

IMPACT OF VERTICAL QUALIFICATION MISMATCH ON ECONOMIC GROWTH

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Recent increase of educational attainment of the population in the developed world entails both positive and negative effects on the economic development of today's economies. One of the most serious consequences is the growing skill mismatch among tertiary education graduates. Generally speaking, the vertical qualification mismatch is defined as employment below the theoretical skill level acquired. With regard to higher education, it comprises university graduates with any occupation different from Managers, Professionals, Technicians and Associate professionals since according to the International Standard Classification of Occupations (ISCO-08) they require an academic degree. As the competition among graduates at the labor market tightens, the most qualified ones are expected to be hired at job positions corresponding most closely to the educational degree acquired. Therefore, it is reasonable to accept that the rate of qualification mismatch is an indicator of the quality of nation's human capital. Table 1 presents data on the labor force with tertiary education (ISCED 5-8) in the 11th new EU member states from Central and Eastern Europe. The percentage has been continuously increasing, thus reaching on average 30% in 2016 compared to only 18% in 2000. In five countries – Czech Republic, Poland, Romania, Slovenia and Slovakia – the cumulative rise is around or above 100%. It is clearly visible that the rate of job mismatch was growing up parallel to the broadening share of graduates in the active population. At least a double-digit increase is observed in all countries except Estonia and Lithuania. This tendency is more clearly expressed in countries with a lower starting level of the most educated human resources such as Poland, Slovakia, Czech Republic, and Romania.

Table 1. Vertical qualification mismatch in the new EU member states (2000-2016)

Country	Active population with tertiary education (%)			Vertical qualification mismatch (%) ^a		
	2000	2016	Cumulative change (%)	2000	2016	Cumulative change (%)
Bulgaria	20.5	31.0	51.2	17.9	23.1	29.0
Czech Republic	11.8	23.5	99.2	7.24	14.3	97.5
Estonia	29.6	38.9	31.4	23.9	24.8	3.77
Croatia ^b	15.5	26.3	69.7	13.4	15.4	15.6
Latvia	19.3	35.0	81.3	16.2	18.8	16.5
Lithuania ^c	42.5	42.0	-1.2	41.7	22.8	-45.3
Hungary	16.2	25.3	56.2	10.9	15.3	40.4
Poland	12.3	32.6	165.0	7.28	20.8	185.7
Romania	8.60	20.0	132.6	11.3	19.3	70.8
Slovenia	16.5	33.9	105.5	9.0	17.5	94.4
Slovakia	10.6	22.6	113.2	8.0	21.9	173.8
Average value	18.5	30.1	62.7	15.3	19.9	29.5

^a Share of employed having completed tertiary education (ISCED 5-8) who are hired at a job position below the theoretical level acquired.

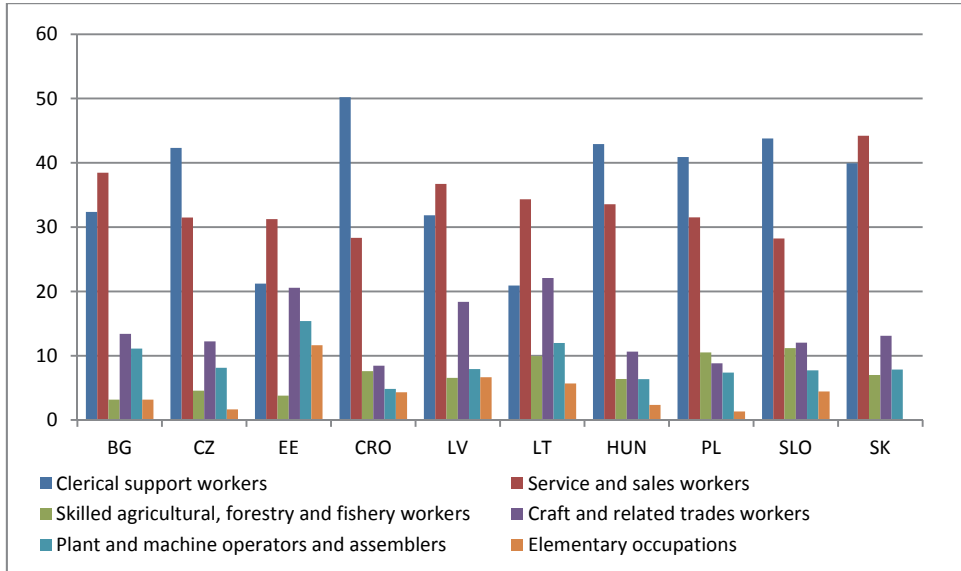
^b The data for Croatia refer to the period 2002-2016.

^c The negative growth reflects a break in the data series in 2002. The drop in the data in year 2001 was caused by the classification of special secondary school (technical school). Until year 2000, persons who have graduated from special secondary school were included in tertiary education. Since year 2001 they are included in post-secondary non-tertiary education.

Source: Eurostat, National Statistics of Croatia, National Statistics of Lithuania.

Figure 1 illustrates the distribution by occupation of the vertically mismatched employees with tertiary education according to the International Standard Classification of Occupations (ISCO-08). The yearly data for each economy are averaged over the period (2000-2016). The prevailing percentage (about 70%) is employed as service and sales workers or clerical support workers. This pattern is strongest in Croatia – half of the graduates (50.2%) on average. However, the percentage has been gradually diminishing from 52 in 2002 to 44 in 2016 on behalf of employment in jobs related to services. The third place is taken by craft and related trade workers (about 8%). In Estonia and Lithuania the corresponding number is above 21.

Figure 1. Distribution of the vertically mismatched employees with tertiary education by occupation (%)^a

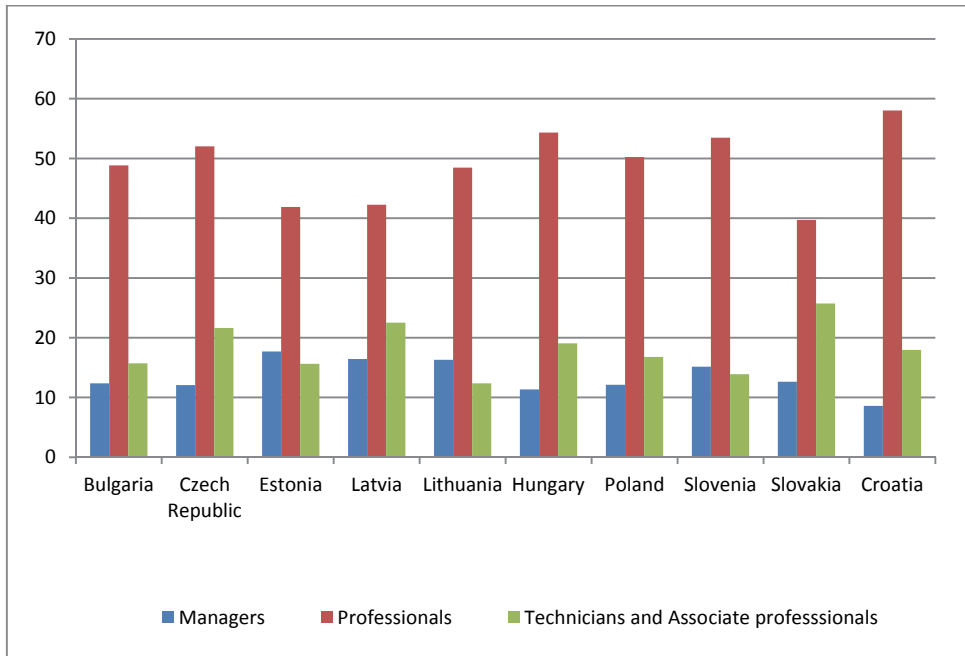


^a Average values over the period (2000-2016) for every country are presented. For Croatia the data span over (2002-2016). Armed forces occupations are excluded.

Source: Eurostat, author’s calculations

The next two charts – figure 2 and figure 3 – focus on the vertically matched employees in 2016. As it was explained above, they include the university graduates working as Managers, Professionals, Technicians or Associate professionals. The prevailing part (49% on average) works in the second job category. The share ranges from 39.7% in Slovakia to more than 58% in Croatia. The second most popular occupation is Technicians and Associate professionals – about 18%. On average, 13.5% work as Managers but the number shows significant variations – from 8.6% in Croatia to 17.7% in Lithuania.

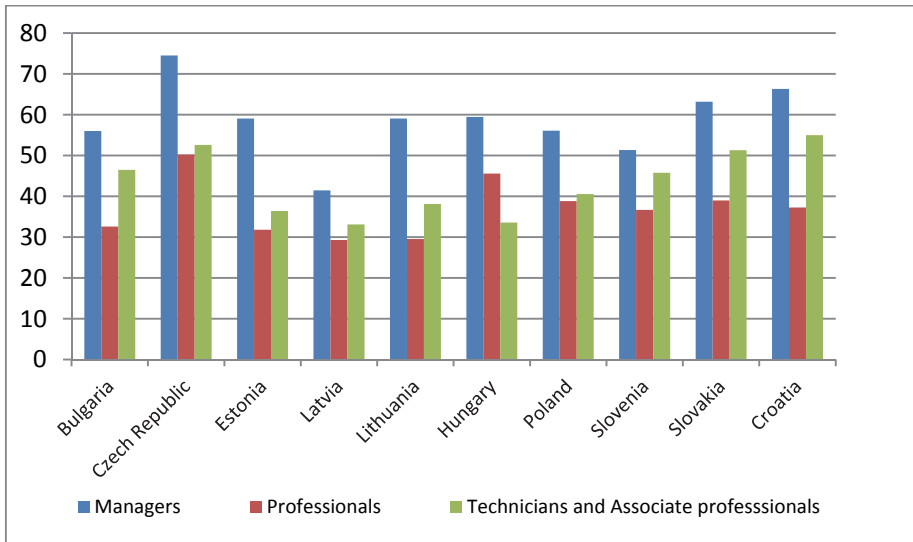
Figure 2. Distribution of vertically matched tertiary education graduates by occupation (2016)



Source: Eurostat, author's calculations

As figure 3 demonstrates, managerial jobs are predominantly occupied by males – almost 59% on average. The gender imbalance is most clearly seen in the Czech Republic where three-fourths (74.5%) are males, Croatia (66.3%), and Slovakia (63.2%). Latvia is the only country in which females prevail in all job categories since they account for 74% of all vertically matched graduates. Women take positions primarily as Professionals and, to a lesser extent, as Technicians and Associate professionals.

Figure 3. Gender imbalances in vertically matched employees with higher education^a (2016)



^a Percentage of males employed at the corresponding job position.

Source: Eurostat, author’s calculations

In the empirical studies skill mismatch has been linked to long-run unemployment (Birk 2001), labor productivity (McGowan and Andrews 2015) or wage inequality (Budria and Moro-Egido 2008). Morgado et al. (2015) find a significant negative effect of vertical mismatch on per capita output in Europe. The next lines summarize the results of a study which aims to illuminate the impact of the degree of vertical qualification mismatch among university graduates on the rate of GDP growth. The methodological framework of the study is rooted in the augmented neoclassical model of growth develop Mankiw, Rome and Weil (1992). The baseline regression of out-of-steady state dynamics takes the following form (10):

$$d \log y_t = a_0 + a_1 \log(y_0) + a_2 \log(s_k) + a_3 \log(n + g + \delta) + a_4 \log(h) + \varepsilon \quad (1)$$

The dependent variable is Gross Domestic Product (GDP) per unit of active population. The values of the structural parameters of the model (α , β , λ) are calculated using the system of equations (2):

$$\begin{aligned} a_1 &= e^{-\lambda t} - 1 \\ a_2 &= (1 - e^{-\lambda t}) \frac{\alpha}{1 - \alpha} \\ a_3 &= -(1 - e^{-\lambda t}) \frac{\alpha}{1 - \alpha} \\ a_4 &= (1 - e^{-\lambda t}) \frac{\beta}{1 - \alpha} \end{aligned} \quad (2)$$

As it was pointed out above, the quality of tertiary education is measured by the graduates who are not vertically mismatched denoted by the variable *vmatch* in table 2. In

order to ascertain the robustness of the results, model 2 and model 5 (table 2) contain vertically mismatched employees defined above (*log vmismatch*) whereas model 3 adds unemployed with tertiary education to the vertically mismatched (*log uvmismatch*). The regressions include also the active population with at least upper secondary education completed (ISCED 3-8) which is denoted by the variable *log h_quantity*. The reason is that the variable *log h* which uses the university graduates only (ISCED 5-8) is highly correlated with both *log vmatch* and *log vmismatch*. The variable *log h_quantity* is not significantly related to the other explanatory variables – the correlation coefficients vary between -0.2 and 0.4. All variables are presented in logs.

Table 2. Panel estimation of the restricted MRW with vertical qualification (mis)match

	Model 1 ^a	Model 2	Model 3	Model 4	Model 5
	All 11 New EU member states			10 New EU member states (excl. Lithuania)	
Dependent variable: first difference of log GDP per a unit of active population ($d\log y_t$)					
const	-0.015 (0.242)	1.117 ^{***} (0.186)	1.173 ^{***} (0.193)	-0.560 ^{**} (0.184)	0.621 ^{***} (0.168)
log y_0	-0.167 ^{***} (0.006)	-0.172 ^{***} (0.007)	-0.172 ^{***} (0.007)	-0.171 ^{***} (0.005)	-0.179 ^{***} (0.008)
log s_k -log ($n+g+\delta$)	0.095 ^{***} (0.009)	0.087 ^{***} (0.010)	0.086 ^{***} (0.010)	0.118 ^{***} (0.007)	0.109 ^{***} (0.009)
log $h_quantity$	0.170 ^{***} (0.039)	0.164 ^{***} (0.044)	0.156 ^{***} (0.046)	0.279 ^{***} (0.032)	0.285 ^{***} (0.044)
log $vmatch$ ^b	0.200 ^{***} (0.031)			0.216 ^{***} (0.024)	
log $vmismatch$ ^c		-0.055 ^{***} (0.009)			-0.059 ^{***} (0.008)
log $uvmismatch$ ^d			-0.057 ^{***} (0.009)		
N of observations	99	99	99	90	90
Adj. R sqr.	0.913	0.884	0.869	0.949	0.916
Normality of residual (p-value)	0.205	0.201	0.209	0.372	0.271
Implicit λ	0.183	0.189	0.189	0.188	0.197
Implicit α	0.363	0.336	0.333	0.408	0.378
Implicit β_1 ^e	0.763	-0.212	-0.221	0.747	-0.201

^a Panel EGLS estimates using period SUR weights are presented.

^b Percentage of active population with higher education who work as managers, professionals, technicians and associate professionals.

^c Percentage of active population with higher education with any occupation different from managers, professionals, technicians and associate professionals.

^d The sum of unemployed and vertically mismatched with tertiary education expressed as percentage of active population with tertiary education.

^e β_1 is the elasticity of the proxy for the human capital quality.

The hypothesis that the negative contribution of tertiary education to growth is related to the vertical qualification mismatch is confirmed by the positive and statistically significant slope coefficient for the variable *log vmatch* (model 1 and 4, table 2). This is fully supported by the restricted MRW regression since the elasticity of the human capital quality (β_1) is around 0.75. Moreover, human capital's quality becomes more important than physical capital for the long-run growth path. On the other hand, in all equations which contain a measure of the over-skilled employees with tertiary education (model 2, 3 and 5), the contribution of education to growth remains below zero. The positive value of the regression coefficient for the variable *log h_quantity* is likely to reflect the beneficial impact of the labor force with upper secondary education since it accounts for more than 60% of the active population on average as the value varies from 54% for Estonia to almost 77% in the Czech Republic and Slovakia.

In general, the econometric output shows that once the vertically matched graduates are introduced into the model, the elasticity of human capital input to aggregate output becomes positive and statistically significant. At the same time, the influence of the over-skilled employees remains negative and statistically significant. This implies that the neoclassical model of growth needs to be further elaborated in order to properly estimate the determinants of economic growth in countries with a higher stock of human capital. Moreover, the study poses some challenges to the educational policy in the field of higher education. It shows that an in-depth analysis is needed of the factors determining the vertical qualification mismatch.

References

1. Birk A., Qualification-mismatch and long-term unemployment in a growth-matching model. HWWA Discussion Paper, No. 128, 2001.
2. Budria S., A. Moro-Egido A., Education, educational mismatch, and wage inequality: evidence from Spain. *Economics of Education Review*, vol. 27, 2008, p. 332-341.
3. Mankiw, G., D. Romer, D. Weil (1992) A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, vol. 107, p. 407-437.
4. McGowan A., D. Andrews, Labor market mismatch and labor productivity: Evidence from PIAAC data. OECD Economics department working papers, N. 1209, OECD Publishing, Paris, 2015.
5. Morgado A., T.N. Sequeira, M. Santos, et al., Measuring Labour Mismatch in Europe, CEFAGE-UE WP 13, University of Evora, Portugal, 2014.