

THE ROLE OF HIGHER EDUCATION ATTAINMENT IN ECONOMIC DEVELOPMENT: EVIDENCE FROM THE REPUBLIC OF MOLDOVA

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Abstract: *This study examines the relationship between attainment of higher education and economic development in the Republic of Moldova amid demographic decline, population ageing, and labour migration. The main aim of the research is to identify whether an increase in the share of individuals aged 25 years and older possessing higher education contributes positively to GDP at purchasing power parity (PPP). The analysis is based on annual macroeconomic data for Moldova covering the period 2001–2024 obtained from the World Bank’s World Development Indicators database and the International Monetary Fund. The empirical methodology relies on the Cobb–Douglas production framework estimated in logarithmic form, where GDP at PPP in constant 2021 international dollars depends on capital stock, labour input, and the share of the population aged 25 or older with higher education. Ordinary least squares (OLS) and two-stage least squares (2SLS) models are estimated in order to test for possible endogeneity of the educational attainment variable and to compare the consistency of the obtained estimates. The results demonstrate that capital accumulation remains the principal driver of economic growth in Moldova, while the share of the population with higher education has a positive and statistically significant effect on GDP at PPP for 2009–2024. Diagnostic procedures do not reveal significant econometric problems related to heteroskedasticity, autocorrelation, multicollinearity, wrong specification. The findings of weak instruments and Wu-Hausman tests suggest that despite demographic challenges and migration processes, the increasing share of the individuals with higher education contributes positively to Moldova’s economic development.*

Key words: *higher education, economic growth, labour, capital stock*

JEL: F43, C22, C26, I25

Introduction

Population ageing, persistently low fertility rates, and large-scale labour migration have emerged as significant long-term constraints on economic growth in Central and Eastern Europe, particularly in post-socialist economies outside the European Union. In the Republic of Moldova, these demographic and social processes are accompanied by a steady decline in the working-age population, a rising demographic dependency ratio, and the ongoing emigration of highly qualified professionals. Under these circumstances, the ability of professional and especially higher education systems to adapt to evolving labour market needs becomes a critical determinant of economic competitiveness and sustained long-term growth.

Traditional economic growth models, such as the Keynesian Harrod–Domar model (Harrod, 1939; Domar, 1946) and the neoclassical Solow model (Solow, 1956), incorporated education only indirectly—primarily through aggregate investment and exogenous technological progress. In contrast, endogenous growth theories advanced by Romer (1990), Lucas (1988), and Uzawa (1965) highlight the direct role of human capital accumulation and education in fostering long-term economic expansion. According to human capital theory (Schultz, 1961; Becker, 1964), investment in education enhances labour productivity and contributes to higher national income. Nevertheless, empirical evidence on the effectiveness of public spending on education remains mixed, especially in former socialist European

countries (Coman et al., 2022), where institutional inefficiencies, labour migration, and structural mismatches between educational systems and labour-market demands are prevalent.

Studies focusing on post-socialist European countries reveal that the impact of public educational expenditure varies considerably across regions and institutional frameworks. While positive effects are more commonly observed in Western Europe, the relationship in Eastern Europe is often statistically weak or inconsistent (Gagauz & Samohvalov, 2024). Earlier empirical research for Moldova has even indicated a negative association between educational expenditure and GDP (PPP), a phenomenon attributed to migration, inefficient allocation of public resources, and problems with alignment between educational programs and labour market requirements (Gagauz & Samohvalov, 2024).

Despite high migration rates, a substantial portion of higher education graduates remain engaged in the Moldovan labour market. However, available official and survey-based data do not allow for a precise estimation of the proportion of graduates who remain in Moldova after earning their degrees. Against this background, the aim of this study is to quantitatively assess the role of the share of individuals aged 25 and older with at least a bachelor's degree among the total 25+ population in Moldova in the level of economic development.

Basic content

The empirical analysis in this study utilises annual macroeconomic data for the Republic of Moldova, spanning the period from 2001 onward. The choice of this observation window is primarily driven by data availability. Specifically, the key indicator reflecting the share of the population aged 25 years and older with higher (at least bachelor's degree) education is available for Moldova in the World Bank database only from 2000. Additionally, the dynamics of capital growth in the socialist period (with constant growth at 4% until 1990, followed by a steady decline in the 1990s) differ fundamentally from the steady capital growth experienced under market conditions in the 21st century, when 16 out of 19 years from 2001 to 2019 showed year-over-year increases in capital stock. Consequently, the effective estimation period begins in 2001.

For each linear regression model, natural logarithm of capital stock for the years 2020–2024 was forecasted using the Ordinary Least Squares (OLS) method for simple linear regression in Microsoft Excel, based on historical natural logarithm of capital stock data from 2001 to 2019.

The analysis draws on data from the International Monetary Fund (capital stock) and the World Bank's World Development Indicators (all other model variables). GDP at purchasing power parity (PPP) in constant 2021 international dollars is used as the dependent variable, as it reflects the scale of economic activity adjusted for price levels over time.

The empirical framework is based on the Cobb–Douglas production function:

$$Y=AK^{\alpha}L^{\beta} \tag{1}$$

where Y denotes output (in US dollars at 2021 PPP), K is capital stock (in US dollars at 2017 PPP), L is labour input, and A reflects the level of technological and human capital development. Labour input is calculated as the product of the population aged 15 and older and the labour force participation rate for that group (ILO estimates in the World Bank database), divided by 100.

A central focus of the study is the role of attainment of higher education in economic development. The variable b_{25} represents the share of individuals aged 25 and older with at least a bachelor's degree. The instrumental variable b_{25_1} reflects the same indicator lagged by one year, allowing the analysis to test whether the attainment of higher education causally influences economic development rather than simply correlating.

The estimated regression specification is:

$$LN(Y) = \beta_0 + \beta_1LN(K) + \beta_2LN(L) + \beta_3b25 + \varepsilon \quad (2)$$

where b25 equals LN(A) from the first equation. Estimation proceeded in stages: first, ordinary least squares (OLS) models were estimated; then, two-stage least squares (2SLS) was used to test the quality of the OLS model. The best-performing model for Moldova, summarised in Table 1, demonstrates a positive, statistically significant relationship between the share of the population with higher education and GDP at PPP, with high explanatory power and sound econometric properties.

Table 1. OLS estimation results for Moldova (2009–2024)

Country	LN(K)	LN(L)	share, 25+	ε	R-squared	Adj. R-squared	Number of observations
Moldova	2.2822**** (1.95*10 [^] (-5))	0.3634 (0.10163)	2.6379** (0.02126)	-37.554*** (0.00181)	0.9518	0.9398	16

****, ***, **, * denote significance at the 0.1%, 1%, 5%, and 10% levels, respectively.

Note: The table presents p-values in brackets.

Source: Calculated by the author

The results indicate that capital accumulation is the principal driver of economic growth in Moldova, as evidenced by the positive and highly significant coefficient associated with capital stock. Additionally, the proportion of the population aged 25 and older with higher education is positively related to GDP at PPP and is statistically significant at the 5% level. The labor variable also maintains the expected positive sign and approaches the conventional 10% significance threshold.

All estimated models were subjected to diagnostic tests for heteroskedasticity, autocorrelation, multicollinearity, and specification errors. These procedures did not reveal any statistically significant econometric issues, thereby confirming the reliability of the estimated models.

To assess whether the observed relationship between higher educational attainment and economic development reflects a causal effect, a two-stage least squares (2SLS) model was estimated, employing the lagged value of the educational attainment variable as an instrument. The results of this analysis are presented in Table 2.

Table 2. 2SLS estimation results for Moldova (2009–2024)

Country	LN(K)	LN(L)	share, 25+	ε	R-squared	Adj. R-squared	Number of observations
Moldova	2.2372**** (8.58*10 [^] (-5))	0.3607 (0.10483)	2.8056** (0.02126)	0.00471*** (0.04041)	0.9517	0.9396	16

****, ***, **, * denote significance at the 0.1%, 1%, 5%, and 10% levels, respectively.

Note: The table presents p-values.

Source: Calculated by the author

The 2SLS estimates remain very close to the OLS coefficients, supporting the consistency and robustness of the obtained estimates. The coefficient associated with attainment of higher education remains positive and statistically significant after instrumenting the variable. The validity of the instrumental variable was additionally evaluated using Weak Instruments and Wu–Hausman diagnostic tests, the results of which are reported in Table 3.

Table 3. Diagnostic tests for the 2SLS model

Country	Weak instruments	Wu-Hausman
Moldova	0.000365****	0.8234

****, ***, **, * denote significance at the 0.1%, 1%, 5%, and 10% levels, respectively.

Note: The table presents p-values.

Source: Calculated by the author

Overall, the findings suggest that despite demographic challenges and migration processes, the increasing share of individuals with higher education contributes positively to Moldova's economic development for 2009-2024. These findings suggest that the OLS estimates are consistent and unbiased.

Conclusions

The results of this study demonstrate that the share of the population aged 25 years and older with higher education has a statistically significant positive relationship with GDP at purchasing power parity in the Republic of Moldova during the period 2009–2024. The estimated Cobb–Douglas–type models indicate that capital accumulation remains the principal driver of economic growth, the labour variable maintains a positive sign but shows comparatively lower statistical significance, which may reflect the ongoing influence of demographic decline and migration on Moldova's labour market.

The estimated models successfully pass tests for heteroskedasticity, autocorrelation, multicollinearity, specification correctness, and weak instruments. In addition, the Wu–Hausman test indicates that the educational attainment variable is not statistically endogenous, supporting the consistency and reliability of the OLS model's estimates.

The positive coefficient associated with the attainment of higher education does not imply that public investment in higher education in Moldova is fully efficient. Previous studies frequently identified relatively weak or even negative relationships between government expenditure on education and economic growth. Nevertheless, the current results suggest that an increase in the share of highly educated individuals contributes positively to economic development, as workers with higher education exhibit higher productivity, adaptability, and innovative potential. This study contributes to the literature by re-evaluating the relationship between higher education and economic growth in Moldova, and may inform future improvements to the higher education system in light of expected demographic changes.

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