Determinants of Qualification Mismatch: background and empirical evidence

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Abstract: This paper focuses on the factors which determine the extent of qualification mismatch which appears to be one of the underlining characteristics of today's labor markets. The results of an empirical study on the new EU member states imply that the main determinants of mismatch among tertiary education graduates include the increasing educational attainment, specifically female gradutes, the share of trade-related service sectors, employed persons with higher education in the fild of Information and communication technologies, and the number of small and medium-sized enterprises.

Keywords: qualification mismatch, overeducation, tertiary education, new member states

JEL: J24, O47, C3

1. INTRODUCTION

The rising qualification mismatch appears to be one of the underlining characteristics of today's labor markets, particularly in the developed world. It denotes the differences between employee's qualification and the qualification requirements of his/her job. The relevant studies distinguish between skill mismatch and education mismatch. The former refers to disparities in the skills being possessed by an individual and those required by a given occupation. Education mismatch denotes the differences in educational attainment. As far as qualification is estimated most often by one's education, in a narrow sense qualification mismatch and education mismatch are used as synonyms as it is here.

On its side, education (qualification) mismatch is classified as vertical or horizontal. Horizontal mismatch denotes the differences in the study field (academic program). An example would be a graduate in Business Administration working as an IT specialist. Vertical qualification mismatch is present when one's educational degree completed (i.e. upper secondary, bachelor, master, etc.) does not match the minimum educational degree required by the job. The vertically mismatched are either overeducated or undereducated. By summarizing the relevant studies, this paper presents on overview of the main factors which determine the extent of vertical qualification mismatch. As well, it presents the output of an empirical model designed to estimate some of the underling determinants for the countries from Central and Eastern Europe.

2. DETERMINANTS OF VERTICAL QUALIFICATION MISMATCH: THEORETICAL BACKGORUND

Being a result of structural imbalances in the labor market, the qualification mismatch is determined by factors influencing either supply or demand of a certain educational degree. Table 1 presents a summary of the main determinants of mismatch mentioned by the relevant studies.

Table 1. Determinants of vertical qualification mismatch

Factors from the demand side	Factors from the supply side
Average educational attainment of the population	Job polarization index
Distribution of the labor force by educational levels (ISCED)	Economy's structure
Distribution of the labor force by study fields (programs)	Business cycle stage
Personal characteristics, age, gender	Temporary contracts, tenure
Quality and selectivity of the national educational system or the study program	Labor law and power of labor unions
Institutional settings of education	Technological level, distance-to-frontier and R&D spending
Labor force growth	Limitations regarding the demand of labor
Characteristics of immigration	Share of micro, small and medium-sized enterprises
National social policy and unemployment benefits	Employer's discriminating practices
Labor market size	

A major reason for growing mismatch is the increasing educational attainment of the active population in today's economies. Given the demand of labor with certain qualification, the higher supply of educated graduates might bring some of them down the occupational ladder causing a rise of overeducation. But, it is not only the average educational attainment but also the distribution of graduates by degrees or academic programs that matters. Sparreboom and Tarvid (2016) point out that graduates from specific programs such as Engineering, Information and Communication Technologies, are less vulnerable to mismatch. On the contrary, workers with degrees in Law, Arts and Humanities, Economic

studies are exposed to a greater risk of being employed below their educational level. Additionally, higher overeducation has been observed for women and younger people.

The overall quality of education at a national level or the quality of the particular study program also plays a role. Lack of presumed knowledge and, especially, skills related to a specific degree would increase the mismatch since the workers would not be able to perform the jobs requiring those skills (Karadjova, 2012). Therefore, the extent of mismatch is expected to be larger in countries with lower quality of education. At the same time, the disparity between the expected learning outcomes and the acquired ones depends also on personal traits or one's self-motivation to succeed. Regarding the institutional settings of educational system, it is pointed out that general rather than specific orientation of the programs is likely to cause an increase of vertical mismatch.

Migration related factors are also mentioned. It appears that first and second wave migrants face a higher risk for mismatch, mostly overeducation. Its decrease for later generations might be explained by the unemployment policies in the host country or the specific type of education being possessed. On the other hand, relatively better quality of education in the home country might cause an increase of undereducation since migrants are well qualified to move up the occupational ladder. As well, the size of unemployment benefits is positively correlated with the incidence of mismatch (Verhaest, Sellami and Ven der Velden, 2017).

Another group of factors concerns the demand of labor (see table 1). A growing number of studies draws attention on the job polarization and its consequences for the labor market. It is demonstrated by the diminishing share of medium-level jobs at the expense of either high-level occupations requiring cognitive skills, or low-level occupations assuming performance of manual tasks (Autor and Dorn, 2013). The falling demand of labor for routine or codifiable tasks lead to job polarization. It is evident by the growing overeducation of university graduates holding jobs below the educational degree completed. Yet, the oversupply of educated labor might be materialized as an increase of structural unemployment. For technological advanced countries, digitalization allowing for replacement of humans used to perform routine tasks with computers is the main driver for the abovementioned tendencies (Goos, Manning and Salomons, 2009). Additionally, Blinder (2007) claims that it might also be explained by outsourcing of computerized activities to countries with cheaper labor.

According to distance-to-frontier view of economic growth, higher education increases nation's innovative capacity in the leading economies and the ability for adoption of those innovations in the less developed world (Vandenbussche, Aghion and Meghir, 2006). Thus,

if the distribution of graduates by study programs does not correspond to economy's structure the qualification mismatch is likely to get deeper.

Business cycle also affects the degree of mismatch. During recession times overeducation shows a tendency to rise since employers prefer keeping more educated workers while firing the less educated in face of job cuts. On the contrary, undereducation could rise during economic booms.

A higher share of temporary contracts makes mismatch larger as far as it suggests lower selectivity of workers' qualification by employers and the jobs taken by workers. Tenure jobs and longer-term contracts could diminish mismatch.

Finally, the size of the labor market also matters. In larger cities, for example, both workers and employers could better satisfy their requirements and find the appropriate education-occupation match due to wider opportunities for selecting jobs or the right individuals to perform those jobs.

3. DETERMINANTS OF OVEREDUCATION: AN EMPIRICAL ESTIMATION FOR THE NEW EU MEMBER COUNTRIES

The next lines present the outcome of an empirical model aiming to identify some underlining factors of overeducation (*vmismatch*) in the new EU member states from Central and Eastern Europe. The regression variables are defined in table 2. The list comprises the active population with higher education introduced above (*h*), the share of females in the labor force with tertiary education (*h_fem*), Gross Value Added-to-GDP ratio for the trade-related services, specifically wholesale and retail trade, transport, accommodation and food service activities, real estate activities (*GVA_sales*), the active population with tertiary education in the ICT field (*h_ICT*), employed persons with higher education in ICT (*empl_h_ICT*). The variables are selected on the basis of the literature review presented above as well as an exploratory analysis of mismatch in the countries under consideration (see, also Neycheva, 2019).

Table 2.Description of the variables and unit root test statisticsa

Variable[a]	Description	PP-Fisher Chi Square (intercept and trend)
log vmismatch	Vertically mismatched employees with tertiary education (% of the labor force having completed higher education)b	25.705 (0.265) [b]
d log vmismatch		157.749 (0.000)

log h	Active population with higher education completed (% of the labor force)	36.625 (0.026)
d log h		110.530 (0.000)
log h_fem	Female active population having completed higher education (% of the labor force with higher education)	33.372 (0.057)
d log h_fem		184.181 (0.000)
log GVA_sales	Gross value added in trade-related service sectors-to-GDP ratio	25.360 (0.280)
d log GVA_sales		132.958 (0.000)
log empl_h_ICT	Employed persons with higher education in ICT (% of total employed with higher education)	24.770 (0.308)
d log empl_h_ICT		127.380 (0.000)
log h_ICT	Active population with higher education in ICT (% of active population with higher education)	29.921 (0.120)
d log h_ICT		127.380 (0.000)

[a]The variables vmismatch, h and h_fem, h_ICT and empl_h_ICT are expressed as percentage of active population (15-74 years of age) and in logs. All data cover the period 2000-2016. Only for h_ICT and empl_h_ICT the available data are for 2005-2016.

[b]P-values are presented in parentheses.

The yearly time series span between 2000 and 2016; the time dimension of the panel is T = 17. First, a unit root check was performed using the Fisher-PP test proposed by Maddala and Wu (1999). The output confirms that the null hypothesis of a unit root cannot be rejected at the 5% significance level. Then, a test for cointegration was applied. It cannot reject the hypothesis of cointegration among the variables *log vmismatch*, *log h* and *log GVA_sales*.

The cointegrating regressions (1) have been solved by Dynamic OLS (DOLS) of Stock and Watson (1993). It accounts for potential endogeneity of the regressors or serial correlation in the error by including additional terms for the lags and leads of the first differences of the explanatory variables denoted by $\Delta X_{i,t+j}$. Thus, the model takes the following general form:

$$Y_t = a_0 + a_i * X_{i,t} + \sum_{j=-k}^{k} f_i * \Delta X_{i,t+j} + \varepsilon_t \quad (1)$$

The dependent variable is *log vmismatch*. The vector of slope coefficients [a_i] measures the impact of its potential determinants. The leads and lags are specified automatically on the basis of AIC criterion. Model 1 in table 3 which includes the cointegrated variables is solved by DOLS. Due to the smaller number of observations, the remaining two models (2

and 3) are solved by panel EGLS with cross-section weights and White cross-section standard errors and covariance.

Table 3. Factors determining the degree of vertical qualification mismatch among tertiary education graduates

	Panel DOLSa	Panel EGLS	Panel EGLS
	Model 1	Model 2	Model 3
Dependent variable: log vmismatch			
log h	0.552*** (0.049)	0.964*** (0.006)	
log h_fem			1.871*** (0.288)
log GVA_sales	0.384*** (0.049)		0.048 (0.124)
log h_ICT			0.225** (0.056)
log empl_h_ICT		-0.073*** (0.018)	-0.124** (0.033)
log small enterpr			-1.090*** (0.281)
adj R sqr.	0.756	0.645	0.558
N of obs.	168	126	64
Normality of residual test (p-value)	0.710	0.102	0.147

The results support the view that the broadening share of the labor force with tertiary education (*log h*) causes a rise of over-skilled employees (model 1 and model 2). This pattern is even more strongly expressed for female graduates (model 3). The regression coefficient of the variable *log h_fem* implies that a 1% increase of the share of females in the active population with college or university education (*log h_fem*) leads to a nearly 2% increase of the rate of mismatch. It means that a large portion of freshly graduated females are employed below the educational degree completed. Additionally, some evidence has been found that the Gross Value Added by trade-related services (*log GVA_sales*) also positively affects the qualification mismatch (model 1).

The increasing number of graduates from ICT-related academic programs (*log h_ICT*) does not diminish the rate of vertical mismatch per se (model 3). At the same time, the negative regression coefficient for the variable *log empl_h_ICT* (model 2 and 3) implies that among all employed with tertiary education those who possess an academic degree in the

field of ICT have been less often employed at jobs requiring skills below their educational attainment level.

Model 3 examines the role of another potential determinant – small and medium-sized enterprises employing between 0 and 20 persons expressed as a percentage of the total number of enterprises in the country. Observations are available over 2010 – 2015. The negative relation to the job mismatch is clearly expressed by the statistically significant slope coefficient below 0. That might be explained by the fact that the more the enterprises in an economy the greater the need for managerial and professional personnel.

Conclusion

This paper focuses on vertical qualification mismatch and its determinants. The review of the relevant studies shows that the most important factors include the index of job polarization, higher educational attainment of the active population and its distribution by educational degrees completed, quality of the education as well as national economy's structure and its technological level. The empirical analysis of overeducation of tertiary education graduates across the countries from Central and Eastern Europe confirms that the extent of mismatch is determined by the growing percentage of graduates in the labor force, especially the share of female gradutes, gross value added in trade-related service sectors, employed persons with higher education in ICT, the number of small and medium-sized enterprises. The rising mismatch might be harmful for long-run growth, wages and income distribution therefore more research is needed on the reasons for mismatch, its economic consequences as well as the government policy toward it.

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