Article

Empirical Analysis of the Impact of Education on Economic Growth

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Abstract: Education is a crucial factor for sustainable economic growth. Therefore, public expenditures on education are of great interest to both researchers and policy makers. The channels through which education affects economic growth differ according to the level of development of the country. This study aims to measure the impact of public expenditure on education for economic growth in North Macedonia. The data used are secondary data derived from the World Bank Indicators for the period 1917–2020. The econometric model employed in this study is an Instrumental Variable Two-Stage Least Square. The dependent variable in the model is Gross Domestic Product and the independent variables in the model are public expenditures on education, labor force participation rate, gross capital formation, unemployment, industry, wages, employment, information, and communication technology, and the instrumented variable is tertiary enrolment. This study suggests that a one-point increase in public expenditures on education will positively affect economic growth in the North Macedonia. The study also shows that a one-point increase in unemployment will increase economic growth and a one-point decrease in employment will increase economic growth in North Macedonia. These two results, which contradict the theoretical and empirical approaches, prove the mismatch between the supply and demand of real occupations in the labor market in North Macedonia.

Keywords: education; public expenditures; skilled labor force; economic growth; 2SLS regression

1. Introduction

Education is a very important pillar that contributes to society in all its dimensions. In this prism, primary, secondary, and higher education as a public investment is a topic of discussion in terms of its impact on economic growth. Encouraging improvement and development, not only in the economic sphere but in all spheres of life, depends on expectation. Incentives for schooling preceded expectations. If the educated expect that their education will improve their welfare, then the intention to educate will increase, raising productivity and boosting the economic growth of the country in general. Education is the critical factor for a nation that promotes economic growth. Hanushek and Woessmann explained economic growth as a function of the quality of education, but they did not find evidence of the importance of years of schooling, but they argued for the relevance of cognitive skills and a basic literacy ratio for economic growth (Goczek et al. 2021). The benefits of a child's education accrue not only to the child as an individual or to his or her parents, but also to other members of society. Thus, my child's education contributes to your well-being by promoting a stable and democratic society (Friedman and Friedman 2002).

The fact that most goods, including education, have dual effects, such as self-benefit and externalities, broadens the horizon to define the nature of education as a public good. Education as a public good is thus seen as a combined good that has the characteristics of two goods: (i) private property and (ii) public property, as a result of the benefits that accrue from the educational process (Musgrave 1969).

1.1. Education Is Becoming the Main Pillar of Global Economic Growth

Following Solow's model (Samuelson and Solow 1956), if public expenditures on education are productive, it is probably under the pretext of investing in human capital, but this only affects the factorial equilibrium and not economic growth and generally has side effects in economic growth. According to this model, the authors can also say that this theory does not show the same results if the authors consider the level of economic development of the country as well as the productivity of expenditures dedicated to education. This approach is different from the economic development of the country and the policy of public spending on education.

Investing in education means, first and foremost, investing in human resources, i.e., creating a skilled labor force that will influence the creation of innovations, increase productivity and wages, reduce the demands on the state to finance various social programs, and increase the state budget by accumulating taxes, and all this is expected to have a positive impact on the economic growth of the country. The benefits of investing in education do not end here. In fact, there is a long, not to say endless, list of benefits to the state and society from adequately educating the population, starting with increasing the number of skilled workers, creating appropriate profiles based on the demands of the labor market while meeting the needs of the market, increasing productivity and wages, and improving living standards, thereby growing the country's economy while increasing social welfare.

From this point of view, the main aim of this study is to measure the impact of public expenditures on education on the economic growth of North Macedonia. Education has always been considered the main pillar of the economic growth of a nation. How education affects economic growth has been studied by different scholars at different times and in different countries. The basic idea of this study lies in the research problem, which is the rationale for public expenditures on education as a public good and the way these expenditures affects economic growth, in the case of North Macedonia.

1.2. Research Objectives

(a)   To highlight the importance of education on economic growth;
(b)   To measure the impact of public expenditures on education on economic growth using related variables—instrumental variable;
(c)   To measure the impact of other related macroeconomic indicators in the economic growth.

1.3. Research Questions

(a)   How do public expenditures on education affect economic growth?
(b)   How do other interrelated variables, such as employment, unemployment, gross capital formation, ICT sector, and industry affect economic growth in the case of North Macedonia as a developing country?

1.4. Research Hypotheses Are as Follows

Hypothesis 1 (H1). *Public expenditures on education are positively related to economic growth in the North Macedonia.*

Hypothesis 2 (H2). *A skilled labor force means higher employment opportunity, therefore: employment positively affects the economic growth while unemployment negatively affects the economic growth.*

Hypothesis 3 (H3). *Wages are positively related to economic growth.*

This study is structured as follows: Section 1 of the study presents the framework of the study, which includes the research problem, aim of the study, research objectives, research questions, and research hypotheses; followed by the Section 2, which presents the literature

review; the Section 3 presents the research methodology, data, and source, which specifies the econometric model used in this study; the Section 4 presents the empirical results and discussions; and the Section 5 presents the conclusions and further recommendations.

2. Literature Review

Education has the potential to bring significant benefits to individuals and society beyond the individual's contribution to employment or increased income. Skills are important channels through which the power of education manifests itself in a variety of social parameters. A study from (Marquez-Ramos and Mourelle 2019) analyzes the relationship between education and economic growth in the case of Spain examining the existence of nonlinearities in the direction of the causality that accounts from education to economic growth. It suggests that an increase in education has a positive effect on GDP growth, while in other cases, the effect could be negative. The World Economic Forum of 2016 highlighted three channels through which education affects a country's productivity: it increases the collective ability of the labor force to complete existing tasks faster; secondary and higher education, in particular, facilitate the transfer of knowledge about new information, products and technologies created by others (Barro and Lee 2010), and by increasing creativity, it enhances a country's capacity to create new knowledge, products, and technologies (Grant 2017).

A study by Suwandaru et al. (2021) evaluates education sector expenditures and economic growth in the case of Indonesia using time series data from 1988 to 2018 and the Cobb-Douglas production function as the economic theory for measurement and concludes that public expenditure on education has an insignificant relationship in the long- and short-run estimation.

At the same time, given the increasing pressure on public finances and wider societal advantages, there is a strong need to ensure that public financing is directed as efficiently as possible to accomplish the desired goals (OECD 2021). Kovtun et al. (2014), in the IMF report on 'Boosting job growth in the Western Balkans', looks at the Balkan countries with the highest youth unemployment rate and duration of any EU country. The authors concluded that the poor performance of the labor market in the Balkan countries is a key social problem that simultaneously undermines medium- and long-term economic growth and poses a major challenge to policy makers. Mojsoska-Blazevski (2009), in a study dealing with reforms for a successful employment policy in the region, found more jobs, a skilled labor force, and more competition in the Western Balkans countries (WBIF—Western Balkans Investment Framework), and stressed that education is positively related to the increase in the employment rate, and indeed the employment rate increases with the increase in the level of education.

On the other hand, the unemployment rate is negatively related to the level of education. Berger and Fisher (2013) conclude that states have the potential to lay a very strong foundation and create wealth by investing in education. If, at the same time, access to quality education is expanded, this not only improves the wellbeing of individuals in society, but also has a positive impact on the economic growth of the country. Woodhall (2006) answered the question: "how much have recent advances in advanced economic thinking contributed to the great challenges facing education?" In most cases, the answer is 'YES'. This paper has shown that recent research on measuring the externalities and contribution of education to economic growth through knowledge creation and transmission has strengthened the idea that education is a public investment.

Michaelowa (2000) believes that education not only increases the utility potential of individuals, but also triggers a domino effect throughout the economy through a series of positive externalities. The authors believe that the growing role of the state in funding and managing education has led not only to a great waste of taxpayers' money, but also to a much poorer education system.

Other forms of incompatibility between qualifications and skills are also likely to have worsened. For example, in some cases, employees may be employed in jobs that are below

their qualifications (highly qualified employees for the country's level of education) or in jobs that normally require skills that workers do not have (under qualified employees compared to job requirements). In both cases, the skills mismatch affects the satisfaction and salaries of individual employees as well as the productivity of the firm. It can also lead to increased staff turnover (Quintini 2011).

Odeleye (2012) examines the relationship between investment in education and economic growth using primary and secondary data. The first model is used to test the performance of teachers in primary schools and the second model is the OLS method to test the relationship between real gross domestic product and current government expenditures on education, government capital expenditures, and gross capital formation. The model shows that in the Nigerian case, a 1% increase in capital expenditure on education leads to a 0.17% decrease in GDP. However, the investment in education, which is supposed to boost economic growth, is insignificant and contradicts economic theory. Endogenous growth models emphasize that human capital is one of the main sources of economic growth (Romer 1994). Biagi and Lucifora (2008) have studied the impact of education on the unemployment rate using labor force survey data for 10 European countries and concludes that higher education (measured from the perspective of workers with secondary education and above) lowers the unemployment rate, both for less and more educated individuals (measured by years of schooling), with other variables remaining unchanged, both demographic and cyclical.

Gupta et al. (1999) applied OLS and 2SLS evaluation techniques to a sample of 50 developing and in-transition countries and concluded that spending on education has a significant and positive effect on student enrollment. Moreover, a 5% increase in public expenditures on education increases enrollment by 1 per cent. Baldacci et al. (2004) found a strong correlation between increased public expenditures on education and improved educational performance. However, the positive impact of education spending is lower in countries led by "poor" governments. They have used a recursive system of equations to measure the direct and indirect relationship between public expenditures on education, human resources, and economic growth. In a sample of 120 developing countries for the period 1975–2000 (Baldacci et al. 2004), the results show that public expenditures on education have a positive impact on education accumulation and thus on economic growth.

Based on the theoretical and empirical studies used in this paper, the authors specify an endogenous economic growth model that includes the role of public expenditures on education on economic growth. Using structural equations on the impact of public expenditures on education on economic growth, the authors developed an econometric model to identify and measure the impact of education on economic growth.

3. Methodology

In line with the theoretical and empirical literature on the impact of public expenditures on education on economic growth, (Lucas 1988; Barro 1990; Barro and Sala-i-Martin 1992), as well as based on numerous empirical studies, this study employs the econometric model Instrumental Variable—Two-Stage Least Squares (IV—2SLS) to measure the impact of public expenditures on education on economic growth in the case of the North Macedonia. Time-series data obtained from World Bank Indicators for period 1997–2020 have been examined.

The use of instrumental variables (IV) as estimators in the context of the classical linear regression model is very simple from a theoretical point of view: if the error distribution cannot be considered independent of the regression distribution, the authors refer to the model IV (ai–vi) using a specific set of instruments. One problem that arises in empirical research is "heteroskedasticity". Although the consistency of the evaluation according to the model IV is not affected by the presence of heteroskedasticity standard IV estimates, the standard errors are inconsistent, preventing valid conclusions.

Even if the IV method is considered the correct assessment technique, the authors can still question its validity in a particular application. One of the tests that determine the significance of instruments is the test based on Sargan (1958).

The 2SLS regression is the most estimated method for the analysis in our case. All the variables included in the model remain very important because of the theory and literature review presented in the second section of the study. Since the path from education as a public good to employment and economic growth is not yet clear, especially for a country in transition like North Macedonia, this model will help to develop the main hypothesis of the study.

The econometric model employed in this study takes the following form:

$$y = \alpha_0 + \beta_1 x_1 + \theta_1 \Sigma x_2 + u \tag{1}$$

$$x_1 = \pi_0 + \pi_1 z_1 + v \tag{2}$$

where:

y = dependent variablex_1 = instrumented variable
Σx_2 = endogenous explanatory variables
z_1 = exogenous explanatory variables and
μ = error term

In the Table 1, the definitions of the variables used in the econometric model are explained.

Table 1. The variables used, their meaning, and the source (Source: authors' contribution).

No.	Variables	Name of the Variables	The Meaning of the Variables	Source
1	GDP	GDP growth (annual %)	Annual percentage growth rate of GDP according to market price based on constant local currency.	WBI
2	EDUexp	Public expenditures on education, total (% of GDP)	Public expenditures dedicated to education as % of GDP represent total public expenditures (current and capital) on education expressed as a percentage of Gross Domestic Product (GDP) in a given year. Public expenditures on education includes government spending on educational institutions (public and private), education administration, and transfers/subsidies to private entities (students/families and other private entities).	WBI WBI
3	LABforce	Labor force participation rate, total (% of total population ages 15–64) (modelled ILO estimate)	The labor force participation rate is the percentage of the population aged 15–64 that is economically active: all people who provide jobs to produce goods and services over a given period.	WBI
4	CAPform	Gross capital formation (% of GDP)	Gross capital formation (formerly gross domestic investment) consists of expenditures on additions to the fixed assets of the economy plus net changes in the level of inventories.	WBI
5	Unempl	Unemployment, total (% of the total labor force) (modelled ILO estimate)	Unemployment refers to the part of the labor force that is unemployed but available for work and looking for work.	WBI
6	Industry	Industry, value added (% of GDP)	Industry corresponds to ISIC divisions 10–45 and includes production (ISIC divisions 15–37). It consists of value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas.	WBI

Table 1. *Cont.*

No.	Variables	Name of the Variables	The Meaning of the Variables	Source
7	SET	School enrolment, tertiary (% gross)	General enrolment in higher education.	WBI
8	Wages	Wage and salaried workers, total (% of total employed)	Salaries of employees according to their engagement contract.	WBI
9	EMPLind	Employment in industry (% of total employment)	Employees are people who work for a public or private employer and receive remuneration in wages, salaries, commissions, tips, partial rates, or pay in kind. The industry corresponds to divisions 2–5 (ISIC review 2) or CF outcome categories (ISIC review 3) and includes mining and quarrying (including oil production), manufacturing, construction, and utilities (electricity, gas, and water).	WBI
10	ICT	Information and communication technology	Communication and information technology	WBI

The table above contains the variables used in the econometric model, their names and meaning, and the data source. As the authors can see, the total number of variables used in the econometric model is ten when GDP is used as a proxy for economic growth and set as the dependent variable, and the independent variables in the model are: Public expenditures on education (% of GDP); Labor force participation rate (% of total population aged 15–64) (modelled ILO estimate); Gross capital formation (% of GDP); Total unemployment (% of total labor force) (modelled ILO estimate); Industry, value added (% of GDP); School enrolment, higher education (% gross); Wage and salaried workers, total (% of total employed); Industry employment (% of total employment); and Information and communication technology. The reason for the variables used is their importance in the context of education, labor force, and economic growth in general.

4. Results

This section of the article presents the results obtained through the econometric model (IV—2SLS) as specified in the above section. They are presented in the following Table 2.

The results obtained from the IV/2SLS mode include (i) *p*-value, 0.0357, (ii) R square, 0.99; (iii) weak identification test, 317.76; (iv) Sargan Overidentification test, 0.000 (exactly identified), and critical values of the Stock and Yogo test. From these results, it can be concluded that the model is appropriate and significant.

After modelling tests suggest that the IV (2SLS) model applied in this study is significant, the authors can proceed with the interpretation of the coefficients. In this regard, the econometric model takes the following form:

$$gdp = -36.385 \quad +4.158 eduexp + 0.422\, capform + 0.298 labforce \\ +0.394 unempl + 1.016 industry - 0.128 gini - 0.571 wages \\ -0.059 emplind + 0.877 ict \tag{3}$$

The *eduexc* coefficient is positive and significant. The authors also find that this variable is instrumented with the exogenous variable set. The effect on the dependent variable includes the effect of both variables, so the coefficient is larger than the other coefficients. This shows that a one-point increase in public expenditures on education leads to an increase in GDP. The positive effect of public expenditures on education for economic growth is consistent with other studies conducted for developed and developing countries (as discussed in literature review section). The empirical results suggest that the increase in public expenditure on education, including the general enrolment variable in higher education (note that this variable is instrumental with the set of exogenous variables), will have a positive impact on economic growth in North Macedonia. In this case, the authors

accept hypothesis H1: Public expenditures on education are positively related to economic growth in North Macedonia.

Table 2. Empirical results (Source: author's calculations).

Model	IV/2SLS	
Independent Variables	**Dependent Variable: GDP**	
	Coefficients	Standard errors in parentheses
Eduexp	4.158 ***	(0.064)
Capform	0.422 ***	(0.036)
Labforce	0.298 ***	(0.053)
Unempl	0.394 ***	(0.040)
Industry	1.016 ***	(0.102)
Gini	−0.128 ***	(0.011)
Wages	−0.571 ***	(0.018)
Emplind	−0.059 ***	(0.014)
Ict	0.877 ***	(0.116)
Constant	−36.385 ***	(7.298)
Instrument:		
Set	√	
Observations	11	
R-squared	0.99	
r2_a	0.996	
F	247.9	
Under identification test (Anderson canon. Corr. LM statistic)	10.965 ***	
Ll	21.74	
Weak identification test (Cragg-Donald Wald F statistic)	317.76	
Stock-Yogo Weak ID test critical values	10% maximal IV size	16.38	
	15% maximal IV size	8.96	(Stock and Yogo 2005)
	20% maximal IV size	6.66	
	25% maximal IV size	5.53	
Sargan overidentification test	0.000 (exactly identified)	

*** $p < 0.01$.

Wages have a negative coefficient of −0.571, which means that a one-point increase per unit in wages will decrease GDP (GDP is reduced by 0.571). This coefficient shows that wages have no effect on the increase in labor productivity in the case of North Macedonia. Also, using the coefficient for employment and unemployment leads to the rejection of the hypothesis 3—wages are positively related to economic growth.

The capform has a positive coefficient and shows that a one-point increase in the capform increases GDP by 0.422. The coefficient labforce (0.298) represents the positive effect of the labor force on economic growth. Since this indicator represents the labor force participation rate, i.e., the percentage of the population aged 15–64 that is economically active (all people who provide jobs for the production of goods and services during a given period), it is expected that with the increase of the labor force per unit, GDP will increase by 0.2985.

The positive unemployment rate of 0.394 and the negative employment rate of 0.059 are the two coefficients that contradict the theoretical and empirical approach but also prove the discrepancy between the supply and demand for real occupations in the labor market in the case of North Macedonia. Virén (2001) observes that one of the main reasons for such asymmetry is to be found in the functioning of the labor market. Rapid downward trends in the economy can have an impact on a disproportionate increase in the unemployment rate, partly because supply and demand do not necessarily meet in every sector of the economy and every labor market activity. This is especially true for developing countries, such as North Macedonia, which is why Hypothesis 2 is rejected (A skilled labor force means higher employment opportunity, and therefore, employment positively affects economic growth

while unemployment negatively affects economic growth). Based on, among other things, the positive and negative coefficients for unemployment and employment, the authors conclude that the increase in public expenditures on education has no effect on market demand and the supply of real occupations.

Fixed capital formation for the labor force has grown very slowly in the Balkans. One explanation of how an economy and a society can maintain such extremely high rates of stable unemployment for years is that employment (many people in work) is usually not included in the market statistics of labor in the right proportions, i.e., it is found in the informal sector of the economy. In any case, this idea has generally been supported by the measures taken to promote the informal economy in North Macedonia and elsewhere. In many countries where the unemployment rate is high, the economic activity of the informal sector is also high (USAID 2013).

If there is no productivity growth and each new unit of the additional labor force is employed, the increase in output is equal to an increase in labor supply. If the growth rate of GDP falls below the growth rate of the labor force, the creation of new jobs is not enough to accommodate all the new job seekers. As a result, the percentage of the labor force employed will fall. In other words, the unemployment rate will rise. If GDP growth equals labor force growth in the presence of productivity growth, more people will enter the labor market than are needed to produce a given quantity of goods and services. The proportion of the labor force hired will decrease. In such a situation, one of the things the authors can say is that it would be "the best of the worst" for the state to subsidize the unemployed and increase the burden on this section of the population, instead of stifling state administration under the pretext of increasing the employment rate or decreasing the unemployment rate and thus paying wages that mean higher costs compared to benefits.

The positive coefficient of industry, which at the same time represents the added value in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water and gas, and the positive coefficient of ICT (communication and information technology) prove that with an increase in these two indicators, GDP also increases.

5. Conclusions

The main objective of this study was to measure the impact of public expenditures on education on economic growth of North Macedonia using time series data from the World Bank Indicators for the period of 1997–2020. In this study, the econometric model used was IV 2SLS with STATA.

The results suggest that the increase in public expenditures on education, including the general variable of enrolment in higher education (note that this variable is instrumental with the exogenous set of variables), will positively affect economic growth in the case of North Macedonia. Based on the positive and negative coefficients for unemployment and employment, among others, the authors conclude that the North Macedonia faces a high number of reforms despite its growth as a low-income country with a low standard of living. Economically, with the sole aim of adapting to the demands of globalization and becoming part of the EU, reforms of this nature have significantly improved the country's overall ranking from World Bank reports—Business Reports. The changes did not have the desired positive effect on key economic indicators, such as economic growth, employment, average wages, and income.

North Macedonia's Gross Domestic Product (GDP) was half that of other Balkan countries even before the global financial crisis. Economic data in this sector are variable and even contradictory because of dynamic and ongoing developments. Generally, education changes are designed for political purposes or guided by the premise of "more is better in a state where better is more" (Bexheti and Mustafi 2015)—Mass, populist education violates the idea of quality and, as a result, is unrelated to labor market demands.

The country, through its institutions, should take relevant measures in terms of reforms that tend to reduce the mismatch between education and labor market demands, in a way that would lay a solid foundation for economic growth. Focusing more on high-quality

education, public expenditures would be used for clear programs that offer the possibility for new, in-high-demand skills training and education, rather than for general educational programs that are outdated.

The authors conclude, among other things, that despite increased public expenditures on education, this rise has no effect on market demand and supply of real occupations based on the positive and negative coefficients of unemployment and employment. In the case of North Macedonia, the authors may state that the line of transmission from education to employment and economic growth is narrow.

Results of this study may serve as a basis for further clarifications in this field, helping the establishment of a broad framework in relation to public expenditures on education and economic growth expressed by several indicators. Scholars and policy makers are especially recommended to use these results for designing better programs and policies with the aim to transform education into a boosting factor of economic growth.

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