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**Unemployment spell and vertical skills mismatches:
The case of Macedonia's youth**

**Viktorija Atanasovska
Tijana Angjelkovska
Jorge Davalos**

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Unemployment spell and vertical skills mismatches: The case of Macedonia's youth

Abstract

The past two decades were characterized by high and persistent youth unemployment rates in Macedonia; this is despite the many active workfare policies addressed to the youth population. Thus, this paper contributes to the literature by investigating the impact that a longer unemployment spell has had on the labour market mismatch of young Macedonian job-seekers. The empirical analysis builds on different econometric model approaches based on the School-to-Work Transition Survey (SWTS) conducted by the ILO in 2012. Our results clearly suggest that longer unemployment spells lead to higher mismatches, but that such effects are heterogeneous across educational attainment groups of low, middle and highly educated young job seekers.

JEL: J24; J21; J31; J62.

Keywords: Youth, unemployment, mismatch, job search duration, Macedonia.

Authors

Mrs. Tijana Angjelkovska

Researcher
Association of economic researchers STOKE-
Skopje, Macedonia,
tijana_angjelkovska@yahoo.com

Ms. Viktorija Atanasovska

Director
Association of Economic Researchers STOKE
Skopje, Macedonia
atanasovska.viktorija@gmail.com

Dr. Jorge Davalos

Assistant Professor
Universidad del Pacifico
Lima, Peru
jdavalos@quant-modeling.net

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I. Introduction

Economic globalization and liberalization, along with the last financial crisis, have led to significant transformations in the labour market worldwide, giving rise to a mismatch between education skills and employability (Dullien et al., 2010, p.124). Mismatch occurs when there are great differences between the work skills – both individually and on an aggregate level – and the skills required for a job, which in an initial phase can reflect in company's decline in productivity, and later affects the growth potential of a specific economy (Sattinger, 2012). The long transitional phase from command to market economy along with the inflow of foreign capital, which forces substantial restructuring in the labour market in transition countries¹ are likely to experience mismatch unemployment (Portcet, 1995). The damaging effects of the mismatch are multi-dimensional; in particular they negatively affect the workers, companies and finally the economies in a way that suggests ineffective allocation of human capital (Kupets, 2015b).

Skills mismatches may arise due to various factors, such as the case of Macedonia where a combination of factors led to unfavourable market condition, resulting in high unemployment rates. In particular, unemployment in Macedonia² started rising drastically after 1995 when the transition started and the structural changes took place. It was expected that the labour market would become more competitive, but the human capital stock was not ready for the fast market changes, which in turn resulted in high job losses. Although the latest unemployment figures suggest that there is a decreasing trend, unemployment rates are still quite high. This is despite many active measures³ from the government directed at reducing unemployment, supported by the inflow of FDI, mainly in the fields of industry (automotive) and textiles. Unemployment rates have been high and persistent across years, which is also reflected in youth unemployment where the figures are strikingly high (e.g. in 2015 total unemployment was 26.1% whereas youth unemployment peaked at 47.4%).

In the case of Macedonia, there is a lack of clear evidence whether the labour market has adjusted to meet the new labour market requirements on the demand side. Despite the current relatively stable outlook, with one of the highest growth rates in after-crisis Europe, Macedonia still faces a very unfavourable situation in the labour market. Consequently, Macedonia is an

¹ Countries that abandoned the planned economy and adopted the market economy. In our context Central and South East Europe countries.

² Graphic presentation in Appendix 1.

³ Action plan for employment in the Republic of Macedonia 2006-2008; Action plan for employment in the Republic of Macedonia 2009-2010; National employment strategy 2015; Action plan for employment in the Republic of Macedonia 2011-2013; Operational plans for active employment policies and measures (annual frequency); Action plan for youth employment 2015, etc.

interesting context for investigating the labour market and skills mismatch with reference to young adults in particular.

The number of students enrolled in higher education has almost tripled in the last twenty years, but this trend was not followed by a proportional increase in the number of job vacancies for highly educated workers. Moreover, Macedonian students prefer social sciences over technical studies and engineering (according to data on the 2012/2013⁴ academic year obtained from the State Statistical Office of the RM). Such a persistent discrepancy between social and natural sciences may distort the supply on the labour market, i.e. Macedonia may experience excess labour supply in social sciences related occupations. Another aspect suggesting potential mismatch in Macedonia is the spread of available job vacancies. Specifically, the spread of available job vacancies is highest in the manufacturing and services sectors, in particular for occupations demanding workers with secondary education. The arguments suggest that there is an existing imbalance between supply and demand on the Macedonian labour market, and in particular there is a gap between offered and required educational skills. Moreover, the fact that the trend in education is not followed by an appropriate trend in job vacancies also points to a related problem – a large number of graduates are being forced into accepting non-graduate level jobs. In other words, the current Macedonian labour market disequilibrium may be pushing more highly educated job seekers to accept jobs for which they are overqualified. Such conclusions are also supported by the School-to-Work Transition Survey (2012) which found that 19% of Macedonian youth settle for lower skilled job positions, and 14% held positions that are above their education level (see Table 2 in Appendix I). This means that a substantial proportion of young workers have an education which does not match the requirements of their jobs.

Answering some of the questions concerning youth unemployment resulting from mismatch is of special policy relevance, since the creation of effective and successful national strategies and policies for enhancing youth employability should initially rely on in-depth analysis which reflects the current labour market conditions in Macedonia. However, to the best of our knowledge, there is a lack of empirical studies with regard to this. An investigation which leads to improved knowledge of workers' skills, in particular in the sense of matching with job requirements, may prove useful for education-related policy process, in particular improved school training may lead to an increase in youth employment. Such an investigation can provide useful insights into how the labour market should reform in order to be fully able to accommodate the increased inflow of individuals with higher education.

This paper contributes to the literature by identifying the relation between the unemployment spell and the likelihood of being either mismatched or matched for a given occupation, with a

⁴ Besides having recent statistical updates on the enrolment trend, we keep the statistics from 2012/2013 academic year to be able to provide consistent links between the general market conditions and the survey data.

focus on young job-seekers. The importance of this research question is explained by Green et al. (2000), who suggest that a long and inefficient job search results in prolonged unemployment spells, emotional distress for job seekers, as well as wider societal costs; among them, the inefficient resource allocation implied by the skills mismatches between labour supply and demand.

This paper is organized as follows: Section 2 reviews the most prominent literature on skills mismatch and its effects on job search duration. Section 3 overviews the data and Section 4 presents the methodology and the model specification employed in this empirical study. Section 5 summarizes the main findings and their implications for Macedonia's current employment policies. Finally, Section 6 discusses the policy recommendations for improvement of the situation in the labour market and reducing the mismatch.

II. Literature review

Skills mismatch refers to the scope of skills and educational level one possesses, but which are different from the skills and education required for the position that one holds at the moment (McGuinness, 2006). This phenomenon can be more pressing in the transition countries relative to developed countries, due to the long lasting structural reforms from command to market economies (Kupets, 2015a). The literature on skills mismatch introduced by Duncan and Hoffman (1981), defined three possible job statuses: (i) overeducation, (ii) undereducation and (iii) matched skills for a specific job. There are several definitions of mismatch depending on the nature of its source, we would take OECDs (2014) definitions: Vertical mismatch (qualification) which occurs from mismatch between the educational level attained by the workers and the level required for particular job (i.e. higher than required for the job-overeducated, lower than required for the job-undereducated); Horizontal mismatch (according to the field of study) which occurs when there is difference between the education specialization of the individual and the actual job position; and Skills mismatch, when a worker has higher skills than required (overskilled) and lower skills than required (underskilled).

There is vast literature on the determinants and effects of the mismatch in transition countries. General knowledge from all the studies is that main cause for the mismatch is the market transformation, along with the slower change and adjustment of the education system relative to the market requirements, which results in obsolete training and skills. In European terms, the share of overeducated workers is double in the first periods of job search relative to five years after graduation (23% initially and 13% five years later) (McGuinness and Sloane, 2011). There is an evident increase in the mismatch in the southern European countries in specific occupational groups for which human capital has increased constantly (Cainarca and Sgobbi, 2009). Sondergaard and Murthi (2011) found that transitional countries' education systems should

undertake structural reform in order to bridge the gap between the market needs and the training offered. In the context of the Western Balkans, Bartlett et al. (2012) found that the mismatches differ among different countries, in particular in some there is vertical mismatch (mainly problem with the overeducation), whereas in others there is a skills mismatch (for the more highly educated candidates). One of the most relevant studies for our paper is the material of Kupets (2015a), where she analysis vertical mismatch in four transition countries, including Macedonia, based on the World Bank's Skills towards Employment and Productivity household survey. The key findings are that post-socialist countries are characterized by highly rigid and imperfect market conditions that lead to skills underutilization. The effect of it for Macedonia is milder, relative to the other three countries. In particular, the results suggested that 20.7% of the urban population in Macedonia is overeducated, relative to 33% in Georgia and 30% in both Armenia and Ukraine. The lower percentage for Macedonia is not only due to the better market conditions, but evidence suggested that the lower mismatch can be result of the trade-off between the lower level jobs and the unemployment levels. The mismatch phenomenon in all these four countries is rather more enduring, as opposed to transitory as it would be in developed countries. Mavomaras (2013) observes the effect of the overqualification on wages and the persistence of the mismatch. The results from the study indicated that there is strong persistence in the skills mismatch, e.g. university graduates that were overskilled in three consecutive years had a 38% probability of remaining overskilled in the fourth year, whereas the candidate that was three consecutive years on a matched position only had a 4.6% probability of becoming overskilled for the position.

Analysis of the search duration on the labour market (mis)match has been popular since the early 1970s, but unlike with the mismatch phenomenon, the evidence for the search duration on the employability and the matching is not vastly researched for transition countries. One of the pioneers in the field is the matching theory offered by Jovanovic (1979), where he suggested that the answer to the matching theory issues can be found if one focuses on the imperfect market information and the cost of the search period. Later study on the search and matching theory introduced by Mortensen and Pissarides (1999) refers to the duration of the search as a key determinant of the probability of getting a better job. The authors suggest that the key is in the imperfect information that job seekers have about the procedures and exact requirements that employers have when recruiting workers, yet their suggestions are that a longer search will generate higher wages. This refers to the perfect circumstances where the decision of the employee is not influenced by different socio-economic conditions, but the search period is only dependent on the individual qualifications and that one is ready to wait longer until they are placed in a matched job-skills position with appropriate remuneration. More contemporarily, relevant finding on the effects of the search duration on the quality of job position is given in the Cuesta (2005) analysis, using an ad hoc module of a labour force survey for Spain, in which he came to the findings that overeducated workers experience shorter durations in their first

significant job and that there are unobserved factors that increase the first unemployment job search after completing education. Further, Baert and Cockx (2012) conducting an investigation using data from the SONAR survey (2003 and 2005) found that young men tend to delay the transition to an adequate job by accepting a job for which they are overeducated more at the start of the employment spell rather than later. One of the important studies for the match theory in transition countries is Kiersztyn (2013), who suggested that the matching model is characterized by asymmetric information, and hence the individuals can only know if they are in a right position once they start working. In the same paper, Kiersztyn (2013) analyses the perception of the overeducation in the labour market based on 20 years of time series data for Poland, in which it is assessed whether overeducation serves as an entry ticket for better positioning on the labour market or if the view that higher qualifications alone lead to more and/or better work options is overplayed. The key findings are that over 50% of the workers in Poland are overeducated for the position they hold and they are in that position longer than 5 years.

Within job search research, special reference is given to the impact of the search duration on the social distress and personal wellbeing. Since the early 1990s there has been evidence of negative effects from unemployment (Feather, 1990; Winefield, 1995), when the results showed that individuals searching for a job were exhibiting low self-esteem and low wellbeing. Similar results were found 20 years later, in the Krueger and Mueller (2011) study based on the survey that was conducted in the interval of 24 months in 2009 and 2010. In particular, they found that the length of the job search duration has a negative relation with finding a job. Moreover, the unemployed show more life dissatisfaction, which is increasing with the increase in the search length. The evidence from the unemployment spell is even more pronounced in the period after the Great Recession, where the unemployment exit rate slowed even more for all search durations.

Considering the overview of the literature presented above, there are several ways to approach the labour market mismatch issue. Although many scholars have tackled the issue of mismatch, there are always gaps to be filled, and hence in this paper the attempt is to explain further the impact of the search period on the possible vertical mismatch in the Macedonian labour market, with special reference to the young adults.

III. Data

Empirical estimations are based on the School-to-Work Transition Survey (SWTS), a unique survey prepared by the national statistical offices for ILO's purposes, which provides relevant information on youth labour markets (15-29 years). The survey includes cross-sectional information on developments in the local labour markets; it includes relevant information for in-

depth investigating of labour market issues and its determinants. The SWTS consisted of five parts: demographics (personal, family and household information); formal education/training, activity history and aspirations; young workers; non-working youth; and youth not in the labour force. The purpose of this survey is to provide policymakers and researchers with comprehensive and analytical reports on the difficulties that young people face in transitioning from education to a job (Matsumoto and Elder, 2010).

The 2012 SWTS in Macedonia was administered to 2544 individuals. The sample was calculated based on census data from 2002, using those between the ages of 15 to 29. For this survey purpose, the State Statistical Office created 32 strata. The stratification was done in two ways: geographically and by region size. The allocation of the respondents was relative to the census data from 2002 and accordingly distributed to each stratum. The strata for the enumeration regions were done following the NUTS 3 classification, based on eight regions, rural urban and according to the size of the region (below 90 and above 91). In all our analysis based on the data, descriptive statistics and econometric analysis, we include the sample weights (ready in the survey) in order to avoid possible biases from non-response, stratification, etc.

Some relevant information from the initial descriptive statistics of the SWTS are: 76.9% of the young people in Macedonia had sought a job for more than a year; almost 50% of young people who are already employed spent more than a year to find that job; more than 54% claim that there are not enough available positions related to their qualifications; 14.4% argue that the requirements for the job were higher than the education/training they received. As is explained in the next section, some questions in the SWTS follow a nested structure which means that subsequent questions are conditional upon a previously answered question. Hence, not all questions are answered by all respondents. As a result, the research question in this study is answered on the empirical analysis of a smaller sample (1239 individuals, out of the total) in particular the ones that responded that they were in the labour force, i.e., at that time either already working or actively seeking a job.

For the model purposes and the nature of the survey, we created several variables: (i) employment status of the respondents, (ii) mismatch variables and (iii) dummy variables for level of education, gender, region, income, search period and migration. From the available data we have constructed two mismatch variables, one subjective and one objective. The subjective variable is constructed from the personal evaluation of the respondents regarding how they perceive themselves on the current working position. Whereas, the objective mismatch variable is constructed from two separate variables of the survey: field of work according to the ISCO classification, which was redefined according to conversion of classification of education classes (ISCED) for each ISCO group, and then the required level of education for a certain position was

compared to their highest level of education completed. In the table below we present the difference⁵ between the subjective and objective definition of the mismatch.

Table 1: Mismatch (%)

	subjective	objective
Overeducated	23.74	36.7
Matched	72.71	42.84
Undereducated	3.55	20.46

Source: STWS and author's calculations

An interesting finding relies on the survey’s subjective self-assessment of skills mismatch where only 3.6% of the respondents perceived themselves as undereducated, whereas according to the objective definition 20.5% held positions for which they possessed lower educational skills than required. Opposite to this, the subjective mismatch variable is suggesting that fewer people perceived themselves being overeducated for the current position (only 23.7%) whereas the objective one is showing us a higher number of employees overeducated for their positions (36.7%). Both variables are providing different views regarding how many respondents are at matched positions. Namely, under the subjective definition, close to 73% of respondents believe their skills are matched with the requirements of their current job, whereas under the objective variable only 43% of respondents are currently at matched positions. Due to the possible caveats of using subjective data for empirical purposes, along with limited variability in the answers, we found the objective definition more reliable for further analysis.

Table 2 provides a summary description of the variables, the number of observations, and their mean and standard deviation.

Table 2: Description of the variables

Variable	N. obs	Label	Mean	Std. dev.
Employment status (employed)	1239	Dummy variable equals 1 if respondents is employed, 0 otherwise.	0.59	0.49

⁵ There is ongoing discussion among scientists and statisticians on the usage of subjective and objective definitions in empirical analysis and models synthesized in the material of Gelman and Hennig (2015). However, there is no consensus which should be used in the wider context. From there, the decision what to include as a mismatch variable in our model was partly determined by the nature of the variable itself, relative to the both definitions, and following Hennig (2010) where he suggests that in order to get more reliable results, one should include variables that are stable and as much as possible observer-independent.

Education level (mismatch)	733	Distinguishes three categories: overeducated (employees whose current position requires lower education qualifications than what they possess), matched (employees who possess adequate education level for the position they hold) and undereducated (employees whose current position requires higher education qualifications than what they possess)	1.84	0.74
Elementary	1050	Dummy variable equal to 1 if the respondent's highest completed level of education is elementary, 0 otherwise.	0.18	0.39
Secondary	1050	Dummy variable equal to 1 if the respondent's highest completed level of education is secondary, 0 otherwise.	0.61	0.49
University	1050	Dummy variable equal to 1 if the respondent's highest completed level of education is post-secondary, 0 otherwise.	0.20	0.40
Age	1239	Age in years at the moment of participating in the survey, can capture some unobserved skills.	23.75	3.46
Gender	1239	Dummy variable equal to 1 if male, 0 otherwise	0.61	0.49
Search period ⁶ (searchall)⁷	1191	Unemployment spell in a discrete time scale: "0.5" searching up to one month, "1.5" searching between one and three months, "4.5" searching between three and six months, "9" searching between six and 12 months, "18" searching between 12 and 24 months, and "36" if searching longer than 24 months.	18.25	15.53
Regional unemployment rate (unempregion)	1239	The country is divided into eight regions and each region was given the appropriate unemployment rate.	29.71	11.36
Regional dummies	1239	Vardar	0.12	0.32
	1239	East	0.09	0.29
	1239	Southeast	0.19	0.39
	1239	Northeast	0.08	0.28
	1239	Polog	0.13	0.33
	1239	Pelagonija	0.12	0.32
	1239	Skopje	0.12	0.32
	1239	Southwest	0.09	0.28
Poor	1239	Dummy variable equal to 1 if the respondent comes from poor household, 0 otherwise.	0.25	0.43
Parent's highest education (maxeduc)	1214	Calculated as a maximum education level of both parents.	12.24	2.61
Migrate	1239	Dummy variable equal to 1 if the respondent has migrated, 0 otherwise.	0.07	0.25

Source: STWS and author's calculations

⁶ Original question in the SWTS: How long were you available and actively looking for work before finding your current job (or establishing your current business)?

⁷ The variable is continuous but reported on a discrete scale (time intervals). In such situations one hypothesizes that the data's distribution within each interval is uniform. This assumption is made by every histogram. From this very standard assumption in descriptive statistics, one can take the mid of the class as a representative value to estimate: the mean, median standard deviation, etc. In our case, we decided to use mid-class points which provide consistent estimates.

After inspecting the structure of the employed workers in the survey according to ISCO9 and ISCED classifications, we obtained the table below, which suggests that the highest percentage of people that are in a matched position have secondary education.

Table 3:
% of undereducated, match and overeducated, by level of education required for the position

	University	Secondary	Primary	Total (%)
Undereducated	2.95%	5.89%	16.12%	24.96%
Matched	12.31%	42.98%	8.32%	63.61%
Overeducated	5.37%	6.07%	0.00%	11.44%
Total in %	21%	55%	24%	

Source: STWS and author's calculations

Looking further into details (Table 4, "Total (%)") it is evident that out of all employed respondents, only 43% are in a matched position, whereas 36% are undereducated for the position that they are holding and 20% are overeducated for the current position, according to the ISCO9 and ISCED classifications.

Table 4: Occupation-ISCO9 classification

	Professional, technical and related workers	Administrative and managerial workers	Clerical and related workers	Sales workers	Service workers	Agriculture, animal husbandry and forestry workers, fishermen and hunters	Production and related workers, transport equipment operators and labourers	Total		
Under-educated	0.14%	2.86%	3.55%	2.46%	6.41%	0.00%	0.00%	0.27%	21.01%	36%
Matched	0.27%	9.00%	0.41%	1.50%	14.60%	2.73%	1.09%	6.68%	6.55%	42.9%
Over-educated	0.27%	0.55%	3.41%	0.14%	1.50%	3.55%	10.23%	0.82%	0.00%	20%
Total by groups	0.68%	12.41%	7.37%	4.10%	22.51%	6.28%	11.32%	7.77%	27.56%	

Source: STWS and authors calculations

Interestingly, the subjective definition indicated that 72.7% of the employed individuals perceived that they are in a matched position, whereas 23.7% perceived that they are undereducated for the position that they are holding and only modest 3.6% perceived that they are overeducated for the position they have.

Table 5: Occupation-ISCO9 classification (with subjective definition)

	Professional, technical and related workers	Administrative and managerial workers	Clerical and related workers	Sales workers	Service workers	Agriculture, animal husbandry and forestry workers, fishermen and hunters	Production and related workers, transport equipment operators and labourers			Total
Under-educated	0.14%	0.82%	0.95%	0.68%	5.73%	2.32%	1.50%	1.36%	10.23%	23.74%
Matched	0.55%	11.60%	6.28%	3.27%	15.96%	3.96%	8.87%	6.28%	15.96%	72.71%
Over-educated	0.00%	0.00%	0.14%	0.14%	0.82%	0.00%	0.95%	0.14%	1.36%	3.55%
Total by groups	0.68%	12.41%	7.37%	4.09%	22.51%	6.28%	11.32%	7.78%	27.56%	

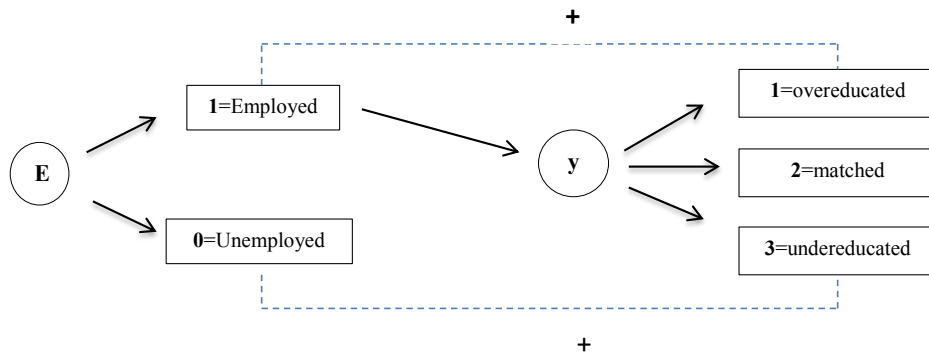
Source: STWS and author's calculations

From the two tables above we can conclude that there is tremendous difference between how people value their knowledge and reality, with high discrepancies between the subjective and objective definition of the matching criteria. However, due to the data constraints from the questionnaire, we cannot empirically test the horizontal mismatch and the skills mismatch, which can possibly explain part of the discrepancies between the two definitions. In particular, we only possess data on the highest level of education, and for the job positions the classification of the ISCO groups. There is no data on the vocational training of the individuals.

IV. Model specification

The structure of our model is such that it has two levels (sequences). This model assumes that once one choice/outcome is observed, the following choices/outcomes are conditional upon it, i.e. the observed states result from a hierarchical structure (Suh, 2008, p.14). Nevertheless, in a nested structure some choices/outcomes are implicit; i.e. once one becomes employed, he/she can be in one of the following three categories: overeducated, undereducated or in a matched position, meaning the choice/outcome is instantaneous within a nested structure.

Figure 1: Model specification



The probability (P) a young person becoming employed ($E=1$) and the probability of being at a given skill mismatch status is represented as:

$$P[E|X_1] \text{ and } P[y|X_2, E = 1]$$

where E is the employment state (1 being employed and 0 otherwise); y represents the categorical variable⁸ taking three skills mismatch states, i.e. whether a young person has a higher, adequate, or lower education than the work position requirement. This leads to four implied equations, one for the employment probit and three for the skills mismatch. Covariate vectors are represented by X_1 and X_2 , where for identification purposes, these vectors may share all variables but one.

First we estimate a nested logit model which is useful to deal with conditional correlation between alternatives, thus similar alternatives are grouped into nests within which independence from irrelevant alternatives (IIA) is assumed to hold (Williams, 1977).

Since the nested logit IIA assumption might not hold, an alternative (second) specification is proposed as a robustness check. In the following equations, y_m are binary indicators for three potential mismatch states (higher, adequate or lower education than the work position requirement):

$$P[y_m|X_2, E] ; m = 1,2,3$$

These equations are independent probit regressions that provide consistent estimates even in the presence of conditional correlation across alternatives (i.e. IIA does not hold). Note that the intuitive hierarchical (sequential) modeling approach is lost. Furthermore, since y_m is censored for the unemployed population, this specification may imply a sample selection bias from the exclusion of the unemployed sample. Therefore, the probit equations are estimated following the heckprobit model specification which corrects for the potential bias introduced by y_m censoring (Van de Ven and Van Pragg, 1981).

⁸ It can be interpreted as ordered or nominal, in this paper it is treated as nominal.

Finally, we present a simple duration model (Kaplan-Meier) that estimates the effect of unemployment spell on the probability of getting a job for which a worker is either matched, under or overqualified.

V. Empirical results

Sequential modeling under the IIA assumption⁹

A sequential modeling approach is represented by a nested logit model. At the first “sequence” an individual is either employed or unemployed. If employed, then the next sequence, may lead to one of three possible alternatives: being overeducated, being matched or being undereducated. For the sake of presentation, only the second and main sequence is discussed in this section whereas the first sequence is presented in Appendix 3. Parameters of the second sequence are identified at every category if the explanatory variables are excluded from the first sequence equation.

The second sequence accounts for the impact of the job search length on the likelihood of one being overeducated, undereducated or matched for the position. In order to better capture such an impact, the three equation sets are estimated, one per education level (primary, secondary and university).

⁹ The model was estimated with both definitions of mismatch (subjective and objective). However, the subjective definition provides results that cannot be presented due to lack of observations for the “undereducated” category (which prevented estimation convergence). Hence, only the objective definition analysis of the mismatch variable is presented.

Table 6: Second sequence – 3 nested logit estimates

Subsample: 733	Elementary		Secondary			University	
	Matched	Under	Over	Matched	under	Over	Matched
Search period (searchall)	-0.291*	-0.011	-0.079***	-0.057***	-0.054**	-0.237**	0.006
Control variables:							
Regional unemployment rate (unempregion)	-0.415	-0.654*	-0.1869	-0.201	-0.174*	0.081	0.14
Vardar	-13.771	11.594	2.229	1.846	0.97	-7.684	5.101
East	11.536	-28.324	-0.59	-0.33	-1.301	7.32	1.952
Southeast	9.486	-15.968*	0.575	-2.104	-2.161	6.266	-1.239
Northeast	7.486	17.536*	2.104	4.846	3.267	6.092	-8.652
Polog	6.457	1.65	-2.32	1.316	0.829	11.163**	-7.566*
Southwest	13.78	5.012	2.629	2.292	2.283	-8.664	4.344
Poor	7.046	-6.667*	0.851	-1.33	-0.764	-17.223*	12.453
Parent's highest education (maxeduc)	-1.563	0.716	-0.217	-0.006	-0.115	0.751	-0.282
Migrate	10.449*	-5.487	-0.617	-0.018	-1.019	-13.454	15.412

Workers with elementary education, the lower educational attainment cannot be overqualified for any job. This explains the absence of an 'over' equation. Similarly, workers with the highest degree (university) cannot be underqualified for any position.

* Significantly different from zero at 95 percent confidence

** Significantly different from zero at 90 percent confidence

*** Significantly different from zero at 99 percent confidence

Due to our skills mismatch definition, workers with elementary education, the lower educational attainment, cannot be overqualified for any job. This explains the absence of an over qualification equation for this group. Similarly, workers with the highest degree (university) cannot be under qualified for any position.

Our results suggest that the unemployment spell has a negative impact on the probability of getting any kind of job. Namely, as is indicated from the estimates in the table above, the search period coefficient is always negative, and it only changes in magnitude across different groups, suggesting that the higher the search period the lower the probability of getting any kind of job¹⁰.

¹⁰ One rationale behind this might be employers' preferences to hire individuals with experience related to the job opening, hence in this regard individuals that have been searching for a job for a longer period have a disadvantage. Moreover, as mentioned previously, in the Macedonian labour market the probability of being employed could also be influenced by socio-economic and political circumstances among which relationships with individuals active in the

Our estimates are also in line with the initial descriptive statistics. Individuals with elementary education (in excess of labour supply) are less likely to get a matched position despite a longer unemployment spell when compared to workers with a secondary education. Having a university degree brings a slight advantage, as a longer unemployment spell would decrease the likelihood of getting an overqualified position but will not reduce the chances of getting a matched position.

The HECKPROBIT model

The rejection of the IIA assumption at the previous NL model implies a potential bias of its estimates. A natural solution to this issue implies the estimation of either a multinomial probit or a multinomial mixed logit (Cameron and Trivedi, 2005, p.490-528) both implying highly complex numerical estimation procedures. For instance, estimation of a multinomial probit with four categories (unemployed, matched, under and overqualified), requires the numerical calculation of a three-dimensional integral where three correlation parameters need to be empirically identified. In our case, the estimation of such a model did not provide reliable results due to a lack of empirical identification. Therefore, a more parsimonious approach is implemented as follows:

- For the employed sample, three single probit models were estimated to assess the probability of being matched, over or underqualified. Each model is conditioned on the unemployment duration (search all), educational attainment and other control variables.
- The reference category for each probit estimation merges the remaining ones. For instance, the over qualification probit reference categories includes those not overqualified, i.e. matched or under qualified.
- The model is censored for the unemployed population. Thus, in order to control for the conditional correlation between the employment status (either matched, under or overqualified) and unemployment i.e. to control for the sample selection bias, a heckprobit model is estimated (Heckman 1979; Van de Ven and Van Pragg, 1981).

The estimation results of the heckprobit model are presented in the table below (Table 7):

political or business arena are considered to be crucial. Individuals that spend significant time searching for a job fail to establish such relationships.

Table 7: Heckprobit estimation results

Equation:	Overeducated	Matched	Undereducated
	Marginal effects/	Marginal effects	Marginal effects
Variables of interest:			
searchall*university	0.008**	-0.007***	
searchall*secondary	0	-0.001	0.006***
searchall*elementary		-0.008***	0.009***
Controls:			
university	0.430***	-0.480***	-
secondary	0.293***	-0.585***	0.125***
elementary	-	-0.572***	0.240***
age	-0.027***	0.028***	-0.019***
gender	0.077***	-0.121***	0.033
unempregion	0.004	-0.003***	0.008***
poor	0.073	-0.033	0.047*
polog	-0.241***		
east	0.067	-	-
vardarski	0.039	-	-
northeast	-0.177	-	-
southwest	-0.136	-	-
southeast	0.144		
Model criteria			
Total number of observations/2	4140	4144	4144
Censored	1868	1868	1868
Uncensored	2272	2276	2276
Log likelihood	-605943	-682494.9	-634374.
Wald chi2	358.41	117.99	515.83
Rho (prob > chi2)	0.6991	0.1819	0.00

Source: STWS and author's calculations

***1% significance; **5% significance; *10% significance

/Constant term is not estimated, this allows for inclusion of all the levels of education without omission problem.

/1 Interaction variables are discrete, educational specific search effects.

/2 Number of observations is expanded as a process of the standard STATA procedure for data manipulation. However the number is equivalent to the 1,239 sample of labour force participants.

- Variable not included in the model.

These new results are robust to a sample selection bias, especially for the 'under education' probit whose conditional correlation's (rho) is highly significant (at 1%). A significant correlation provides evidence of conditional dependence between the unemployment status and 'under education'. It should be noted that the existence of such correlation is a violation to the previous

nested logit model which imposed this correlation to be 0 across nests. In order to capture the effect of the unemployment spell on the skills mismatch, three interaction variables (searchall*university, searchall*secondary and searchall*elementary) are included among the explanatory factors. They allow us to measure workers' specific relationships depending on their educational attainment.

The interaction variables indicate that the unemployment spell has a negative impact on the probability of earning a matched job regardless of the completed level of education. In other words, a longer unemployment spell (every additional month) implies a 0.7% and 0.8% decrease in the probability of in obtaining a matched position, for youth with university degree and elementary degree respectively. In particular, a longer unemployment spell implies that:

- a) **University graduates** are 0.8% (per month of unemployment spell) more likely to end up overeducated rather than getting a matched position.
- b) **Elementary and secondary educated workers** are 0.9% and 0.6% (per month of unemployment spell), respectively, more likely to end up under qualified rather than getting a matched position.

Both findings (a and b) are consistent with the descriptive statistics presented in appendix 1 (Table A1d) and are mainly explained by the excess of labour supply of elementary- and university-educated workers. Furthermore, individuals with secondary education are less penalized on their search for a matched position by a higher unemployment spell (Table 7, matched probit).

Age is included as a proxy for experience and the estimates suggested that an increase in the age of a jobseeker does not lead to a higher probability of the same becoming more employable. The intuition of the result is logical, because if a person is unemployed, just by ageing one would not gain more skills and experience that are required by the potential employer. Other control variables (gender, regional unemployment rate and regional dummies) exhibit the expected economic and statistical significance.

Simple duration model

To further complement the relevance of the previous findings, a duration/survival analysis is implemented following Florens, Fougere and Mouchard (2008). The method, also known as "failure time process", defines the probability of an "event" occurring at a specific point in time (observing the search duration period, one gets an indication of whether a job seeker ends on a matched or mismatched position). In our model there are two possible events, whether an individual becomes employed or not. The moment the event occurs (i.e. an individual gets a job), we observe a former censored event. Therefore, such a moment becomes the moment in

time that the observation for that individual stops. A “failure time process” consists of three stages: 1) the initial point in time; 2) duration of the survival (unemployment spell) and 3) the occurrence of the event. The latter is the moment in time when an individual becomes employed and we get to know whether or not the job matches with individuals’ educational attainments. We get information from the “failure event”, meaning that once an event occurs, we get insight about the link between the unemployment spell and the skills mismatch status.

The Kaplan-Meier¹¹ estimate is considered the simplest way of computing the survival analysis over time in spite of all difficulties associated with subjects and situations (Goel, Khanna and Kishore, 2008). Our duration analysis results tend to verify the initial findings from the nested logit and heckprobit models. They suggest that the longer the unemployment spell the lower the probability that one will get a better job position. In this section we present simple univariate analysis for all the education levels. We both graphically inspected and statistically tested each educational level each educational level and possible job matching outcomes. Our estimates suggested that the groups are proportional, i.e. we are dealing with approximately parallel functions. We tested for equality across the groups in order to make sure we include the right determinants for the Cox model. For the purposes of the analysis we used a non-parametric test (log-rank test of equality across outcomes) and semi-parametric model (univariate Cox proportional hazard regression).

Kaplan-Meier analysis

The Kaplan-Meier graphs for individuals with only elementary education (Figure 2) suggest that the likelihood that one will get an undereducated position is higher in the first periods of the spell and that such likelihood decreases as the search duration increases. It also shows that having an elementary education implies a higher probability of ending up at an underqualified position irrespective of the unemployment spell. It should be noted that such a gap tends to disappear as the unemployment spell increases.

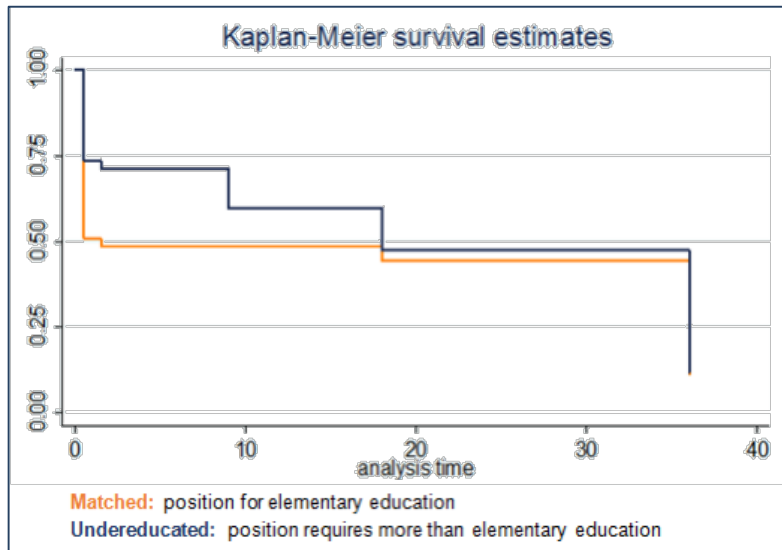
¹¹ It defines the probability of one individual to get employed after time t as $S(t)$:
 $t_1 \leq t_2 \leq t_3 \leq \dots \leq t_n$.

Where t corresponds to the moment when one gets employed (intervals between events are not uniformed). The $S(t)$ estimator is a nonparametric maximum likelihood one, written as:

$$S(t) = \prod_{t_i < t} \frac{n_i - d_i}{n_i}$$

where the maximum is taken over the set of all constant survival curves with breakpoints at the event times t_j .

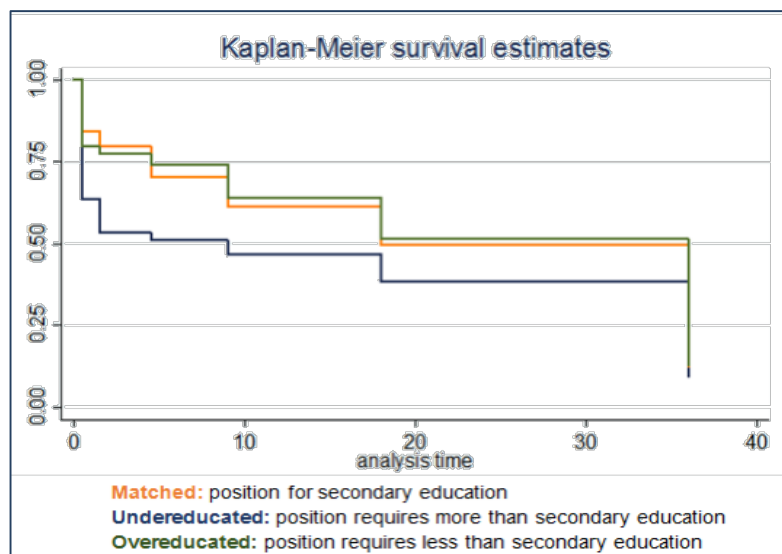
Figure 2: Kaplan Meier survival estimates for individuals with elementary education



Source: STWS and author's calculations

Job seekers with completed secondary education, exhibit a highest likelihood of ending-up at a matched position if they get a job early in the unemployment spell (Figure 3). Getting matched or overqualified position exhibit similar probabilities with respect to the unemployment spell duration. As in our previous models, secondary educated job seekers are the less penalized by the unemployment spell.

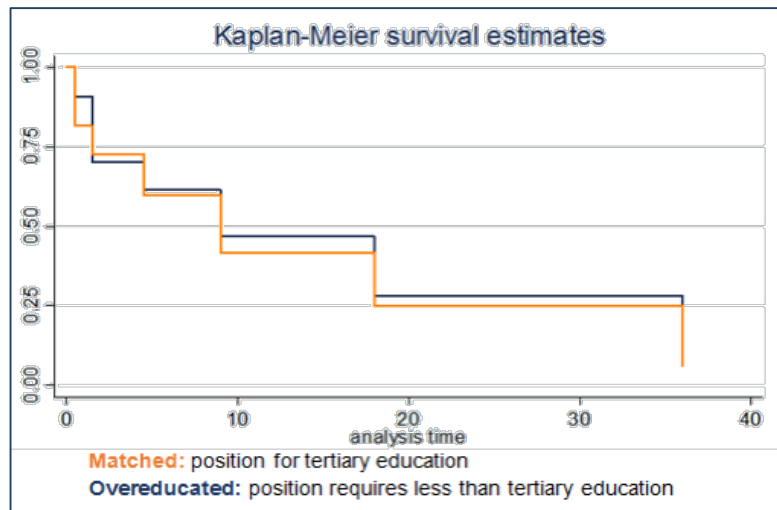
Figure 3: Kaplan Meier survival estimates for individuals with secondary



Source: STWS and authors calculations

Finally, highly educated job-seekers exhibit similar probabilities of getting either an overqualified or matched positions as the unemployment spell increases. Nevertheless, they seem to be the more penalized by the unemployment spell when compared to less educated job seekers since their probabilities of getting any position (either matched or overqualified) decrease faster as the unemployment spell increases.

Figure 4: Kaplan Meier survival estimates for individuals with post-secondary education



Source: STWS and author's calculations

Semi-parametric univariate Cox model

The model takes the reduced form and is performed for each educational level separately:

$$Searchall = \alpha + \beta_1(mis)match + \beta_2 reg. unempl. rate + \beta_3 Poor + \beta_4 gender + \beta_5 age + \mu$$

Where Searchall is the length of the job search period, $\beta_1(mis)match$ can take value of under, match, over, represents the probable job position outcome, $\beta_2 reg. unempl. rate$ calculated for year 2012 for all the administrative regions in Macedonia, that are different in terms of economic development. $\beta_3 Poor$ dummy that accounts for social background of the respondent, which is assumed to have impact on the decision of how long one will wait for "good" job, $\beta_4 gender$ and $\beta_5 age$ are included to control for the personal characteristics and μ , the error term.

In Table 8 we present the Cox (1972) model¹² estimates where we check for the probability of being in a mismatched position for each education level. In general, the estimates from the Cox model are confirming the descriptive statistics and initial findings in the two level nested logit model and Kaplan–Meier survival estimates.

¹² The threshold to include a determinant in the model is a p-value of less than 0.2, under the assumption that any determinant with a higher p-value will not give any useful information for the model. The log-rank tests for equality of survivor function exhibited p-values of "0.0000" thus are all included in the final model.

Table 8: Semi-parametric Cox-estimates

Variable	Elementary	Secondary	Post-secondary
age	-0.082***	-0.079***	0.126***
gender	\	0.146***	-0.618***
unempregion	-0.018***	-0.008***	-0.014***
poor	0.661***	-0.092**	-0.770***
match	0.625***	0.773***	0.465***
over	\	0.408***	0.623***
under	0.519***	0.611***	

Source: STWS and author's calculations

* Significantly different from zero at 95 percent confidence

\-var. not included

** Significantly different from zero at 90 percent confidence

*** Significantly different from zero at 99 percent confidence

From the estimates presented in Table 8 it can be noticed that when distinguishing between different education levels, the employees with different skills share similar length of job search periods. Moreover, the job search period increases relative to the unemployment rate of the regions meaning that the higher the unemployment rate of the region the longer the search period. Looking at the individual characteristics, as already indicated by the nested model, individuals with secondary education have shorter search periods. This is in line with our expectation considering the characteristics of Macedonian labour market explained earlier. Following the Cox estimates for individuals with post-secondary education, we find that the search period for these individuals is longer as the market does not have enough job creation for high skilled workers. Hence the longer the search period, the higher the probability that a post-secondary educated individual will end up in a mismatched position. The estimate for the elementary education does not have any explanatory power.

VI. Concluding remarks

This paper attempts to investigate the impact of the job search duration period on the probability of a young job-seeker to be on a job position matched to his/her education level. The empirical analysis builds on the School-to-Work Transition Survey data for Macedonia collected in 2012. Three possible outcomes are defined: being on a matched position, overeducated or undereducated for a given position/occupation. This differentiation is important due to the fact that the Macedonian labour market is characterized by high unemployment rates and slow job creation on the labour demand side, and rapid and uneven labour force creation on the labour supply side. This is expected to be useful for improvement of the labour policies and labour market conditions in general.

The findings from our analysis suggest that a longer job search period, implies a lower likelihood of getting a job, more specifically, a lower probability of being employed on a matched position irrespective of job seeker's education level. What is also revealed by this investigation is that not every job seeker is equally penalized by the unemployment spell. Namely, our analysis suggest that individuals with post-secondary education are affected the least whereas the elementary educated group is affected the most in the sense that individuals in this group are less likely to get a matched job when compared to the other groups.

The insight from estimates looking at the three possible employment outcomes (overeducated, matched or undereducated) for the position held suggest that the individuals with university degree have twice higher probability of being on a position for which they are overqualified compared to the individuals with secondary education degree. For the individuals with lower education levels, i.e. elementary and secondary, the results suggest that the probability of individual getting a job for which is undereducated is twice higher for the candidates with only elementary education, relative to the candidates with secondary education. Knowing this, it is indication that even people with a lengthy job search might still end up in a mismatched position.

These findings are confirmed by our estimation methods and provide insight into the Macedonian labour market developments. In particular, it provides clear evidence on the existence of labour supply and demand mismatches. From one side, this may be explained by the labour supply growth, mainly university level graduates. From the demand side, there is evidence of important job creation that require secondary education. Policy makers should account for this issue when attempting to address the problem of high unemployment and when creating labour policies, especially active labour policies that are directed mainly towards the young workers.

This paper faces some limitations that may require further investigation; mainly the potential endogeneity caused by the unobserved abilities that may relate negatively with the employment mismatch and unemployment spell i.e. more able job seekers may find a job faster and also might end up getting a job that better matches their education levels. This would imply an ability bias (Harmon et al., 2003) in the unemployment spell impact on the probability of getting a matched position. Even though one may argue in favour of an instrumental Variable approach, Heckman and Urzua (2009) and Card (1999) raise some concerns regarding the empirical validity of the instruments suggested by the literature on wage estimations. Therefore, our findings can be interpreted in the light of the evidence provided by Angrist and Krueger (1991) and Griliches (1977) who argue against a significant ability bias. Our proposed specifications address the ability bias only indirectly by including control variables that are related to the omitted (due to non observability) variables such as the education level itself, socio-economic characteristics, gender and urbanity.

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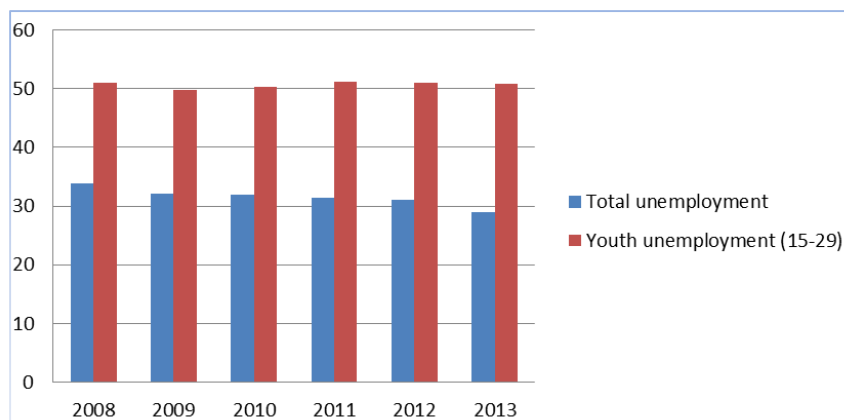
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Appendix 1: Macroeconomic context of labour in Macedonia

The high and persistent total unemployment rate reflects in youth unemployment, too, where the figures are strikingly high:

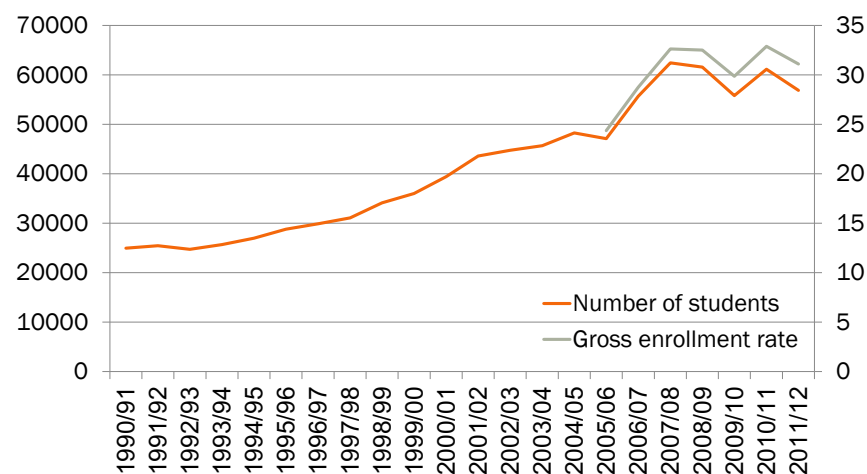
Table A1a: Unemployment rates in Macedonia



Source: State Statistical office and authors calculations

At the same time, the number of students which have enrolled in higher education has almost tripled:

Table A1b: Number of students enrolled in higher education or enrolling in 1st cycle studies over time



Source: State statistical office

There is a major discrepancy between the popularity of social and natural sciences:

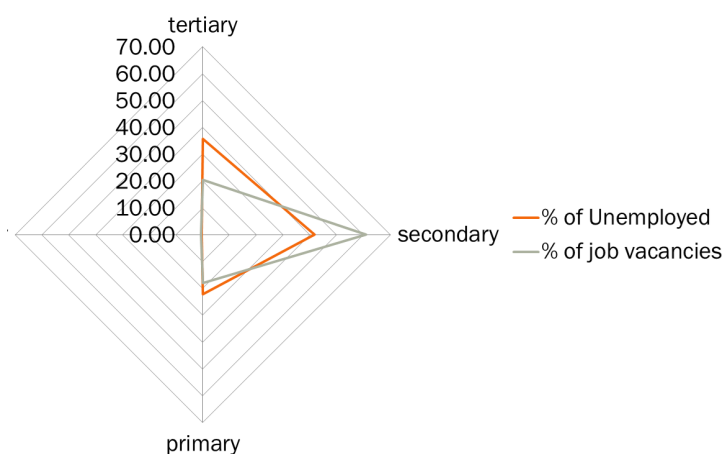
Table A1c: % of students enrolled in a particular field of study (1st cycle degree) 2012/2013

Social sciences		% of total students
	Economics, management, business administration	22.32%
	Law, political sciences, journalism	14.95%
	Tourism	4.67%
	Agricultural studies	2.55%
	Philology, philosophy	17.68%
	Pedagogy	7.88%
	Arts and other	4.49%
% of total students enrolled in social sciences		74.55%
Natural sciences		
	Biotechnical sciences	5.40%
	Architecture	5.24%
	Civil and mechanical engineering	3.02%
	Natural sciences and mathematics	7.02%
	Electrical engineering and IT	0.47%
	Technical sciences and other	4.30%
% of total students enrolled in natural sciences		25.45%

Source: State statistical office

Considering the trend identified above, Macedonia should be characterized with an increase in job vacancies and career possibilities for social science students. Analyzing the data available from the State Statistical Office and the Employment Office in Macedonia, we can see that the spread of available job vacancies is highest for people with secondary education (manufacturing and services), which is inconsistent with the trend in education:

Table A1d: % of unemployed vs. % of job vacancies (2013)



Source: State statistical office

This suggests that there is an existing imbalance between supply and demand on the Macedonian labour market, or more specifically that there is a gap between skills offered and skills required.

Table A1e: Education-employment mismatch

	Overeducated	Undereducated	Primary education or less	Secondary education	Post-secondary education
Armenia	21.6	11.4	0	57.1	42.9
Cambodia	4.2	56.4	61.8	33.6	4.7
Egypt	11.1	33.9	31	49.3	19.6
Macedonia	19	14.4	15.5	58.3	26.3
Jordan	9.4	43	47.2	18.3	34.6
Liberia	9.3	45.7	44.9	49.7	5.3
Malawi	1.7	81.8	83.3	14.8	1.9
Peru	30.1	17.4	18.7	48.7	32.6
Russian Federation	13.8	31	6.9	39.7	53.5
Togo	3.6	54.7	54.5	42.6	2.9

Source: School to Work Transition Survey, various countries, ILO (2012).

Appendix 2: First sequence - nested logit estimates

Table A2a: Employment by experience, gender and motherhood status

Total sample:1050	employed		
	elementary	secondary	university
Experience	0.239**	0.222***	0.453**
Gender	1.677	0.595*	-0.221
Mothers (chilwom)	0.630	0.137	-0.212

* Significantly different from zero at 95 percent confidence

** Significantly different from zero at 90 percent confidence

*** Significantly different from zero at 99 percent confidence

Source: STWS and author's calculations

Empirical studies have suggested that the probability of being employed varies with experience. Namely, probability of one being employed first tends to increase with cumulated human capital through experience. Looking at the first sequence estimates, as a starting point for conditional nested analysis, we found that the likelihood of being employed increases with experience at all education levels (elementary, secondary and post-secondary) suggesting that the higher the experience in the labour market the higher the human capital and probability of getting a job. In terms of gender, by investigating markets in Latin America, Edwards and Lustig (1997) argue that the probability of being employed is systematically higher for men than for women of the same age and educational background (p.323). Also, by considering OECD countries, Kostoris and Lupi (2002) and Quintano et al. (2012) found that being a female is related with a higher probability of being unemployed. Additionally, for respondents with secondary education, males have a higher likelihood of getting a job which might be a signal for possible female discrimination. Overall, and at a given age, we can say that the likelihood of one being employed is higher if one has higher level of education. Having in mind the nature of the survey, the percentage of employed people with secondary education is expected to be higher compared to others. There are two main reasons for this; one is the age constraint of the respondents, while the second one is due to a change in the legislative that declared secondary education to be mandatory for all. Additionally to this, as mentioned previously, female discrimination is suspected for those with secondary education. The discrimination suspicion arose from the labour market developments, for in the past years most of the FDI inflows were in technical and mechanical field. But this can be only transitory, since Macedonia is a textile industry country, branch that employs high portion of female workers. In Appendix 2b we give brief overview on the highest level of finished education for female participants in the labour force.

Table A2b: Female workers by education matching

	University	Secondary	Primary
undereducated	5.26%	4.31%	0.00%
matched	19.14%	37.32%	11.00%
overeducated	5.26%	6.22%	11.48%

Source: STWS and author's calculations

Appendix 3: Selection equations

The following presents the main and selection equations that result from the heckprobit estimations (table 7). Estimations were performed in one-step (ML). As can be seen, two out of three accept the null hypothesis of conditional correlation between the main and selection equations.

Equation:	Overeducated	Matched	Undereducated
Variables of interest:			
searchall*university	0.031***	-0.019***	/
searchall*secondary	-0.001	-0.003	0.019***
searchall*elementary	/	-0.023***	0.029***
Controls:			
university	1.629***	-1.382***	0.401***
secondary	1.114***	-1.682***	0.774***
elementary		-1.505***	
age	-0.104***	0.079***	-0.062***
gender	0.295***	-0.349***	0.106
unempregion	0.016	-0.009***	0.029
poor	0.277**	-0.096	0.151*
polog	-0.917***	/	/
east	0.234***	/	/
vardarski	0.159	/	/
northeast	-0.672	/	/
southwest	-0.119	/	/
southeast	0.516	/	/
Selection equation:			
searchall*university	-0.043***	-0.042***	/
searchall*secondary	-0.033***	-0.034***	-0.028***
searchall*elementary	/	-0.043***	-0.041***
university	0.769***	-1.271***	/
secondary	0.934***	-1.048***	0.654***
elementary	/	-1.139***	0.651***
age	0.096***	0.109***	0.050***
gender	0.243***	0.223***	0.171***
unempregion	-0.089***	-0.027***	-0.035***
poor	-0.514***	-0.431***	-0.434***
polog	0.278***	/	/
east	-0.312**	/	/
vardarski	0.737***	/	/
northeast	1.692***	/	/
southwest	1.064***	/	/

	southeast	-0.484***	/	/
	Urban	-0.031	0.001	-0.069
	Marital			
	1	0.208	0.186	0.016
	2	0.285***	0.283***	0.296***
	3	0.847***	0.934***	0.534**
Model criteria				
Total number of observations/1		4140	4144	4144
Censored		1868	1868	1868
Uncensored		2272	2276	2276
Log likelihood		-605943	-682494.9	-634374.
Wald chi2		358.41	117.99	515.83
Rho (prob > chi2)		0.6991	0.1819	0.00