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Danacica, Daniela-Emanuela and Babucea, Ana-Gabriela

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The Role of Education for the Duration of Unemployment in Gorj County

Daniela-Emanuela DĂNĂCICĂ

Faculty of Economics, Constantin Brancusi University of Târgu-Jiu, România

Ana-Gabriela BABUCEA

Faculty of Economics, Constantin Brancusi University of Târgu-Jiu, România

Abstract

În această lucrare sunt prezentate rezultatele proiectului internațional ASO “Rolul Educației asupra duratei șomajului” pentru județul Gorj. Folosind ca metodologie metoda Kaplan-Meier precum și Cox’s proportional hazard model, acest proiect raspunde la intrebarea: nivelul educațional influențeaza durata șomajului în economiile observate? De asemenea, este estimată și influența vârstei precum și a genului asupra duratei șomajului.

Abstract

In this paper are presented the results of the ASO international project “The Role of Education for the Duration of Unemployment” for Gorj County. Using techniques to estimate models for duration data, like the Kaplan Meier method and Cox’s proportional hazard model, this project answer to the following question: does the education level influence the duration of unemployment in Gorj County? The influences of age and gender on duration of unemployment spells are also estimated.

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Database description

Statistical data analysis, as part of the project “The Role of Education for the Duration of Unemployment” is based on data offered by the National Agency for Employment of Romania (NAE). 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

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%).

The minimum duration for unemployment spells is– 0 months and its maximum duration is 57 months, with an average of 8.8 months and median of 6 months. 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 for the analyzed period.

Analyzing the empirical data we noticed that 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. 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. 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.

As for the variable level of education, 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.

We have also in our database persons registered with unfinished secondary school, with less 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. 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. We noticed 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 table 1 we have descriptive statistics for the duration of unemployment spells in months and the variables sex, educational level and age.

Table 1: *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, | 35683 | 9.16 | 8.53 | (9.08-9.25) |

| | | | | |
|---|-------|-------|-------|---------------|
| vocational school and apprenticeship complementary education | | | | |
| Special education Level 2 | 25456 | 8.77 | 9.01 | (8.66-8.88) |
| Theoretic high school, speciality high school | | | | |
| Level 3 | 5012 | 9.69 | 10.16 | (9.41-9.97) |
| Foremen school and post high school | | | | |
| Level 4 | 4554 | 5.05 | 5.44 | (4.89-5.21) |
| college, university education | | | | |
| 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) |

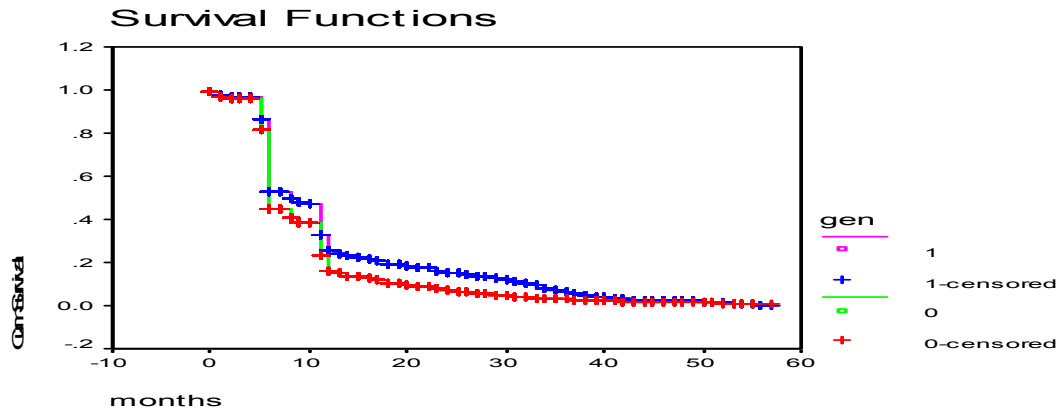
We used the non-parametric Kruskal-Wallis test in order to test the null hypotheses that the mean duration of unemployment spells is the same for each of the levels of the factors sex, age and level of education. Since the p-values are lower than 10^{-6} for each factor, the null hypothesis is rejected.

2. Kaplan Meier survival analysis

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.

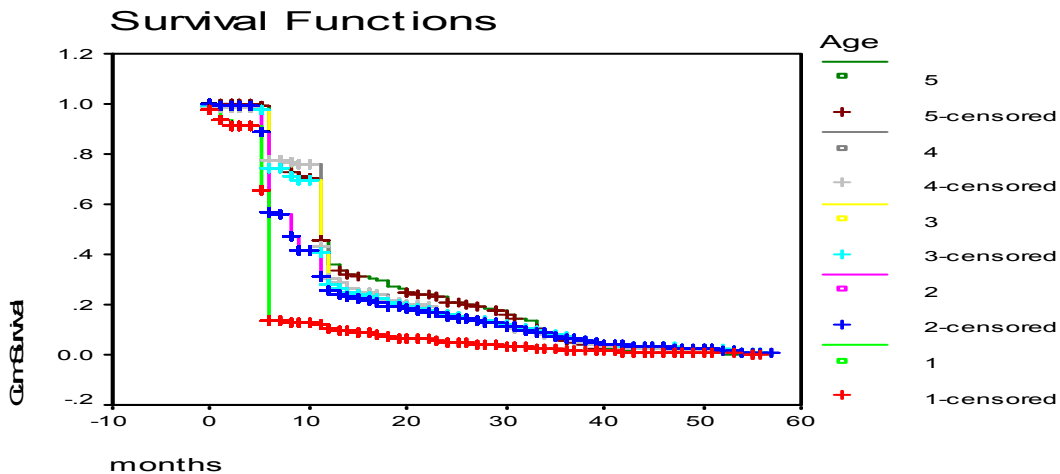
In figure 1 there is presented the survival curve for the women and men in the database. The qualitative sex variable has been codified, 1 representing men, 0 representing women. The results suggest a significant difference in probabilities of remaining unemployed between female and male (we have a higher 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 1: *Survival function estimates for male and female unemployed*



In figure 2 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:

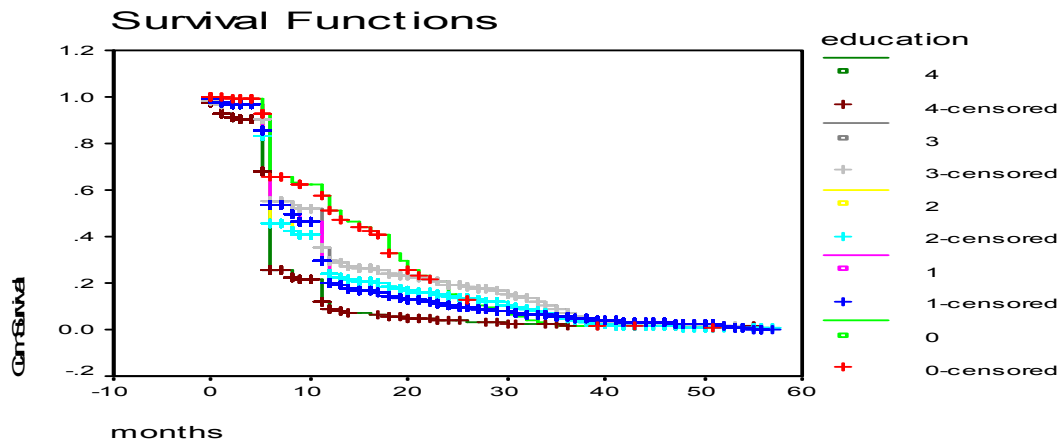
Figure 2: *Survival function estimates for the age groups 15-24 years, 25-34 years, 35-44 years, 45-54 and 55-64 years*



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

Figure 3: *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 3 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.

3. Cox analysis

In order to study the 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, $h_t(t)$ is the hazard function and $h_0(t)$ is the baseline function. In Table 2 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 2: 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 3 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 3: 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 3 the hazard for the unemployment spell to end is 14% lower for the female unemployed than 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.

Conclusions

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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