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ECONOMIC FREEDOM AND EDUCATIONAL ATTAINMENT: EVIDENCE FROM NEW EU MEMBER STATES

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Abstract. Educational attainment is a critical factor for individuals and societies given its positive economic implications. Therefore, determinants of educational attainment are important for design and implementation of educational policies. In the article, the causal interaction between economic freedom and educational attainment is investigated in sample of the new European Union states over the 2000–2019 term by means of causality test. The consequences of panel level causality analysis reveal a bilateral causality between economic freedom and educational attainment in the sample. In other words, on the one hand econometric freedom has a significant influence on educational attainment, on the other hand educational attainment has a significant influence on economic freedom. Furthermore, country level causality analysis uncovered a bilateral causality between economic freedom and educational attainment in Lithuania, a unidirectional causality from economic freedom to educational attainment in Latvia, a unidirectional causality from educational attainment to economic growth in Bulgaria, Czechia, Hungary, and Slovenia.

Keywords: economic freedom, educational attainment, new EU Member States, panel causality analysis.

JEL Classification: C33, D02, I20.

Introduction

The globalization process accelerated as of 1970s, and many countries began to integrate with global economy through market-oriented policies. In this context, effect of economic freedom on economic growth and various indicator of life satisfaction has been extensively researched to the present (Graafland, 2020; Taş & Ulusoy, 2021; Kabir & Alam, 2021). However, the channels which economic freedom affects economic growth and development through have not yet been fully determined. In this context, educational attainment is a significant determinant of human capital, labor productivity, innovation, competitiveness, and technological development (Breton, 2013). Therefore, the reciprocal interaction between economic freedom and educational attainment is important for economic growth and development.

The individuals in the countries with higher economic freedom attach more importance to education, because main components of economic freedom including government sector size, legal structure and property rights, sound money, international trade freedom, and regulations allow the economies to operate more efficiently, become more competitive, and produce better economic performance and in turn raise the returns to education (Feldmann, 2021). The positive effect of economic freedom on economic growth has been affirmed by a wide range of researchers such as Taş and Ulusoy (2021), Kabir and Alam (2021), Brkić et al. (2020), Doucouliagos and Ulubasoglu (2006). The positive growth of economic freedom can also positively influence the education by increases in educational investments and personal income. On the other hand, a well-educated individual is also more likely to support the policies increasing the economic growth and development (Papaioannou, 2018). Therefore, a two-way interaction between economic freedom and educational attainment is theoretically expected.

In the empirical literature on determinants of educational attainment, the effect of demographic variables, parent income, teacher experience, school resources, real

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GDP per capita, economic growth, poverty, income distribution, globalization, and ICT penetration on educational attainment have generally explored. The researchers have generally analyzed the influence of economic freedom on literacy rate, life quality, and human development. Only a few researchers have investigated the influence of economic freedom or its main components on educational attainment only at panel level. For this reason, the paper aims to make a contribution to the relevant literature in two ways: First, the paper will be one of the first papers to analyze the reciprocal influence between educational attainment and economic freedom in sample of the new EU (European Union) member states. Secondly, the causality analysis will be conducted at both country and panel levels. The paper was organized as follows: The literature about interaction between economic freedom, educational attainment, and human development was reviewed in Section 1. The related data and method were described in Section 2. Later, empirical applications were made in Section 3 and the study was concluded with Conclusions.

1. Literature review

Educational attainment is a crucial determinant for economic and social development. For this reason, the specification of factor underlying educational attainment exhibits important for educational policy-making. The researchers have determined many determinants such as demographic characteristics, teacher experience, school resources, economic growth, real GDP per capita, poverty, income distribution, globalization, and ICT penetration as factors underlying educational attainment (Mayer, 2010; Gumus & Kayhan, 2012; Badr et al., 2012).

Grubel (1998) analyzed the influence of economic freedom on some indicators of economic development in 113 countries via regression method and reached that economic freedom raised the human development and adult literacy rate. On the other hand, Esposto and Zaleski (1999) investigated the effect of economic freedom on adult literacy rate and life expectancy in 1985 via regression approach and discovered an insignificant influence of economic freedom on adult literacy rate in countries with low literacy rates. However, economic freedom had a positive influence over literacy rates in countries with high literacy rates.

Stroup (2007) explored the effect of economic freedom on prosperity in 104 countries for the period of 1980–2000 and raised the literacy rate and primary education attainment. Nikolaev (2014) also investigated the influence of economic freedom on life quality proxied by various indicators including human development in a panel consisting more than 100 countries for the period of 1980–2010 via regression analysis and discovered a positive influence of economic freedom on human development.

Çalışkan (2016) investigated the effect of economic freedom and its main components on education in a panel of 118 countries with different income levels over the 1970–2000 period by means of regression analysis and revealed that economic freedom had a positive influence on tertiary school enrolment and the number of students per teacher in primary education. On the other hand, government size, freedom of international trade, and regulations had a positive effect on tertiary school enrolment; but legal structure and property rights decreased the tertiary school enrolment. All the components of economic freedom except freedom of international trade raised the number of students per teacher in primary education.

Zaman et al. (2017) analyzed the influence of economic freedom and its components over higher education in SAARC economies for the 1995–2012 term via regression approach and found a positive influence of economic freedom and its components on various education proxies. Naanwaab (2018) explored the influence of economic freedom on human development in 88 countries by means of quantile regression and the findings indicated a changing influence of economic freedom on human development varied depending on quantiles of human development and the countries with lower human development gained more gains from increases in economic freedom.

Satrovic (2019) explored the interplay among economic freedom, human capital, and shadow economy in 34 countries for the period 1999–2013 through ARDL approach and discovered a positive influence of economic freedom on education proxied by secondary school enrolment. On the other hand, Stryzhak (2020) examined the relation among happiness, income, education, and economic freedom in 145 countries in 2018 through correlation analysis and discovered that education was closely related to economic freedom.

Okunlola and Ayetigbo (2021) examined the influence of economic freedom on human development in ECOWAS countries over 1990–2017 term via pooled mean group ARDL approach and revealed a positive influence of economic freedom on human development. Last, Feldmann (2021) analyzed the influence of economic freedom on individuals' view about education in 48 countries through regression analysis and found that individuals from countries having higher economic freedom attached more importance to educational attainment.

A few researchers have investigated the effect of educational attainment on economic freedom or its components and have disclosed that educational attainment fostered the economic freedom in parallel with theoretical expectations.

DeAngelis and Shakeel (2018) explored the effect of private school on civil liberties, political rights, and economic freedom in 174 countries for the period of 1999–2014 through regression analysis and reached that private primary school enrolment positively affected the political and economic freedom. On the other hand, Papaioannou (2018) explored the effect of educational attainment

proxied by average schooling years on economic freedom in 125 countries for the period of 1975–2015 through regression method and uncovered a positive influence of educational attainment on economic freedom.

2. Data and method

In the paper, the reciprocal relationship between economic freedom and educational attainment was examined through causality analysis. Two institutions, Heritage Foundation and Fraser Institute already calculate the economic freedom indices which are widely employed in the studies. In the causality analysis, economic freedom was represented with economic freedom index by Fraser Institute (2022) regarding Nikolaev (2014), Çalışkan (2016), and Okunlola and Ayetigbo (2021). The economic freedom index is calculated with a combination of five indicators of government size, legal system and property rights, sound money, trade freedom, regulations and their sub-components and gets values between 0 (lowest economic freedom) and 10 (highest economic freedom) (Fraser Institute, 2022). On the other hand, educational attainment was represented by education index of UNDP (United Nations Development Programme) (2022), because education index is calculated with employment of mean schooling years of adults and expected schooling years of school aged children and gets value between 0 (lowest) and 1(highest). Economic freedom and education index were annual and covered 2000–2019 period, because economic freedom index regularly existed as of 2000 and both series lasted in 2019. The symbols and definitions of the variables were shown in Table 1.

Table 1. Description of dataset (source: authors' own elaboration)

Variable symbols	Variable description
EFREEDOM	Economic freedom index (annual)
EDU	Education index (annual)

The EViews 12.0 and Stata 15.0 were employed for the econometric analyses. The sample of the research composed of Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

The common characteristics of economic freedom and education index of the sample were displayed in Table 2. The means of economic freedom index and education index of the sample were respectively 7.4366 and 0.8092. However, both economic freedom and education index varied relatively less among the EU transition states.

Table 2. Descriptive statistics (source: authors' own elaboration)

Characteristics	EFREEDOM	EDU
Mean	7.4366	0.8092
Standard Deviation	0.4930	0.0589
Maximum	8.21	0.910
Minimum	5.44	0.654

The causal relationship between economic freedom and educational attainment was analyzed with causality test of Emirmahmutoglu and Kose (2011). The test is the developed version of Toda-Yamamoto causality test for heterogeneous panels and takes the cross-sectional dependency into consideration. For this reason, the series are not required to be stationary for utilization of the test. In this context, Emirmahmutoglu and Kose (2011) causality test may be utilized with the series of I(0) and I(1). Moreover, the test can be employed in existence of insignificant or significant cointegration interaction (Emirmahmutoglu & Köse, 2011). The causality between X and Y can be expressed as following:

$$Y = \varphi_{\dot{Y}}^{Y} + \sum_{k=1}^{k_i+d_{\max_i}} A_{11,ik} Y_{it-k} + \sum_{k=1}^{k_i+d_{\max_i}} A_{12,ik} X_{it-k} + \mu_{\dot{Y},T}^{Y}; \quad (1)$$

$$X = \varphi_{\dot{Y}}^{X} + \sum_{k=1}^{k_i+d_{\max_i}} A_{21,ik} Y_{it-k} + \sum_{k=1}^{k_i+d_{\max_i}} A_{22,ik} X_{it-k} + \mu_{\dot{Y},T}^{X}, \quad (2)$$

k is the lag length, $d_{\max}$ is the maximum integration level in both equations.

3. Empirical analysis

In the part of econometric analysis, pre-tests of cross-section dependence and homogeneity were firstly employed to make a selection among the tests of unit root and causality. In this context, the entity of cross-sectional dependence was analyzed by cross-section dependence tests of LM by Breusch and Pagan (1980), CD by Pesaran (2004), and LM adj. by Pesaran et al. (2008) and test' consequences were depicted in Table 3. The null hypothesis of cross-section independency was denied and in turn presence of cross-sectional dependence was concluded.

Table 3. Results of cross-sectional dependence tests (source: authors' own elaboration based tests' findings)

Test	Test statistic	Prob.
LM	131.8	0.0001
CD*	6.206	0.0003
$LM_{adj.*}$	16.8	0.0002

Note: *two-sided test.

The availability of heterogeneity was analyzed through delta tilde tests of Pesaran and Yamagata (2008) and test

findings were shown in Table 4. As a consequence, null hypothesis of homogeneity was denied and presence of heterogeneity was concluded.

Table 4. Results of homogeneity tests (source: authors' own elaboration based tests' findings)

Test	Test statistic	Prob
$\tilde{\Delta}$	11.989	0.0002
$\tilde{\Delta}_{adj.}$	13.004	0.0001

The availability of unit root in variables of economic freedom and educational attainment was investigated via Pesaran (2007) CIPS test thanks to the presence of cross-sectional dependence and the consequences of unit root test were shown in in Table 5 pointed out that both EDU and GRWOTH were I(1). The results indicated that, EFREEDOM was stationary at the level, but EDU became stationary after first-differencing.

Table 5. Results of unit root test (source: authors' own elaboration based test findings)

Variables	Constant	Constant + Trend
EFREEDOM	–2.714***	–3.054***
D (EFREEDOM)	–4.414***	–4.789***
EDU	–2.014	–2.334
D (EDU)	–3.651***	–3.705

Note: *** it is significant at 1%.

The findings of cross-section dependence and homogeneity tests directed us to employ a causality test taking cross-section dependence and heterogeneity into consideration. Therefore, the causal relationship between educational attainment and economic freedom was analyzed by means of Emirmahmutoglu and Kose (2011) and the findings of causality test were shown in Table 6. The panel level causality analysis uncovered a bilateral causality between economic freedom and educational attainment. However, the country level causality analysis discovered a bilateral causality between economic freedom and educational attainment only for Lithuania. On the other hand, a unidirectional causality from economic freedom to educational attainment in Latvia and a unidirectional causality from educational attainment to economic freedom in Bulgaria, Czechia, Hungary, and Slovenia were discovered.

A mutual interplay between educational attainment and economic freedom is theoretically expected. However, most of the researchers have investigated the influence of economic freedom on educational attainment and revealed that economic freedom fostered educational attainments and raised the awareness of education. On the other hand, a few scholars have found that educational attainment has been also a significant determinant of economic freedom. Our panel level causality analysis also pointed out a two-way causality between economic freedom and educational attainment. In other words,

Table 6. Results of causality test (source: authors' own elaboration based on causality test)

Countries	EFREEDOM $\not\rightarrow$ EDU		EDU $\not\rightarrow$ EFREEDOM	
	Test statistic	P value	Test statistic	P value
Bulgaria	2.688	0.442	7.955	0.047
Croatia	1.374	0.241	0.311	0.577
Czechia	2.331	0.127	18.653	0.000
Estonia	0.765	0.682	1.234	0.540
Hungary	1.519	0.678	8.292	0.040
Latvia	15.418	0.001	1.511	0.680
Lithuania	37.880	0.000	7.107	0.069
Poland	0.695	0.707	0.244	0.885
Romania	2.373	0.305	2.772	0.250
Slovakia	3.215	0.360	2.360	0.501
Slovenia	5.558	0.135	12.357	0.006
Panel	66.925	0.000	57.676	0.000

economic freedom had a significant influence on educational attainment, and in turn educational attainment had a significant impact on economic freedom. However, country level causality uncovered a two-way causality between economic freedom and educational attainment only for Lithuania, and a unidirectional causality from economic freedom to educational attainment in Latvia; a unidirectional causality from educational attainment to economic freedom in Bulgaria, Czechia, Hungary, and Slovenia. The findings of country level causality analysis can be resulted from the transition from state-controlled command economy to market-driven capitalism.

Conclusions

Education is a critical determinant for economic and social development of the societies, because it is a key element of growth and development theories. Therefore, governments give priority to educational policies. In this context, we analyzed the mutual interaction between educational attainment and economic freedom in sample of EU transition economies with causality test taking the gap in the related literature into consideration.

The panel level causality analysis uncovered a bidirectional causality between economic freedom and educational attainment. In other words, there was a feedback process between educational attainment and economic freedom. The consequences of country level causality analysis pointed out a bilateral causal interaction between economic freedom and educational attainment in Lithuania; and a unidirectional causality from economic freedom to educational attainment in Latvia; and a unidirectional causality from educational attainment to economic freedom in Bulgaria, Czechia, Hungary, and Slovenia. The transition from command economy to market economy by the countries began in mid-1990s. Therefore, educational attainment affected the economic freedom in the

beginning, but economic freedom may probably affect the educational attainment over time. Future studies can analyze the relationship between main components of economic freedom and educational attainment.

Disclosure statement

We do not have any competing financial, professional, or personal interests from other parties.

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