WHEN HIGHER EDUCATIONAL ATTAINMENT HARMS GROWTH: THE ROLE OF VERTICAL QUALIFICATION MISMATCH

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Abstract: *This paper presents a summary of results of a study which investigates the reasons behind the negative link between higher educational attainment of the labor force and the rate of real growth observed in some economies. It tries to explain that pattern in light of the labor market channel and the existence of vertical qualification mismatch specifically. The hypothesis raised has been verified by evaluating the impact of tertiary education on growth in two economies – Bulgaria and Estonia.*

Introduction

According to both exogenous Solow-type and endogenous neoclassical models of growth human capital is positively linked to the rate of real GDP per capita changes (Mankiw et al., 1992; Romer, 1986; Lucas 1988). However, a number of empirical studies which approximate the human capital stock by educational indicators fail to prove the existence of a direct positive link between higher educational attainment and per capita growth rate (Neycheva 2010). Various reasons are presented in order to explain such statistically insignificant or negative outcome. Hanushek and Woessmann (2007) place emphasis on the human capital quality instead of quantity (see also Faruq and Taylor, 2011; Jin and Jin, 2014). Another essential issue is the effect of educational levels on growth or productivity (Petrakis and Stamatakis, 2002; Ang et al., 2011; Neycheva, 2016).

In light of the abovementioned this paper tries to give new evidence on the lack of a positive impact of higher educational attainment on growth of Gross Domestic Product (GDP) per capita by focusing on the labor market channel. The *hypothesis* which the study tries to explore is that a growing share of tertiary education graduates in the active population might lead to a higher degree of vertical qualification mismatch which in turn could worsen the growth prospects.

Definition and measurement of vertical qualification mismatch

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 associated professionals because they require an academic degree according to the International Standard Classification of Occupations (ISCO-08). Skill mismatch has been referred to in the empirical studies mostly related to long-run unemployment (Birk, 2001), labor productivity (McGowan and Andrews 2015), and 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. For the purposes of testing the abovementioned hypothesis, the labor force with tertiary or higher educational degree completed has been decomposed into three parts:

- *RVMhigh* is the share of the vertically mismatched (eq. 1). According to the above definition it takes into account the employed with tertiary education who work in any occupation except managers, professionals, technicians and associated professionals.

$$RVMhigh = \frac{Vertically\ mismatched\ with\ tertiary\ education}{Active\ population\ with\ tertiary\ education} \quad (1)$$

- *RVMUhigh* represents university graduates who are either vertically mismatched or unemployed during the investigated period (eq. 2)

$$RVMUhigh = \frac{Vertically\ mismatched\ with\ tertiary\ education + Unemployed\ with\ tertiary\ education}{Active\ population\ with\ tertiary\ education} \quad (2)$$

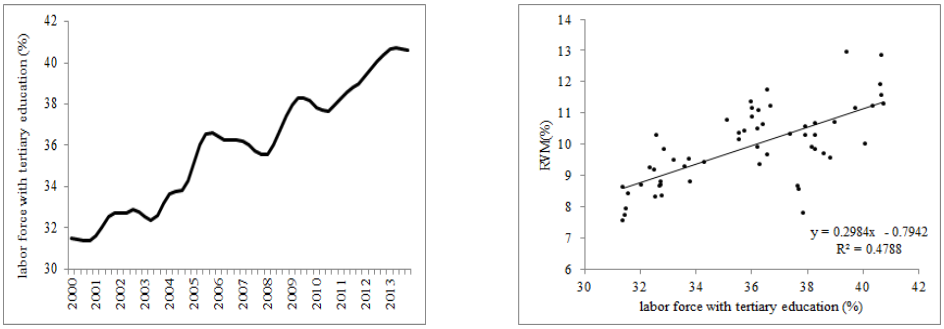
- *RSMOhigh* refers to the graduates whose jobs match the theoretical skills acquired (eq. 3). The latter could be used as an indicator of the quality of tertiary education as well.

$$RSMOhigh = \frac{Employed\ in\ occupations\ requiring\ tertiary\ education}{Active\ population\ with\ tertiary\ educaiton} \quad (3)$$

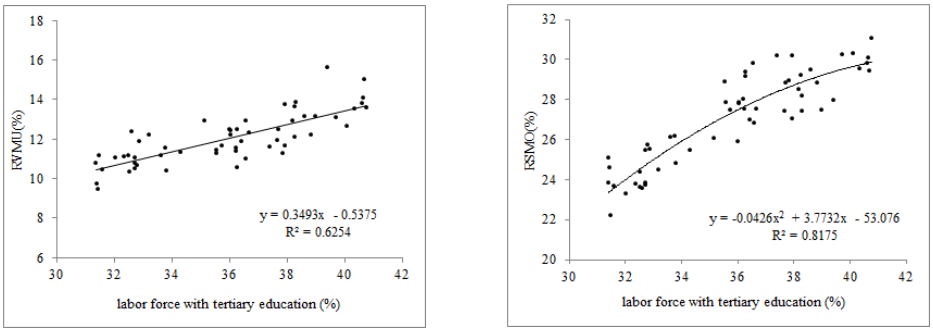
Figures 1-2 shed light on the functional relations between the labor force with tertiary education and the abovementioned indicators. It is clearly seen that the degree of mismatch is closely related to the changes in the human capital's structure. The non-linear positive dependence observed for Bulgaria (fig. 2b and fig. 2c) indicates that the strong increase of the number of people with tertiary education deepens both the degree of mismatch and unemployment. In Estonia the number of graduates holding either a bachelor's degree or a master's degree has been declining by 1.7% per year since 2008. This is accompanied by a slow increase of the vertical mismatch and unemployment (fig. 1b and 1c).

Figure 1. Tertiary education graduates vs. degree of mismatch in Estonia

(a) *Labor force with tertiary education* (b). $RVMhigh$



(c) $RVMUhigh$ (d) $RSMOhigh$



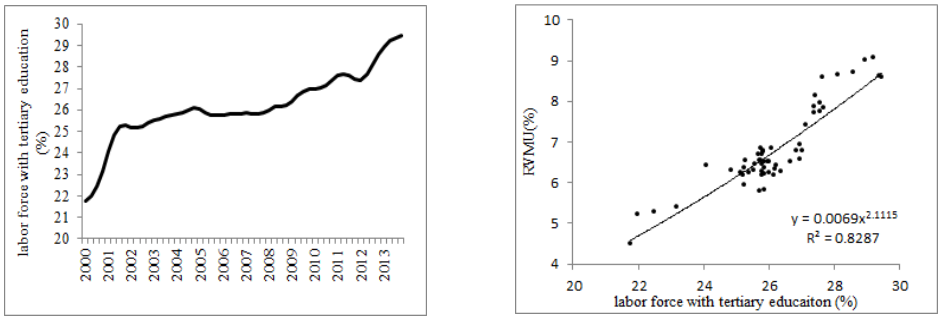
Source: Eurostat, author's calculations

In Bulgaria the share of the university graduates in the labor force is higher than the EU average. Additionally, between 2008 and 2012 their number was growing up by 5.5% per year. The labor market's response to this tendency is an increase at a diminishing rate of employed in skill match

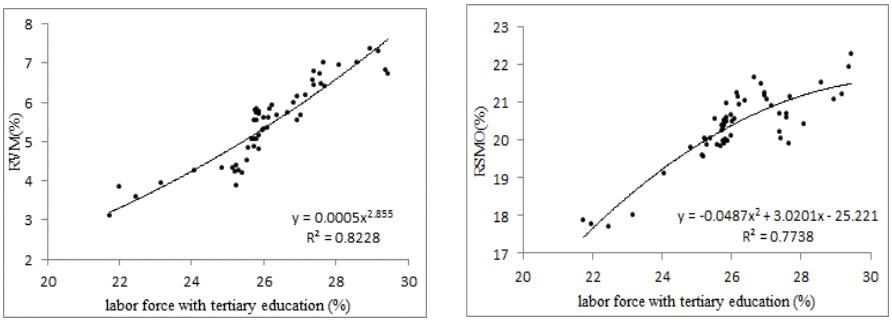
occupations (fig. 2d). In general, the graphical analysis justifies the assumption that the higher university completion rate extends the qualification mismatch.

Figure 2. Tertiary education graduates vs. degree of mismatch in Bulgaria

(a) *Labor force with tertiary education* (b) $RVMhigh$



(c) $RVMUhigh$ (d) $RSMOhigh$



Source: Eurostat, author's calculations

Econometric models and outcome

The empirical models are based on the procedure suggested by Carrion-i-Silvestre and Sanso (2006). It takes into account the possible endogeneity of the explanatory variables. For this reason it is preferred to the popular method of Gregory and Hansen (1996). The null hypothesis of cointegration is tested by a multivariate extension of the KPSS test (Kwiatkowski et al. 1992). The optimal data dependent bandwidth parameter is selected in accordance with the method proposed by Kurozumi (2002). The growth regression (eq. 4) is an extension of the DOLS model proposed by Stock and Watson (1993). Its application would ensure the robustness of the results since it accounts for the structural breaks in the data, the potential endogeneity of the regressors, and the serial correlation in the errors by including additional terms ($\Delta X_{i,t+j}$) for

the lags and leads of the first differences of the explanatory variables. It is powerful for small samples, as well.

$$ln\ RGDP_t = a_0 + \sum d_i * X_{i,t} + \sum_{j=-k}^{k} f_i * \Delta X_{i,t+j} + g(t) + \varepsilon_t \qquad (4)$$

The dependent variable is Real Gross Domestic Product (*RGDP*) per unit of active population in logs. The vector of slope coefficients [di] measures the long-run impact on growth of the regression variables. In addition to the degree of vertically mismatched presented by variables *RVMhigh*, *RVMUhigh*, and *RSMOhigh* discussed above the vector of regression variables takes into account:

- the share of active population having completed secondary education (*sec*);
- real business investments (*rinv*);
- foreign direct investments (*fdi*);
- the value of export (exp).

The function denoted by *g(t)* represents the regime shift model which best describes the co-integrating relation. For each of the two countries four specifications for *g(t)* have been considered for each break quarter, as follows:

- model *An* assumes a shift in the level*:* $g_{An}(t) = \alpha + \theta * DU_t$ (5)
- model *A* represents a level shift with trend: $g_A(t) = \alpha + \theta * DU_t + \varphi * t$ (6)
- model *D* simulates a regime shift: $g_D(t) = \alpha + \theta * DU_t + \sum_i \beta_i * X_{i.t} * DU_t$ (7)
- model *E* denotes a regime shift with trend: $g_E(t) = \alpha + \theta * DU_t + \varphi * t + \sum_i \beta_i * X_{i.t} * DU_t$ (8)

The dummy variable (DU) is equal to 0 up to the corresponding break quarter for real GDP (TB) and 1 after that.

$$DU_t = \begin{cases} 1, t > TB \\ 0, t \leq TB \end{cases} \qquad (9)$$

The respective break quarters are 2007:3 for Estonia 2006:4 for Bulgaria. Model D has been applied for Estonia and model E for Bulgaria for function (g_t). As it is shown in table 1, the slope coefficients of the variables *RVMhigh*, *RVMUhigh* and *RSMOhigh* show the expected percentage change of real GDP per unit of active population in response to a 1% increase of the respective variable. The results are in conformity with those presented in table

1. The negative values for Bulgaria (models 3-4 in table 1) reveal that both the labor market mismatch including unemployment and the contribution of the workers in skill match occupations determine the negative impact of tertiary education on growth previously discussed. As it is expected, in Estonia the regression coefficient of the variable *RSMOhigh* is above zero whereas the results for the vertical qualification mismatch is negative. This econometric exercise confirms the hypothesis that the rapid growth of university graduates might deepen the vertical qualification mismatch which, in turn, adversely affects aggregate output. It must be emphasized that the coefficients for secondary education (sec) in Bulgaria is negative and statistically significant (model 3 and model 4).

Table 1. Impact of vertical qualification mismatch on growth

Dependent variable lnRGDP[*]	Estonia break 2007:3		Bulgaria break 2006:4	
	1	2	3	4
RVMhigh[**]	-0.115[(2)] (0.049)	-	-0.105[(2)] (0.042)	-
RVMUhigh	-	1.419[(2)] (0.536)	-	-0.111[(3)] (0.056)
RSMOhigh	2.280[(3)] (1.323)	2.842 (2.198)	-0.238[(3)] (0.125)	-0.067 (0.109)
sec	0.478[(3)] (0.273)	0.994[(1)] (0.255)	-1.295[(1)] (0.124)	-0.984[(1)] (0.121)
rinv	0.196[(1)] (0.019)	0.156[(1)] (0.020)	0.188[(1)] (0.045)	0.059 (0.059)
fdi	0.062[(2)] (0.029)	0.176[(1)] (0.018)	0.066[(2)] (0.020)	0.102[(1)] (0.026)
exp	0.199[(1)] (0.029)	0.201[(1)] (0.026)	0.175[(1)] (0.018)	0.152[(1)] (0.019)
AIC	-320.048	-307.025	-432.882	-421.311
Doornik-Hansen test (p-values)	3.264 (0.196)	1.613 (0.446)	0.328 (0.849)	3.482 (0.175)

[*]All variables are presented per unit of active population and expressed in logs. Standard errors are given in parentheses. The models are solved by the DOLS method with structural break.

[**]The square terms of the three human capital proxies are also included since the preliminary analysis shows that they are linked to growth by a polynomial relationship.

[(1),(2),(3)] Significant at the 0.01, 0.05 and 0.10 level, respectively

Analysis of the study results and concluding remarks

This paper sheds some light on the link between higher educational attainment of the population and the rate of real growth by testing the importance of the labor market channel. The study compares two countries - Estonia and Bulgaria which have a relative high share of active population with tertiary education. Yet, the outcome reveals some important differences between the two economies.

First, the increasing share of university graduates leads to a steeper increase in the degree of vertical mismatch in Bulgaria. In contrast, in Estonia the share of the vertically mismatched raises more slowly when the labor force with higher education increases. Second, the labor force with higher education which occupies positions requiring relevant theoretical knowledge and skills is positively related to the rate of growth in Estonia but negatively in Bulgaria. A plausible explanation of such an outcome might be the differences in the quality of education or the direct link between tertiary education and the national labor market. As well, secondary education also affects growth negatively in Bulgaria, while for Estonia the regression coefficient is positive and statistically significant.

Though the comparison of the study results is complicated due to differences in the methodology, it should be noted that the regression output supports Ganeva et al. (2014) who pay attention on the adverse effect of the qualification mismatch of the university graduates in the Bulgarian economy. The study has some practical implications for the educational policy in the European economies specifically the countries with increasing tertiary education graduation rates. The automatic following of the headline target that 40% of those aged 30-34 years should have higher education by 2020 might have a negative impact on the economy. Therefore, the primary responsibility of the government should be to ensure the quality of education as well as the conformity between the sectoral country profile and the labor market requirements on the one hand and knowledge and skills acquired in school on the other hand. Further research is needed in this direction.

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