when the pre-established event is achieved. The survival level is of 100% from the curve origin until the moment of the first occurrence of the event (employment in our case), where it drops to the new calculated value, that constitutes a new level during which survival is constant, until the next event achieved. Therefore, every step corresponds to the occurrence of one or several pre-established events.

For our survey the pre-established event is employment, this event being ascribed the value 1, the number of the subjects who achieved the event at the end of the analyzed period being of 19369, representing only 23.9% of the total of subjects; the rest of 61592 subjects representing 76.1% of the total either did not achieve the event, or their track has been lost (they don't have the date of unemployment leaving), they have been censored at the right side, being ascribed the value 0.

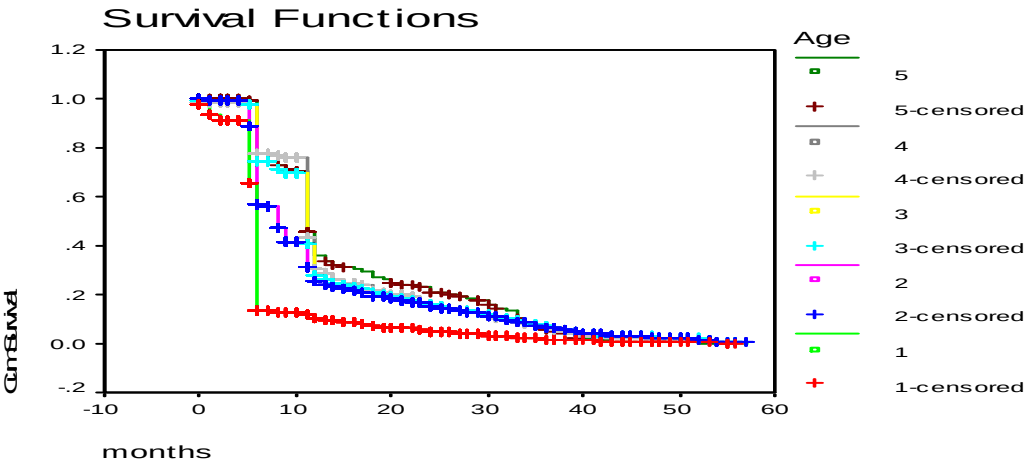
In figure 15 there is presented the survival curve for the women and men in the database. The qualitative sex variable has been codified, 1 representing men, 0 representing women. The results suggest a significant difference in probabilities of remaining unemployed between female and male (we have a higher probability of remaining unemployed for male rather than for female). The median unemployment duration for female is 10 months and for male is 13 months. After 40 months the curves coincide.

Figure 15: ***Survival function estimates for male and female unemployed***



In figure 16 there is presented the survival curve for the age groups 15-24 years, 25-34 years, 35-44 years, 45-54 and 55-64 years. Applying Kaplan-Meier analysis we have:

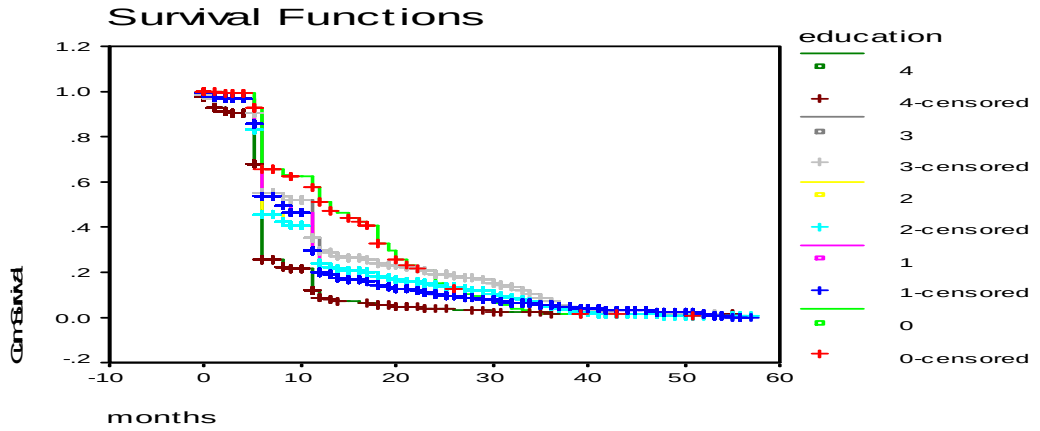
Figure 16**:** ***Survival function estimates for the age groups 15-24 years, 25-34 years, 35-44 years, 45-54 and 55-64 years***



We can notice that the probability of remaining unemployed increased with age. The older persons are at a disadvantage on the labor market of Gorj County. The median unemployment duration for the age group 15-24 years is 6 months; for the age group 24-34 years is 8 months, for the age group 35-44 years is 11 months, for the age group 45-54 is 11 months and for the age group 55-64 is 11 months. The differences observed are statistically significant.

In figure 17 there is presented the survival curve for the level of education. Applying Kaplan-Meier analysis we have:

Figure 17: ***Survival function estimates for the five groups of education***



We can notice that the probability of remaining unemployed is higher for the persons without education, followed by the persons with foremen school and post high-school and the lowest probability of remaining unemployed is for the persons with university education. For the group 4, university education level (faculty and college) the probability of unemployment at time t or later decreases much more rapidly, indicating that the unemployed with the higher education have better opportunities in the labour market of Gorj County. We can notice in the figure 17 that after 40 unemployment months curves start to coincide and the educational level no longer influences the probability of finding a job.

Testing the statistical signification for Kaplan Meier method presupposes the choice of one of the two hypotheses: the null hypothesis, which supposes that curves should be the same for two or several levels of a specified factor, or the alternative hypothesis, which supposes that they should be different. With this purpose we used the log rank test with Chi-Squared distribution under the null. For all three factors, the highly significant p-values (lower that 10^{-6}.) confirm the results derived graphically from the Kaplan-Meier estimates of the survival functions.

4. Cox analysis

In order to study the impact of the level of education on the length of unemployment spells in Gorj County, we used the Cox proportional hazard model. The hazard function is the probability that an event occurs at time t, conditional on it has not occurred till that time. The hazard function suggested by Cox is $h_i(t) = e^{x_i'\beta} h_0(t)$, where x_i represents the covariate values, β represents the regression coefficients, $h_i(t)$ is the hazard function and $h_0(t)$ is the baseline function. In Table 4 are given the results of the omnibus tests of the model coefficients (using SPSS 10.0). The score chi-square statistic and the likelihood ratio show the fact that we can reject the null hypothesis.

Table 4: ***Omnibus tests of the model coefficients***

-2 Log Likelihood	Overall (score)			Change From Previous Step			Change From Previous Block		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
224183,716	694,546	9	,000	625,135	9	,000	625,135	9	,000

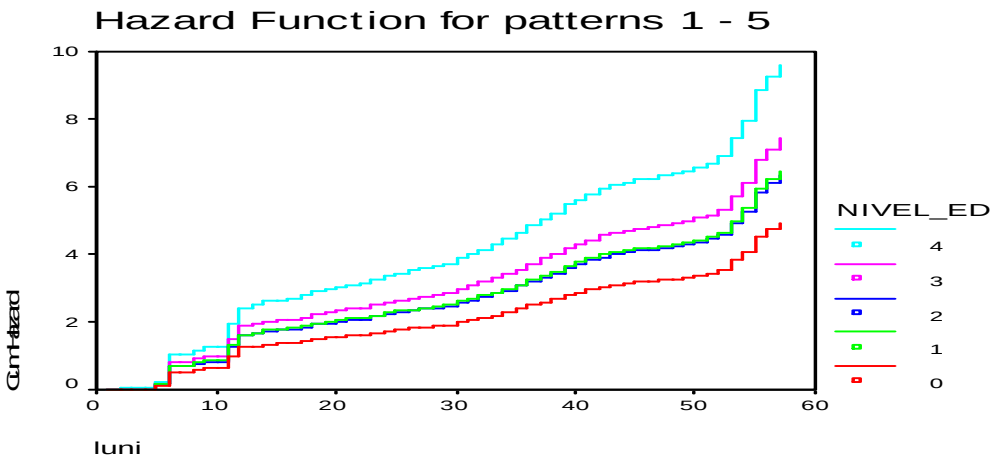
In Table 5 are presented the results of the Cox regression analysis B is the estimate vector of the regression coefficients. Exp(B_p) is the predicted change in the hazard for each unit increase in the covariate.

Table 5: ***Variables in the equation***

	B	SE	Wald	df	Sig.	Exp(B)	95,0% CI for Exp(B)	
							Lower	Upper
Age	-,002	,009	0.041	1	,000	,998	,981	1.016
Sex	-,151	,021	54,002	1	,000	,860	,826	,895
Education			428,441	4	,000			
Education(0)	-1,284	,143	80,382	1	,000	,277	,209	,367
Education(1)	-,745	,038	387,847	1	,000	,475	,441	,511
Education(2)	-,748	,039	368,430	1	,000	,473	,438	,511
Education(3)	-,701	,051	191,203	1	,000	,496	,449	,548

As we can notice from table 5 the hazard for the unemployment spell to end is 14% lower for the female unemployed that for the male unemployed. With increased age, the hazard is reduced by 0.2% each year. All other levels of education yield significant hazard ratios of less than 1 with a decreased risk for the unemployment spell to end. The hazard ratio is the lowest for the level 0 - without education - 0.209 and the highest for level 3 - foremen school and post high school (0.496). As we expected, the hazard ratio increased with higher levels of education. We can notice the fact that the hazard ratio for the level 1 - unfinished secondary school, secondary school, vocational school and apprenticeship complementary education,special education is slightly higher than for the level 2- theoretic high school, speciality high school. The cumulative hazard functions for different levels of education are presented in Figure 18.

Figure 18 . Cumulative hazard functions for different levels of education



5. Conclusions

The aim of this paper is to present some of results of research within ASO grant "The Role of Education for the Duration of Unemployment". Although the Romanian research team filed an application to NAE in June 2006, in order to obtain data for the whole country, at the end of August 2006 we received only the database for one county, the Gorj County.

Survival analysis of the duration of unemployment spells give the following results:

In respect of the duration of unemployment, persons with university education level remain unemployed for 5 months on the average, unlike persons without education, who remain unemployed for 13 months on the average, and persons with maximum 10 years of study, who remain unemployed for 9 months on the average. As for age, for the group 15-24 years 20.75% leave unemployment by becoming employed, 30.76% of the young people aged between 25-34 years registered in the database leave unemployment by becoming employed, 32.07% of the persons aged between 35-44 years become employed during the analysed period, 28.82% is the percent corresponding to the age group 45-54 years respectively 23.07% for the age group over 55 years. The age group 15-24 years is disadvantaged on the labour market by the lack of experience, a considerable number of them become unemployed after graduation. But the duration of unemployment is on the average the smallest for the age group 15-24 years, 6 months, compared to 9 months for the group 25-34 or 13 months for the group over 55 years. Regarding the variable gender, of 33270 women registered in our database 19.21%, leave unemployment by becoming employed and of 47691 men registered 27.21% leave unemployment by becoming employed. But the duration of unemployment is smaller for women with about a month on the average.

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