The Relationship between General Government Education Expenditure, Employee Educational Level and Tertiary Education in the European Union: Analysis Based on Eurostat Data

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Abstract

This study examines the relationship between general government total expenditure on education (% of GDP) and employees by educational attainment level and how it influences tertiary education (levels 5-8) in the European Union, using Eurostat data for 2023.

The analysis is based on three main indicators: general government total expenditure on education, employees by educational attainment level and tertiary education. The methodology includes the use of secondary data in descriptive statistics, correlation analysis and multiple linear regression. The results highlight a relatively uniform distribution of public expenditure on education, but reveal significant differences between countries regarding tertiary education.

The Pearson and Spearman correlation analysis point out weak results that are not statistically significant. The analysis of the coefficients indicates that employees by educational attainment level influence tertiary education, while general government total expenditure on education does not. The study shows that the structure of the labor market is the factor that explains the differences in tertiary education across the 27 countries studied.

Keywords: *Public expenditure, education expenditure, investments, education, tertiary education*

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1. Introduction

Education is one of the key pillars of a country's economic and social development, as it is directly linked to labor productivity, the growth of human capital and economic competitiveness.

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European Union member states allocate public resources to education in order to create a skilled workforce. Differences in general government total expenditure on education (% of GDP) varies due to the differing financial capacities of the countries analyzed, the importance they place on education and their public policies.

Public investments contribute to the skill level of employees and their participation in tertiary education. It is not only the efficient allocation of financial resources that matters, but also how public policies are implemented. Although they are referred to as "expenditures" in the education system, they are in fact investments in human capital and in the productivity of the workforce.

This study aims to analyze the relationship between general government total expenditure on education (% of GDP), employees by educational attainment level and tertiary education (levels 5-8) across the 27 member states of the European Union using secondary data from Eurostat for the year 2023.

In the same time, this study focuses on analyzing the impact of the selected indicators and examines how public expenditure on education can influence the structure of the labor force and educational development.

2. Literature review

The literature highlights the fact that countries allocate their education expenditures differently, regardless of whether they are developed countries or the level of education (Di Gioacchino et al., 2025). In the context of the globalized economy, public expenditure on education is an important tool for implementing public policies. The level of expenditure on education is influenced by each country's level of economic development (Molina-Morales, 2013). In most countries, education is funded through public spending, which serves as the foundation for the development of education systems. General government total expenditure on education (% GDP) and percentage of total government budget allocated to education are two of the indicators used in comparative analyses of countries (Millin et al., 2023). Increased government expenditure on education stimulates economic growth and such investments should be a priority even when resources are limited (Konopczyński, 2024).

Investments in education are important for a country economy and development. The high demand for education makes funding education a priority for a country government. The government spends money to provide education and people contribute through their own expenses, with both contributing to the growth of human capital (Varughese & Bairagya, 2025).

Education contributes to the development of human capital, having a positive impact on productivity and economic growth. Government funds play an important role in financing education, and public spending has increased in the last years (Grbić et al., 2025). Investments in education are considered a driver of economic growth (Naurin & Pourpourides, 2023). The way governments use their resources is very important. The efficiency of government spending varies from

country to country. Countries with weak governance may spend excessively, thereby risking the loss of public funds due to poor decisions (Hall & O'Hare, 2024). Studies highlight the fact that the population's level of education has an impact on health and longevity. Public investment in education is reflected in both economic and social indicators (CM et al., 2025).

Education has cognitive, behavioral and psychological effects on individuals and educational attainment is a key indicator of overall progress in education (Qin et al., 2025). In this context, employees by educational attainment level reflects how this progress is manifested in the workforce. The literature shows that the composition of the labor force by educational attainment level affects the labor market (Cheregi, 2025). Employee positions in the labor market is influenced not only by age and years of experience, but also by educational attainment level (ten Berge et al., 2020).

In the literature, the increase in the number of employees with higher education contributes to the emergence of over education, a phenomenon associated with an oversupply of skilled workers relative to market demand (Krejčí & Balcar, 2025). The educational level of employees is influenced by the structure of the labor market and, consequently, by salary policies (Chassamboulli & Gomes, 2023). Formal education contributes to economic development and most countries are seeing a rapid increase in the educational attainment of their workforce (Jaume, 2021). Differences in employees' educational levels can affect their performance in the job market, potentially impacting their salary or position (Hansen et al., 2024).

Higher education systems are constantly expanding and are actively supported by governments because they are essential to economic and social development. In many sectors of labor market, tertiary education has become a requirement (Czarnecki & Korpi, 2025). The role of higher education is to develop skills and support research and innovation. The level and structure of financial investment influence the sustainability of the tertiary education (Doucek & Maryska, 2025). According to studies, the relationship between tertiary education and the rate of economic growth has been the subject of increasing research. Government spending on education is viewed as an investment in human capital that reduces unemployment and contributes to economic growth (Mehmetaj & Xhindi, 2022). A higher proportion of individuals with tertiary education contributes to the economic and social development of a community (NICA et al., 2025).

Poor governance and corruption hinder long-term economic growth. Research findings highlight the need to improve the quality of education. Tertiary education is essential for economic development (Tleppayev et al., 2025). Education and vocational training programs help individuals by improving their skills so they can adapt to new technologies (Profiroiu et al., 2022).

The quality of tertiary education is becoming a necessity for institutions, as globalization increases the demand for accountability (Papadogiannis et al., 2024). There are significant differences among countries in terms of the structure and content of tertiary education (Hajmási et al., 2025).

3. The Metodology of Research

The purpose of this research is to analyze the possible connections between general government total expenditure on education (% of GDP), the total number of employees by educational attainment level and the number of teaching staff in tertiary education (levels 5–8).

The research was based on secondary data from the Eurostat database for the year 2023 and analyzed 27 countries within the European Union, showing a significant connection between the indicators used.

Data sources

Table 1

Country	General government total expenditure on education (% of GDP)	Employees by educational attainment level	Tertiary education (levels 5-8)
Belgium	6.3%	4,245.00	31,960
Bulgaria	4.1%	2,518.20	20,882
Czechia	4.5%	4,108.50	19,700
Denmark	5.5%	2,659.50	26,956
Germany	4.5%	37,657.80	483,305
Estonia	6.3%	581.6	4,413
Ireland	2.8%	2,265.70	11,676
Greece	4%	2,860.80	20,240
Spain	4.2%	17,780.10	195,221
France	5%	24,542.60	133,307
Croatia	5.3%	1,384.90	19,176
Italy	3.9%	18,237.00	111,316
Cyprus	5.2%	418	3,669
Latvia	6.1%	723.7	6,986
Lithuania	5.1%	1,207.90	11,604
Luxembourg	5.1%	286.2	1,668
Hungary	5.3%	4,046.70	29,269
Malta	4.1%	255.1	2,592
Netherlands	4.9%	7,942.10	82,676
Austria	4.9%	3,906.60	65,425
Poland	5%	13,590.00	99,185
Portugal	4.3%	4,197.90	47,042
Romania	3.3%	6,561.80	26,649
Slovenia	5.4%	841	9,485

Country	General government total expenditure on education (% of GDP)	Employees by educational attainment level	Tertiary education (levels 5-8)
Slovakia	5%	2,178.60	11,828
Finland	6.3%	2,245.20	18,110
Sweden	7.2%	4,621.20	39,604

Source: dataset based on Eurostat (2023)

3.1 Methodological limitations

Discrepancies in the Eurostat databases limited the analysis, as some countries did not report all values. For this reason, we did not include countries within the European Economic Area. Due to the limitations of the databases, the analysis is based on a single reference year and did not include additional indicators tailored to our needs.

3.2 Statistical analysis

To analyze the selected variables, general government total expenditure on education and the number of employees with tertiary education, descriptive and inferential statistical methods were studied. Descriptive statistics revealed the main characteristics of the data obtained from Eurostat for the year 2023 for the 27 countries of the European Union. To evaluate the selected variables, Pearson and Spearman coefficients were calculated. To continue the analysis, a multiple linear regression model was applied, which allowed for the examination of predictors of the dependent variable. The statistical analysis was performed using the JASP software.

4. Results and Discussions

The table below summarizes the variables used in the analysis, derived from Eurostat data based on the 27 member states of the European Union.

Dataset variables

Table 2

Variable	Analytical approach	Sample size
General government total expenditure on education (% of GDP)	Measured as a percentage	27
Employees by educational attainment level	Absolute numbers for employees by education level	27

Variable	Analytical approach	Sample size
Tertiary education	Absolute numbers for employees by education level	27

Source: dataset based on Eurostat (2023)

The results in the table below present the main indicators and include the median, mean (arithmetic), standard deviation, skewness, standard error of skewness, kurtosis, standard error of kurtosis, minimum and maximum for the variables general government total expenditure on education (% of GDP) and tertiary education.

Descriptive Statistics

Table 3

	General government total expenditure on education (% of GDP)	Tertiary education (levels 5-8)
Median	5.000	20880
Mean (arithmetic)	4.948	56810
Std. Deviation	0.979	97130
Skewness	0.099	3.602
Std. Error of Skewness	0.448	0.448
Kurtosis	0.314	14.90
Std. Error of Kurtosis	0.872	0.872
Minimum	2.800	1668
Maximum	7.200	483300

Source: Data processed by the authors using JASP

These results illustrate the distribution of data and variability across the 27 countries of the European Union and highlight the differences among them, particularly with regard to the allocation of financial resources and workforce. This analysis supports the interpretation of descriptive statistics and provides a starting

point for identifying correlations among indicators. General Government total expenditure on education in the 27 countries analyzed has an average of 4.948% and a median of 5.0%, which represents a concentration of values around these percentages.

The standard deviation of 0.979 suggests moderate variability across countries, while the skewness of 0.099 shows no extreme values. The kurtosis of 0.314 confirms a slightly flat distribution compared to normality and the range of variation, from a minimum of 2.8% to a maximum of 7.2%, reflects differences across countries.

The standard error of skewness is 0.448, and the standard error of kurtosis is 0.872. The number of employees with tertiary education has a mean of 56.810 and a median of 20.880, indicating a strongly asymmetric distribution. The standard deviation is 97.130, showing a high dispersion among the 27 countries analyzed.

The positive asymmetry of 3.602 indicates that most countries have relatively low values. The kurtosis of 14.90 confirms the presence of extreme values and emphasizes the differences between the countries studied. The range of variation, from a minimum of 1,668 to a maximum of 483.300, highlights the high inequalities between countries. The standard error of the asymmetry is 0.448, and the standard error of the kurtosis is 0.872.

The following table presents an analysis of the correlations between government total expenditure on education and the number of employees with a tertiary education. To evaluate these variables, Pearson and Spearman correlation analyses were conducted.

Pearson and Spearman correlations

Table 4

		Pearson		Spearman	
		r	**p**	**rho**	**p**
General government total expenditure on education (% of GDP)	Tertiary education (levels 5-8)	-0.166	0.407	-0.244	0.220

Source: Data processed by the authors using JASP

The results of the Pearson correlation analysis (r= -0.166) indicate that, although general government total expenditure on education is increasing, the number of employees with tertiary education is declining slightly. The p-value (p = 0.407) suggests that the relationship between the variables is very weak.

The Spearman correlation coefficient (ρ = -0.244) indicates a weak negative correlation between general government total expenditure on education (as a percentage of GDP) and the number of employees with tertiary education. The p-value (0.220) indicates that this association is not statistically significant.

The two correlation coefficients, Pearson and Spearman, indicate a weak negative relationship between general government total expenditure on education and employees with tertiary education. The values of the coefficients indicate that there is no strong relationship between the two variables, as they are not statistically significant.

Given that Pearson and Spearman correlations indicated a weak relationship between the variables, multiple linear regression was performed to determine how the indicators influence one another.

Model summary on tertiary education

Table 5

Model	R	R2	Adjusted R^2
M_1	0.932	0.868	0.857

Source: Data processed by the authors using JASP

M_1, the multiple linear regression model that includes total general government expenditure on education (% of GDP) and employees by educational attainment level, indicates, based on the R coefficient (=0.932) a relationship between the included predictors and tertiary education.

The R^2 value, 0.868, indicates the differences among the 27 countries, as its value reflects a strong relationship between the variables. The adjusted R^2 (=0.857) confirms the model consistency.

For the next part of the study, the influence of the predictors on tertiary education was examined using ANOVA analysis. For this analysis, the dependent variable was tertiary education (levels 5–8) and the independent variables were general government total expenditure on education (% of GDP) and employees by educational attainment level.

ANOVA analysis

Table 6

	Sum of Squares	df	Mean Square	F	p
Regression	2.130×10+11		1.065×10+11	79.15	< .001
Residual	3.229×10+10	4	1.345×10+9		
Total	2.453×10+11	6			

Source: Data processed by the authors using JASP

The ANOVA analysis of the multiple regression model assesses the significance of the predictors on the tertiary education in European Union countries. The F statistic (=79.15) and p value (<0.001) indicate that the predictors contribute to the variation of the tertiary education. This analysis confirms the significance of the model and supports the results of the predictor coefficients.

After conducting the ANOVA analysis, which indicated that Model M1 explains the variation in tertiary education, the research continued by examining the coefficients of the multiple regression model to analyze each predictor.

Coefficients

Table 7

Model	Predictor	Unstandardized	Standardized	t	p	VIF
M0	Intercept	56,810		3.039	0.005	
M1	Intercept	-26,680		-0.678	0.505	
M1	General government total expenditure on education (% of GDP)	3,542	0.036	0.471	0.642	1.049
M1	Employees by educational attainment level	10.36	0.939	12.38	< 0.001	1.049

Source: Data processed by the authors using JASP

An analysis of the predictors reveals that the variable employees by educational attainment level has a high coefficient (=10.36) and a higher standardized coefficient (=0.939), and is statistically significant with a p value (<0.001). The result indicates an influence on tertiary education. The variable general government total expenditure on education has a low coefficient and a high p value (=0.642), indicating that it is not statistically significant.

The results show that the multiple linear regression model significantly explains the variation in tertiary education. The employees by educational attainment level variable indicates that it has a strong and significant influence, while general government total expenditure on education do not influence the outcome within the analyzed model.

5. Conclusions

This study examined the relationship between general government total expenditure on education (% of GDP), employees by educational attainment level and tertiary education in 27 European Union member states, using Eurostat data for the year 2023.

Descriptive statistical analysis revealed significant variations among the countries studied, highlighting differences between general government total expenditure on education and tertiary education. The high variability and presence of outliers for tertiary education suggest significant disparities in the labor force structure and the need for further analysis to better understand the correlations between indicators.

The Pearson correlation coefficient (r = -0.166) indicated a negative correlation between total general government total expenditure on education and tertiary education, and the p value (p = 0.407) shows that this relationship is not statistically significant. The Spearman coefficient indicated a weak negative result

with a correlation coefficient of -0.244. The p value (0.220) indicated that this correlation is not statistically significant. The results suggest that higher levels of public expenditure on education do not necessarily translate into a larger number of employees with higher education. The weak negative correlation suggests that public investment in education is not the only factor determining the educational profile of employees. To continue the research, starting from descriptive statistics and correlation analysis, a multiple linear regression was performed to identify the common effect of the general government total expenditure on education and employees by educational attainment level on tertiary education.

The model summary results indicated that the predictors contribute significantly to the variation in tertiary education, supported by the ANOVA analysis showing that the model is statistically significant. The coefficient analysis shows that the variable employees by educational attainment level has a significant impact on tertiary education, while general government total expenditure on education does not have a significant effect. The results of multiple linear regression indicated that there is a relationship between the independent variables and tertiary education.

The result of the study indicates that employees by educational attainment level represents the factor that explains the differences in tertiary education in European Union countries, while general government total expenditure on education does not have a significant effect.

The study's limitations restricted the analysis due to the lack of essential data, both by year and by country. Future research will depend on extending the analysis over a longer period and using more detailed indicators.

References

1. Chassamboulli, A. & Gomes, P. (2023). Public-sector employment, wages and education decisions. *Labour Economics*, 82. https://doi.org/10.1016/j.labeco.2023.102345
2. Cheregi, V. I. (2025). Is labor matching effectiveness dependent on education level, age or gender? *Baltic Journal of Economics*, 25(1), 1–20. https://doi.org/10.1080/1406099X.2024.2442841
3. CM, J., Hoang, N. T. & Yarram, S. R. (2025). *Dual Effects of Education Expenditure on Life Expectancy: An Empirical Assessment of Crowding-Out and Complementarity. Econometrics*, 13(4). https://doi.org/10.3390/econometrics13040044
4. Czarnecki, K. & Korpi, T. (2025). *More funding, more students? Student funding policies and tertiary education enrolment ratios in 32 high-participation countries*. Higher Education. https://doi.org/10.1007/s10734-025-01504-1
5. Di Gioacchino, D., Sabani, L. & Usai, S. (2025). Public Versus Private Investment in Education in a Two Tiers System: The Role of Income Inequality and Intergenerational Persistence in Education. Italian Economic Journal, 11(1), 253-284. https://doi.org/10.1007/s40797-023-00256-0
6. Doucek, P. & Maryska, M. (2025). *Comparison of Tertiary Education Financing in the Czech Republic with Selected EU Countries*. Liberec Economic Forum 2025, 41-52. https://doi.org/10.15240/tul/009/lef-2025-03

7. Eurostat. (2023). Government expenditure on education. [Online] (Planned update March 2026). Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education.[Accesed 21 March 2026].
8. Eurostat. (2023). Employees by educational attainment level. [Online] (Updated 13 March 2026) Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eegaed/default/table?lang=en. [Accesed 21 March 2026].
9. Eurostat. (2023). Classroom teachers and academic staff by education level, programme orientation, sex and age groups. [Online] Available at: https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_perp01__custom_20647120/default/table. [Accesed 21 March 2026].
10. Grbić, M., Jovanović, D., Fedajev, A. & Atanasovska-Cvetković, A. (2025). Public Expenditure on Education and Economic Growth: An Empirical Analysis of Causality in Serbia. *European Journal of Sustainable Development*, 14(4), 817. https://doi.org/10.14207/ejsd.2025.v14n4p817
11. Hajmási, K., Machová, R., Korcsmáros, E. & Fehér, L. (2025). *Global Research Trends on the Relationship Between Critical Thinking and Tertiary Education: A Bibliometric Analysis from the Perspective of Countries with Varying Human Development Levels*. Administrative Sciences, 15(8). https://doi.org/10.3390/admsci15080296
12. Hall, S. G. & O'Hare, B. (2024). A model of the impact of government revenue and quality of governance on schooling. *International Journal of Educational Development*, 108. https://doi.org/10.1016/j.ijedudev.2024.103055
13. Hansen, A. T., Hvidman, U. & Sievertsen, H. H. (2024). Grades and Employer Learning. *Journal of Labor Economics*, 42(3), 659-682. https://doi.org/10.1086/724048
14. Jaume, D. (2021). The labor market effects of an educational expansion. *Journal of Development Economics*, 149. https://doi.org/10.1016/j.jdeveco.2020.102619
15. Konopczyński, M. (2024). *Education Versus Infrastructure: Is There a Trade-off in an Open Economy with Perfect Capital Mobility?* Contemporary Economics, 18(3), 280-300. https://doi.org/10.5709/ce.1897-9254.538
16. Krejčí, M. & Balcar, J. (2025). The Growing Pains of Education: Exploring Educational Mismatch Trends. *Review of Economic Perspectives*, 25(1), 48–65. https://doi.org/10.2478/revecp-2025-0004
17. Mehmetaj, N. & Xhindi, N. (2022). *Public Expenses in Education and Youth Unemployment Rates—A Vector Error Correction Model Approach*. Economies, 10(12). https://doi.org/10.3390/economies10120293
18. Millin, M., Fielding, D. & Owen, P. D. (2023). *Education spending, economic development, and the size of government. Public Sector Economics*, 47(3), 285-333. https://doi.org/10.3326/pse.47.3.1
19. Molina-Morales, A. (2013). Institutions and Public Expenditure on Education in OECD Countries*. *In Review of Public Economics*.
20. Naurin, A, & Pourpourides, P. M. (2023). *On the causality between household and government spending on education: evidence from a panel of 40 countries*. Empirical Economics, 65(2), 567-585. https://doi.org/10.1007/s00181-022-02345-y
21. Nica, E., Dima, C., Dumitrescu, O. C. & Angheluță, P. S. (2025). Trends in Educational Attainment and Field of Study Among Adults in the European Union. *European Journal of Sustainable Development*, 14(4), 81. https://doi.org/10.14207/ejsd.2025.v14n4p81
22. Papadogiannis, I., Vassilakis, C., Wallace, M. & Katsis, A. (2024). *On the Quality and Validity of Course Evaluation Questionnaires Used in Tertiary Education in Greece*. Trends in Higher Education, 3(2), 221-234. https://doi.org/10.3390/higheredu3020013

23. Profiroiu, C. M., Rădulescu, C. V., Angheluță, P. S. & Călin, A. M. (2022). Education and Employment of Population with Tertiary Education Attainment in the European Union. *European Journal of Sustainable Development*, 11(4), 105. https://doi.org/10.14207/ejsd.2022.v11n4p105
24. Qin, T., Wei, P. & Xie, Y. (2025). *Does education level affect the health status of the elderly? The chain mediating effect of internet use, health behavior and social class identity*. PLoS ONE, 20(2 February). https://doi.org/10.1371/journal.pone.0319389
25. ten Berge, J., Lippényi, Z., van der Lippe, T. & Goos, M. (2020). *Technology implementation within enterprises and job ending among employees. A study of the role of educational attainment, organizational tenure, age and unionization*. Research in Social Stratification and Mobility, 69. https://doi.org/10.1016/j.rssm.2020.100548
26. Tleppayev, A., Zeinolla, S., Tyulyubayeva, D. & Aben, A. (2025). *Education, Institutions, and Investment as Determinants of Economic Growth in Central Asia and the Caucasus: A Panel Data Analysis.* Economies, 13(3). https://doi.org/10.3390/economies13030078
27. Varughese, A. R. & Bairagya, I. (2025). *Public and household financing of education in India: are they substitutes or complements?* World Development Perspectives, 39. https://doi.org/10.1016/j.wdp.2025.100703