Education-Job Match among Romanian University Graduates
A Gender approach

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Abstract: In this paper we use micro-data from a national-wide survey conducted in 2008 by NRILSP and CURS to investigate the labor market entry and early career process for the university graduates. In particular, we want to investigate the factors that affect the odds of job matching. We focus strictly on the personal incentives, making a gender distinction. For this we employ the standard logistic model. The data are interpreted in concordance with the random utility models. This approach assumes that the decision maker has a perfect discrimination capacity, so the choice is the result of its preference.

Key-Words: Occupational sex segregation, School-to-work transfer, choice models, random utility models, logistic model

1 Introduction
During the last two decades participation in higher education increased significantly in Romania. Thus, according to LFS data the share of university graduates in active population almost doubled between 1997 and 2008 from 7.9% to 14.3%.

Romanian economy had to face rapidly changing requirements associated at the beginning with an in-depth transition from plan to market and then with high rates of economic growth between 2000 and 2008. Job creation during the last decade was mainly concentrated in economic activities and occupations placed on the low part of the value added chain. Thus, it became more and more obvious that the demand side and the supply side of the Romanian labor market followed different pathways of development. Job mismatch and the need to adequate initial and vocational education with labor market demand were put on the top of both education and employment policy agenda. Labor market analysts evidenced an increasing mismatched on the Romanian labor market, where surpluses and deficits of labor force coexists at regional level (Pirciog, Ciuca, Blaga, 2006, p.139).

During the last couple of years more emphasize was put on increasing the quality of higher education in Romania, while the insertion of graduates in adequate workplaces became a core indicator for assessing universities and their curriculum. From this point of view, the present paper is the first one in Romania, aiming at a better understanding of the education-job match among those with tertiary education and its determinants. As Romanian labor market is still segmented from a gender perspective, with industry and construction still being traditional male dominated, while services are female dominated, so, another aim of the present paper is to find if there are different patterns of labor market insertion for women and men with tertiary education.

1.1 Theoretical background at a glance
The European Commission’s initiative “New Skills for New Jobs” emphasize the need to better anticipate and match labor market and skills needs, with other words it prioritize the need to increase the education-job match. From the individual point of view, matching skills means employability, better prospects of carrier development and better protection against unemployment risks. On the other hand, from the economic point of view matching skills implies higher productivity, competitiveness and innovation in the EU area. (EC, 2009, p.10). At EU level, the concept of “education-job match” refers to a situation of consistence between workers acquired and required skills, that is in fact in line with job-matching theories.

There are three main labor market theories addressing job match/mismatch: human capital theory, credentialism theory and job-matching theory (Boudarbat, Chernoff, 2010, p.3-5). According to human capital theory education-job mismatches are transitory and are parts of an efficient labor market, where skills are constantly upgraded in order to advance in career The above mentioned theory also leads to the idea that policy intervention is required only when job mismatches become persistent (CEDEFOP, 2009, p.14).

Credentialists argue that most of skills are acquired on job, so education is just a proxy that employers are using in order to asses the future trainability of employers (Boudarbat, Chernoff, p.4).
Job-matching theory postulates that the degree of consistence between acquired and required skills correlates with workers productivity, earnings and turnover (Sattinger, 1993, p.31).

Large number of studies focused on education-job match and its determinants and their conclusions were sometimes divergent, according to the specific economy/labor market that is scrutinized. Some authors argued that occupation specific programs leads to a higher match, while others evidenced that general skills increase the match in specific fields. Some authors pointed out that a full time job leads to a better match, while others emphasized that job matching increases in temporary contracts (Boudarbat, Chernoff, p.6).

2 Data, variables and model specification
In this section, we describe the micro-data used for the analysis of job matching of university graduates and also the variables included in the model. Then, we summarize the random utility models (RUMs) and the standard logistic model.

2.1 Data and variables
To develop a education-job match choice model for the Romanian university graduates we used micro-data collected in a national survey carried out in Nov.2008 – Jan. 2009. The survey was designed to investigate the labor market entry process and early career process of the Romanian university graduates, 1, 3, respectively 5 years after graduation. The records cover individual characteristics of the university graduate (decision-maker) about capital accumulation before and after graduation, family background, personal characteristics as age, sex, place of residence etc., details about the current employment status and all the jobs before and after graduation.

The survey used snowballing sampling technique, with several stating points in each county, due to the lack of consistent statistics on graduates of higher education (university and college). In order to balance the bias introduced by the snowballing technique the sample was stratified on educational profile of graduates.

93.8% of university graduates interviewed were employed at the moment of survey investigation. The high insertion rate of university graduates is explained on the one hand by the bias induced by snowballing techniques that lowers the probability to reach out non-employed persons. On the other hand the survey was carried out when the Romanian economy was still growing and the characterized by a growing demand and labor force deficits. Thus, we have to underline that our analyses is carried out on a specific labor market context with low unemployment rate and high speed of filling vacancies and jobs that were generated.

From the sample used in our study we selected only the individuals that were employed in October, 2008 and no older than 35 years. The database we used contains 1614 employees from which 59% are women and 41% men.

Table 1: Investigated university graduates by education-job match/mismatch and gender (N=1614)

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Job match</td>
<td>72.7%</td>
<td>76.2%</td>
<td>74.8%</td>
</tr>
<tr>
<td>Job mismatch</td>
<td>27.3%</td>
<td>23.8%</td>
<td>25.2%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

74.8% of surveyed university graduates declared that they jobs matches their acquired education. Job-matching seems to be slightly higher among female graduates than male. It is more probable to find women in the public sector (public administration, education, health care), where employment procedures are more rigorous and education-job match is usually higher. Also, it is more probable for man to try to take advantage of increasing earning opportunities in those sectors in demand, sometimes in mismatched jobs.

The observed dependent variable is where the decision maker chooses to accept or not a job related to his education and how this option varies along genders. To understand the choice of the decision-maker, we considered thirteen explanatory variables (which, as we see below, captures the deterministic part of the utility function of the decision-maker). We summarized them in three main groups: education (field of studies, type of college, post-graduate education and the year when they graduated), demographic (marital status, father's level of education, the social environment they grey up) and employment (work experience during undergraduate years, time lapse until finding the first significant job after graduation, number of jobs before the current one, methods used to find employment, full-time vs. part-time, permanent vs. temporary job).

2.2 The Random Utility Model
Let the university graduate \(i\), \(i = 1, \ldots, n\), where \(n\) is the size of the population, faces a choice amongst two mutually exclusive alternatives: (a) accept a job related to his/her university education and (b) accept a job in different domain. Each alternative from the choice set gives the decision maker \(i\) a certain degree of well-being (certain wage, work responsibilities and activities, more or less schedule flexibility etc.), which is expressed by the utility functions \(U_{a}^{i}\) and \(U_{b}^{i}\).
The utility functions are composed of a deterministic part \((V^i_a, V^i_b)\), which captures the influence of the explanatory variables observed by the analyst and a random component \((\varepsilon^i_a, \varepsilon^i_b)\), which captures the unobserved part by the analyst. The last component, according to Manski is determined by several sources of uncertainty: unobserved attributes of the already considered explanatory variables, unobserved individual variations among the attributes ("unobserved taste variations"), measurement errors and proxy. All these uncertainties make the decision maker's option impossible to predict exactly.

Even though, we consider that the decision maker acts rationally and selects the alternative that provides him the highest value of the utility function. For our situation, we consider that the dependent variable \(y\) equals 1 if there is a match between the job and the college degree and 0 otherwise. We appreciate that the choice probability for individual \(i\) that decides to work in the field he/she has the degree, has the mathematical expression:

\[
Pr\left[Y = 1\mid x\right] = Pr\left[U^i_a > U^i_b\right] = Pr\left[V^i_a + \varepsilon^i_a > V^i_b + \varepsilon^i_b\right] = Pr\left[\varepsilon^i_b < V^i_a - V^i_b + \varepsilon^i_a\right] = \int_{-\infty}^{\infty} \left(\int_{-\infty}^{\infty} f_{\varepsilon_a}(\varepsilon^i_a) f_{\varepsilon_b}(\varepsilon^i_b) \, d\varepsilon^i_b\right) d\varepsilon^i_a
\]

(2)

Where \(f_{\varepsilon_a}(\varepsilon^i_a), f_{\varepsilon_b}(\varepsilon^i_b)\) is the underlying joint probability density function of the error terms PDF), also named the density of the unobserved utility. Depending on the specifications of the PDF, different discrete choice models can be obtained. For this application we considered that the random terms are identically distributed (IID) extreme value type 1.

The deterministic parts \((V^i_a, V^i_b)\) are treated as linear combinations of explanatory/independent variables and unknown parameters (1). The independent variables are observed by the analyst, as mentioned above, and include attributes of the alternatives, socio-economic characteristics of the decision maker and of the environment in which he operates. The components \(\beta_a, \beta_b, \varepsilon^i_a, \varepsilon^i_b\) are not observed by the analyst, so are treated as stochastic influences. It can be seen that the choice probability (2) depends only on the difference in utility of the two alternatives, not on their absolute value. In other words, we can statistically estimate the parameters only for the factors that capture differences across the two alternatives. The choice probability is also insensitive to the scale on which the utility is measured.

### 2.3 The Logistic Model
The logistic model has been derived by Luce (1959) from the independence of the irrelevant alternatives (IIA), which means that the odds between two alternatives it's not influenced by the presence of a third alternative. The mathematical framework was further developed by Marschak, Marley, McFadden.

For the logistic model we use the notations from the previous subsection and put the condition that the unobserved part of the utility for each alternative is IID and the variance of the error term is equal to \(\pi^2/6\). The density for each random component of the utility and the respective cumulative distribution are given by

\[
f_\varepsilon(\varepsilon^i_j) = e^{-\varepsilon^i_j} e^{-e^{-\varepsilon^i_j}} \quad \text{and} \quad F_\varepsilon(\varepsilon^i_j) = e^{-e^{-\varepsilon^i_j}}, j \in \{a, b\}
\]

(3)

Taking into account eq. (1), (2), (3) and the assumed not correlation among the random components of the different alternatives, the choice probability for decision maker \(i\), becomes

\[
Pr[Y = 1\mid X] = \frac{e^{X^\top \beta_a}}{1 + e^{X^\top \beta_a}}
\]

(4)

The unknown parameters with maximum likelihood estimator.

### 3 The model estimation
We analyzed the job-degree match of the university graduates, 1, 3 and 5 years after finishing their studies, taking into account the gender dimension. We computed 3 models: one for all the university graduates (M1), one for the female graduates (M2) and another one for the male graduates (M3). The parameters of all these models were estimated using Stata package. The results are presented in Table 2 (parameters, standard deviations, P-value and some tests that estimate de measure of fit for each model).

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>COEFFICIENTS</th>
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<tr>
<td></td>
<td>M1</td>
</tr>
<tr>
<td>EDUCATION</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>-0.271</td>
</tr>
<tr>
<td>(0.333)</td>
<td>(0.530)</td>
</tr>
<tr>
<td>Economics</td>
<td>-0.053</td>
</tr>
<tr>
<td>(0.193)</td>
<td>(0.299)</td>
</tr>
<tr>
<td>Health sciences</td>
<td>2.890***</td>
</tr>
<tr>
<td>(0.731)</td>
<td>(1.043)</td>
</tr>
</tbody>
</table>
University  
-0.704*** -0.221 -1.034***  
(0.184) (0.290) (0.273)  
Law  
-0.325 0.052 -0.720*  
(0.253) (0.370) (0.367)  
Fine arts  
-0.497 -0.123 -0.355  
(0.394) (0.467) (1.120)  
Type of college (Public)  
Private  
-0.504*** -0.978***  
(0.154) (0.243)  
Post-graduate studies finished or about to finish (No)  
Yes  
0.384** 0.667**  
(0.138) (0.233)  
Generation (2003)  
2005  
-0.127  
(0.224)  
2007  
-0.706**  
(0.215)  
DEMOGRAPHICS  
Marital status (Single)  
Married  
0.240 0.416*  
(0.130) (0.212)  
Father's level of education (Lower)  
Similar  
0.500*  
(0.223)  
The social environment where the individual grew up (Rural)  
Urban  
-0.402* -0.604*  
(0.158) (0.266)  
EMPLOYMENT  
Work experience during undergraduate studies (No)  
Yes  
-0.650*** -0.894***  
(0.132) (0.210)  
Time lapse since finding the first job after graduation (None)  
Less than 6 months  
0.366* 0.456 0.403  
(0.148) (0.193) (0.235)  
More than 6 months  
-0.193 -0.178 -0.108  
(0.191) (0.247) (0.303)  
Mobility (no. if jobs)  
-0.334**  
(0.113)  
Method used to find the current job (Informal)  
Formal  
0.544*** 0.671*** 0.464*  
(0.129) (0.175) (0.202)  
Type of job (Full-time)  
Part-time  
-1.575*** -1.547*** -1.700**  
(0.266) (0.309) (0.564)  
Type of contract (Temporary)  
Permanent  
0.628*** 0.963***  
(0.158) (0.210)  
Constant  
2.230*** 1.258*** 3.62***  
(0.381) (0.460) (0.706)  
N  
1.614 949 664  
Correct classification  
75% 76.7% 74.4%  
Pseudo R²  
0.141 0.153 0.174  
Cox - Snell R²  
0.147 0.155 0.184  
McKelvey- Zavoina R²  
0.359 0.438 0.329  
Nagelkerke R²  
0.218 0.232 0.267  
Note: Standard errors are in parentheses.  
*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests)  
M1 - Odds of having a job related to the education for all the graduates  
M2 - Odds of having a job related to the education for women  
M3 - Odds of having a job related to the education for men  

Maybe the most surprising findings of our exercise is that the fields of study doesn’t influence the job matching, as most of the fields do not significantly affect the match. Moreover “University” negatively affects the match, decreasing for “University” graduates the probability to fill a job according to education with 50.6%. “Health sciences” is the only one field of study that strongly influences the match. Surprisingly or not, but in contradiction at least with other studies carried out in other countries graduates in a specific field do not have the best chance to find employment according to their studies. One plausible explanation is that there is a weak correspondence between education system and labor market demand. Health care is characterized by strong professional bodies regulating access to this system and providing benefits to its members, and seems to be the only one that can affect strongly the match.

Graduating a private university strongly decrease the match. If public universities made important steps to provide to their graduates skills more related to labor market demand, private universities develop their schooling plans and curriculum on different basis, possible more profit-driven. Taking into account the period when the survey was carried out, when the economy was still on a growing trend and the labor market was characterized by high vacancy rates and labor force deficits it is less likely to assume that employers were operating with prejudices with respect to graduates of private universities.

For level of study, results emphasize that higher the degree, higher the match. The education-job match is even stronger for male sample.

Those who worked before graduation have a poorer incidence of job match as against the base category. Also, the time lapse since finding the first job after graduation affects the match. If the individual fill a job during the first 6 months after graduation then the
probability to develop a career conducing to a job corresponding to education increases with 44.3%.

The labor market seems to be more demanding with the male side of the labor force, asking more stability from their part. Higher the number of jobs filled in a life time, lower the probability to fill a job according to education.

Also, women have more chances to develop their career step by step, as their match increases with the time lapse from graduation. The probability to be in a job according to education is at 1 year after graduation with 29.1% lower that at 5 years after graduation.

Having a full time job strongly increases the likelihood of education-job match both for women and men, whereas having a permanent job increases the match for women, as well as for the entire sample.

Finding a job via formal methods definitely influences the match both for women and men but coefficients are stronger for women than for men. Finding a job via informal methods increases the likelihood to fill mismatched positions.

Demographics influence the match only for men. Being married and having a father with higher education significantly increases the probability to fill a job matching to education. Also living in urban areas negatively affects the match for male side of the sample. The explanation for this situation consists in the features of rural and urban development. Employments opportunities for university graduates are almost entirely concentrated in urban areas, so, both probabilities to find matched or mismatched jobs increases as against rural areas.

4 Conclusions
Analyzing the data for M1 we could assume that to a certain degree determinants associated with the choices that graduates are making during their education influence the match, such as choosing to be enrolled in a public institution, choosing to complete the university studies with post-university courses, working or not before graduation and choosing to find a job via formal channels. Also, if we consider the features of our labor market we cannot assume that being in a part time or temporary job is an individual option, but more probable a major force.

What it can be considered a weak point of our education system is that choosing a certain field of study, there are no guaranties that an individual will have the best chances to develop a career in the similar economic sector/activity. As said before, much emphasize must be put on educating for the skills need, especially on the activity and curriculum of private universities.

Analyzing the findings for female sample we found that there is not a “model” for the female entry on the labor market and their career prospects. It is recommended for them to develop a “step by step” career in permanent jobs. In fact this is the career model for those employed in the public sector where career advancements are strongly regulated. Also, the best career prospects for women in terms of filling a job according to education are in the health care sector. Also, this point to a still traditional labor market that places women and their best opportunities in sectors associated with “taking care of others”.

Romanian labor market seems to have more specific requirements for male graduates. Determinants associated with the choices that graduates are making but also with pre-determined variables (father’s education, area of residence) influence the match. Increasing the level of education through post-university courses, valuing stability in a specific workplace strongly influences the chances for male graduates to fill a job according to their education. Also, the findings can suggest that the Romanian labor market is still shaped on the “breadwinner model”, as it favors the career prospects for married men.

Even if the level of education among women is increasing and their enrollment in tertiary education is higher that male enrollment labor market, that is still developed in low added sector (where physical abilities are a plus) and “traditionally” shaped, is not prepared to provide the best returns to women investment in education.

References:


