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(RE)EMPLOYMENT PROBABILITY OF LONG-TERM UNEMPLOYED PEOPLE IN ROMANIA – A MULTINOMIAL LOGISTIC REGRESSION APPROACH

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ABSTRACT
The aim of this paper is to analyze the (re)employment probability of long-term unemployed individuals during 2009-2010. A dataset with 270235 registered unemployment spells is used and the effect of individual characteristics for the (re)employment chance is analyzed using multinomial logistic regression.

Keywords: employment, odd, logistic regression
JEL Classification: J64, J21

I. INTRODUCTION

The aim of this research is to analyze the (re)employment probability of individuals registered as unemployed for six months or more at the National Agency of Employment Bucharest, during the period 2009-2010. There are 338631 long-term spells registered in the 2009-2010 period in Romania. Since we focused on the (re)employment probability, for the econometric analysis we dropped the spells deactivated due to death of individuals, deactivated due to retirement, ongoing spells or spells with an unclear reason for deactivation. We also dropped the individuals with an unknown level of education. The final dataset has 270735 completed spells, with information about gender of individuals, age, education, county, urban or rural area of living, marital status, if the individual received unemployment allowance during his/her current spell or not, if the individual is a first time job-seeker or he/she has previous work experience, if the individual has a disability or not.

A registered unemployment spell ends at the moment when is deactivated from the system. Finding a job, enrolling in a form of education, expiry of the legal period for receiving

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unemployment allowance, going abroad, maternity, etc., are reasons for deactivation. After processing the initial data we still have 20 different reasons for deactivation in our dataset. We created a variable named "*status*" that represents the status of an individual at the deactivation time. An individual at the moment of deactivation can be short-term (re)employed (for less than 12 months), long-term (re)employed (for more than 12 months) and inactive on the Romanian labor market. This categorical variable is the endogenous variable of our study. The explanatory variables are presented in table 1 from the appendix. Multinomial logistic regression is used to estimate the effect of the explanatory variables on the endogenous "*status*".

II. DATASET DESCRIPTION

Out of all 270735 long-term spells, 6,2% were deactivated due to short-term (re)employment, 24,9% were deactivated due to long-term (re)employment and 68,9% were deactivated because other reasons than (re)employment, and these individuals are inactive on the Romanian labor market. The distribution by gender is the following: 37,6% of spells belong to women and 62,4% belong to men. In figure 1 from the appendix we have the distribution by age groups of the long-term spells; we can notice that most of the long-term unemployed are aged in between 35 years and 54 years. 2,8 % from the total spells belong to very low educated individuals (without education or with less than 8 years of study), 24,9% spells belong to gymnasium graduates, 2,9% belong to apprentice schools, 32,7% of the spells belong to individuals who graduated vocational schools, 27,2% for high-schools, 0,1% for special education (for individuals with disabilities), 1,6% for foremen school, 1,1% for post-high-schools and 6,7% of the spells belong to individuals who graduated higher education (short-term, college, or long-term higher education).

In the initial dataset we had information about counties from where the individuals reside. Because we have too many counties in Romania and we cannot use the variable counties in the econometrical analysis, we created a new variable, region, according to the regulation of Romanian administration. The distribution of the spells by region is presented in figure 2 from the appendix. Out of all 270735 long-term spells, 37,3% belong to individuals from rural area and 62,7% spells belong to individuals from urban area. 4,5% of the spells belong to individuals with an unknown marital status, 11,5% belongs to unmarried individuals, 78,8% to married individuals, 4,3% to widowed individuals and 1% to divorced individuals. 98,9% of the total spells belong to individuals who received unemployment allowance during their current spell, and only 1,1% belong to individuals without unemployment allowance. 96,4% of the spells belong to individuals with previous work experience and only 3,6% to individuals without previous work experience. Also, 99,9% of the spells belong to individuals with a normal health condition and only 0,1% are disabled individuals.

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III. MULTINOMIAL LOGISTIC REGRESSION RESULTS

Since our endogenous variable is categorical, we will use the multinomial logistic regression to analyze the effect of exogenous variables on (re)employment probability for long-term unemployed individuals. Because on the dataset structure, we didn't use in the econometrical analysis the following explanatory variables: unemployment allowance, previous work experience and health status.

The data were computed with SPSS 17.0 software. All the other explanatory variables were simultaneously analyzed. Last category, inactivity at the deactivation moment is the reference category. In table 2 from the appendix are presented the results of multinomial logistic regression analysis. Wald test results show us that the regression coefficients are non-negative. The estimated values of regression parameters are denoted by *B;* odds ratio for every explicative variable is given by *Exp (B).*

As we can notice from table 2, regression coefficient for women is negative when **status=short-term (re)employment,** thus long-term unemployed women, compared with men are less likely to exit from unemployment due to short-term (re)employment than to go in inactivity. Analogue, the regression coefficient for women is negative when **status=long-term (re)employment,** meaning that women, compared to men are less likely to exit in long-term (re)employment than going in inactivity, and the probability is even higher than for short-term (re)employment. Dănăcică and Mazilescu (2012) proved that long-term unemployment women have a 18,2% lower (re)employment hazard rate than men, for 2008-2010 period.

All the long-term unemployed individuals aged in between 15 and 54 years, compared with those aged in between 55 and 65 years are more likely to exit from unemployment in short-term (re)employment than going in inactivity. The highest short-term (re)employment probability is registered from individuals aged in between 15 and 24 years. Same situation we have for **status=long-term (re)employment**, however the gap between 15-24 group and the other age groups are less pronounced. The result is highly significant.

For the explanatory education, we have interesting results. An individual long-term unemployed who graduated gymnasium, compared with one who has less than 8 years of study is less likely to exit in short-term (re)employment than to go in inactivity; the result is highly significant. As we expected, individuals who graduated post-high-school, foremen school and a higher education (long-term or short-term), compared with very low educated individuals, are more likely to go in short-term (re)employment than inactivity. However if we are looking at their confidence intervals we can notice that there is no statistically significance for the differences between the odds of short-term (re)employment of an individual who graduated a higher education, one who graduated foremen school or one who graduated post-high-school.

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For the other educational groups we didn't have statistically significance when comparing with very low educated individuals. But when the **status=long-term (re)employment,** we have a different picture: all the education groups have positive regression coefficients, meaning that very low educated individuals have the lowest probability to exit in long-term (re)employment. Individuals who graduated a higher education have the highest probability to exit in long-term (re)employment. The result is statistically significant.

Long-term registered unemployed living in South-West region have the lowest probability to exit in short-term (re)employment. The result is highly significant. When **status =long-term (re)employment**, except South-Muntenia, all the other regions have positive regression coefficients, meaning that individuals living in these regions, compared with those living in South-Oltenia, are more likely to exit in long-term (re)employment than in inactivity. For Bucharest we don't have significance. An individual living in South-Muntenia region has the lowest long-term (re)employment at the deactivation time.

An unemployed living in rural area, compared with one from urban area is less likely to exit in short-term (re)employment than going in inactivity. For status=long-term (re)employment, as we can see from table 3, we have the same situation, however the difference between urban and rural area is slightly lower in the case of long-term (re)employment.

When **status=short-term (re)employment**, we didn't have significance for the differences between the odds of reemployment for unmarried, married, widowed and divorced individuals. As we expected,a married individual, compared with a divorced one is more likely to exit in long-term (re)employment than in inactivity, and the result is significant.

IV.CONCLUSIONS

The aim of this research of to analyze the (re)employment chances of long-term unemployed individuals registered at National Agency of Romania during 2009-2010. Based on the multinomial logistic regression analysis results we can formulate the following conclusions:

- The chances to exit from unemployment in short-term (re)employment than to exit in inactivity decrease

with 24,4% for women compared with men. A woman, compared with a man is less likely to exit in long-term (re)employment than inactivity. However the gap between men and woman is lower in the case of long-term (re)employment than short-term (re)employment.

- As younger an individual is, as higher are his/her chance to exit in short-term or long-term (re)employment.

The gap between age groups is higher for short-term (re)employment than for long-term (re)employment.

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- Education has a significant effect on (re)employment probability of long-termunemployed individuals.

Individuals who graduated post-high-school, foremen school and a higher education (long-term or short-term), compared with very low educated individuals, are more likely to go in short-term (re)employment than inactivity, however there are no statistically differences between their odds. In the long-term (re)employment case, we have a different situation, as higher is the level of education, as better is the prospectus of leaving unemployment for a long-term job.

- Region and rural area of living have a significant effect on (re)employment chance too. An individual

living in rural areas of Romania, compared with one from the urban areas is more likely to exit in inactivity than in short-term or long-term (re)employment, at the deactivation time.

REFERENCES

- Addison, J. and Portugal, P. (2003), Unemployment duration; Competing and defective risks. Available at: ftp://repec.iza.org/RePEc/Discussionpaper/ dp350.pdf
- Apostolache, M. A (2013), Protecţia reală a intereselor financiare ale României şi Uniunii Europene - factor important al dezvoltării economice şi al creşterii bunăstării societăţii româneşti, Ed. Expert, Bucureşti.
- Apostolache, M. A., Apostolache M. C. (2010), Aspects regarding regionalism and regionalization, Buletinul Universităţii Petrol-Gaze din Ploieşti, Seria Ştiinţe Socio-Umane şi Juridice, Nr.1, pp.37-42.
- Böheim, R. and Taylor, M. P. (2000). Unemployment Duration and Exit States in Britain, CEPR Discussion Papers 2500, C.E.P.R. Discussion Papers
- Dănăcică, D.E. (2010), Employed or Unemployed? An Empirical Analysis of Romanian Labor Market, Studia Universitatis Babeş-Bolyai, Oeconomica, Volume 55, Issue 2. pp. 76-86.
- Dănăcică, D.E., Mazilescu, R., (2012), Characteristics of Long-Term Unemployment Spells in Romania, Annals of Constantin Brâncuşi University, Economy Series, vol 4II, pp.122-129.
- Lancaster, T., Nickell, S. (1980), The Analysis of Re-Employment Probabilities for the Unemployed, Journal of Royal Statistical Society, series A, 143 (2), pp. 141-165.
- Moffitt, Robert A. (1999), New Developments in Econometric Methods for Labour Market Analysis. In: Handbook of Labor Economics, Eds. O. Ashenfelter and D. Card. Amsterdam: North Holland.
- Mortensen, D. T. (1986). Job search and labor market analysis. In Handbook of Labor Economics,volume 2 of Handbook of Labor Economics, chapter 15, pp. 849–919.

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- Narendranathan, W. & Stewart, M. (1993), Modeling the Probability of Leaving Unemployment: Competing Risks Models with Flexible Baseline Hazards. Applied Statistics – Journal of the Royal Statistical Society SeriesC 42(l), pp. 63-83.

APPENDIX

TABLE 1. *DEFINITION OF EXOGENOUS VARIABLES*

Exogenous variables	Definition
Gender	Dummy variable, 0-women, 1-men
Age	[15-24], [25-34], [35-44], [45-54], [55-65]
Education	Qualitative variable at first, with the following categories:1-gymnasium, 2-apprenticeship complementary education, 3-vocational school, 4-theoretical high-school, 5-special education (for people with disability), 6-foremen school, 7-post-high-school, 8-university education (short-term college or long-term university) and 9 -without education, primary education or incomplete gymnasium
Region of living	Categorical variable 1- North-East Region, 2 – West Region, 3- North-West Region, 4- Central Region, 5- South-East Region, 6- South-Muntenia, 7 – Bucharest-Ilfov Region and 8 – South-West Oltenia Region.
Area of living	Dummy variable, 0-rural, 1-urban
Marital status	Categorical variable 1-unknown status, 2- unmarried, 3-married, 4-widowed, 5-divorced

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FIGURE I. *DISTRIBUTION OF LONG-TERM UNEMPLOYMENT SPELLS BY AGE GROUPS*

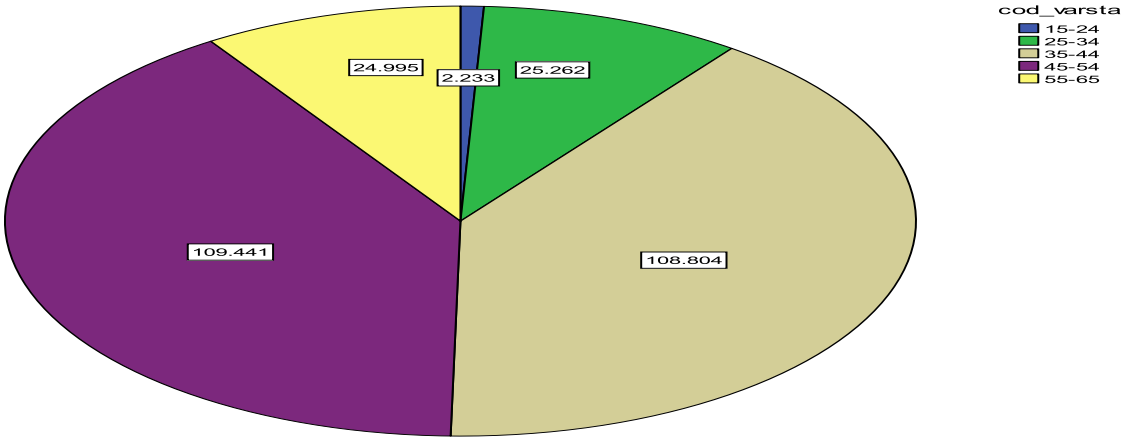

FIGURE II. *DISTRIBUTION OF LONG-TERM UNEMPLOYMENT SPELLS BY REGION*

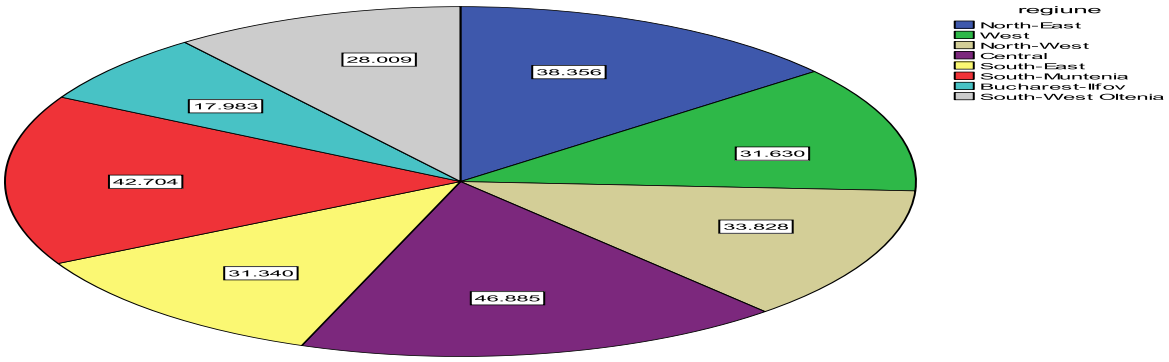

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TABLE II. *MULTINOMIAL LOGISTIC REGRESSION RESULTS*

Endogenous Variable		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Short-term (re) employment	Intercept	-3,408	,113	903,229	1	,000			
	Women	-,280	,018	242,631	1	,000	,756	,730	,783
	Men	0[b]	.	.	0	.	.	.	.
	15-24	2,120	,070	906,469	1	,000	8,329	7,256	9,562
	25-34	,967	,042	539,304	1	,000	2,630	2,424	2,854
	35-44	,826	,036	525,978	1	,000	2,284	2,129	2,452
	45-54	,476	,036	174,178	1	,000	1,610	1,500	1,727
	55-65	0[b]	.	.	0	.	.	.	.
	Gymnasium	-,141	,051	7,667	1	,006	,869	,786	,960
	Apprenticeshipeducation	-,063	,066	,886	1	,347	,939	,825	1,070
	Vocational school	-,055	,050	1,220	1	,269	,946	,858	1,044
	High-school	-,043	,051	,712	1	,399	,958	,867	1,058
	Special edu	,024	,241	,010	1	,921	1,024	,639	1,643
	Foremen school	,159	,080	4,007	1	,04	1,173	1,003	1,371

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						5			
	Post-high-school	,241	,085	7,989	1	,005	1,273	1,077	1,505
	University education	,280	,056	25,136	1	,000	1,323	1,186	1,476
	Less than 8 years of study	0[b]	.	.	0	.	.	.	.
	North-East	,189	,038	25,117	1	,000	1,208	1,122	1,301
	West	,627	,037	294,334	1	,000	1,872	1,743	2,011
	North-West	,195	,039	25,561	1	,000	1,216	1,127	1,311
	Central	,482	,035	189,215	1	,000	1,619	1,512	1,734
	South- East	,458	,038	148,289	1	,000	1,581	1,469	1,702
	South-Muntenia	,538	,035	236,884	1	,000	1,713	1,600	1,835
	Bucharest- Ilfov	,586	,041	202,966	1	,000	1,798	1,658	1,949
	South-Oltenia	0[b]	.	.	0	.	.	.	.
	Unknown	,136	,103	1,756	1	,185	1,146	,937	1,402
	Unmarried	,097	,098	,978	1	,323	1,102	,909	1,336
	Married	,165	,096	2,971	1	,085	1,179	,978	1,422
	Widowed	,095	,103	,847	1	,357	1,099	,899	1,345
	Divorced	0[b]	.	.	0	.	.	.	.
	Rural	-,170	,018	89,921	1	,000	,843	,814	,874
	Urban	0[b]	.	.	0	.	.	.	.
Long-term	Intercept	-	,060	798,72	1	,00			

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(re) employment		1,708		0		0			
	Women	-,182	,010	330,526	1	,000	,833	,817	,850
	Men	0[b]	.	.	0	.	.	.	.
	15-24	1,084	,052	437,978	1	,000	2,957	2,671	3,273
	25-34	,402	,022	325,433	1	,000	1,494	1,431	1,561
	35-44	,408	,018	525,106	1	,000	1,504	1,452	1,557
	45-54	,239	,018	184,864	1	,000	1,270	1,227	1,314
	55-65	0[b]	.	.	0	.	.	.	.
	Gymnasium	,139	,031	20,310	1	,000	1,149	1,081	1,220
	Apprenticeshipeducation	,153	,040	14,798	1	,000	1,166	1,078	1,261
	Vocational school	,228	,030	55,899	1	,000	1,256	1,183	1,333
	High-school	,269	,031	76,542	1	,000	1,309	1,233	1,391
	Special education	,398	,134	8,800	1	,003	1,489	1,145	1,936
	Foremen school	,323	,046	48,371	1	,000	1,381	1,261	1,512
	Post-high-school	,377	,052	53,154	1	,000	1,458	1,317	1,613
	University education	,482	,034	201,122	1	,000	1,619	1,515	1,730
	Less than 8 years of study	0[b]	.	.	0	.	.	.	.
	North-East	,117	,019	39,503	1	,000	1,124	1,084	1,165
	West	,138	,020	50,249	1	,00	1,148	1,105	1,193

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						0			
	North-West	,217	,019	132,679	1	,000	1,242	1,197	1,289
	Central	,241	,018	185,295	1	,000	1,273	1,230	1,318
	South- East	,078	,020	15,808	1	,000	1,081	1,040	1,124
	South-Muntenia	-,045	,019	5,872	1	,015	,956	,922	,991
	Bucharest- Ilfov	,020	,023	,726	1	,394	1,020	,975	1,067
	South-Oltenia	0[b]	.	.	0	.	.	.	.
	Unknown	,069	,054	1,599	1	,206	1,071	,963	1,191
	Unmarried	-,013	,052	,063	1	,802	,987	,892	1,093
	Married	,192	,050	14,894	1	,000	1,212	1,099	1,337
	Widowed	,007	,054	,018	1	,892	1,007	,905	1,121
	Divorced	0[b]	.	.	0	.	.	.	.
	Rural	-,117	,010	138,432	1	,000	,890	,872	,907
	Urban	0[b]	.	.	0	.	.	.	.

a. The reference category is: inactivity

b. This parameter is set to zero because it is redundant.