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Education and Economic Growth: Evidence from the EUROMED Countries

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The Mediterranean Strategy on Education for Sustainable Development (MSESD) Report reveals that the Mediterranean is an exceptional eco-region not only due to its geographical characteristics, but also its heterogeneous economic structure, in which education is regarded as a key driver of sustainable development. Given this importance, this study attempts to investigate the impact of education as a channel for human capital accumulation on two different growth concepts in a panel group of eight Euro-Mediterranean Partnership (EUROMED) countries. We utilize an endogenous growth model using annual observations spanning from 2000 to 2017 by employing the Augmented Mean Group (AMG) estimator. Empirical results obtained from the Augmented Mean Group estimator indicate a positive impact of education, regardless of the growth proxy. In addition, empirical findings reveal that the impact of education on inclusive growth is five times higher than that on output growth. We also find that capital is the main driver of growth while inclusive growth is primarily triggered by education. One of the main policy implications raised in this study is that education reforms that attempt to improve educational quality will assist policymakers to achieve sustainable development goals. Extensive policy discussions related to the experiential findings are also provided.

Introduction

Human capital is a measure of skills and attributes of labour in which education plays a crucial role to increase efficiency and productivity. Theoretical discussions on human capital are in broad consensus that education is the main source of human

capital (Becker 1964; Griliches 1997; Mincer 1974 among others). Odit *et al.* (2010) describe education as an investment in human capital due to the fact that benefits accrue to an educated individual over a lifetime of activities. Hanushek and Wößmann (2010) describe education as a key determinant of economic well-being, which leads to an increase in the human capital inherent in the labour force of a country. In addition, a great number of empirical studies have also addressed the importance of education in promoting economic growth (see, for example: Temple 2002; Afzal *et al.* 2011; Marquez-Ramos and Mourelle 2019 among others).

According to the Mediterranean Strategy on Education for Sustainable Development (MSESD) Report (2014), the Mediterranean is regarded as an exceptional eco-region not only due to its geographical characteristics, but also the fact that it brings countries and peoples together from different levels of economic and social development, religions, languages, and cultures. Based on the vision presented in the report, education is addressed as a key factor for achieving sustainable development. Indeed, the main objective of the MSESD is to integrate sustainability into education policies and systems in the Mediterranean region while promoting a holistic and transformative approach to education that fosters sustainable development values, knowledge, skills, and behaviours among learners and educators. The strategy also seeks to promote dialogue and cooperation among Mediterranean countries on ESD and to mobilize resources to support ESD initiatives. Given the explicit role of education in the development process, the Mediterranean seems to be an interesting region to study.

Despite a variety of single-country cases from the region,[a] we still do not know how education affects growth in an encompassing sample. Therefore, the purpose of this study is to investigate the impact of education as a channel for human capital accumulation on two different growth concepts in a panel group of eight Mediterranean countries over the period 2000–2017.

Apart from the aforementioned motivation, the contribution of this study to the existing literature is two-fold. First, this study does not only investigate the impact of education on output growth, it also focuses on the impact that it has on inclusive growth. Inclusive growth is a broader concept that considers the dependence between macroeconomic and microeconomic dynamics and economic growth.[b] Experiencing higher output growth is not a sufficient achievement given the high level of extreme poverty and therefore could take place without a poverty reduction (Mulok *et al.* 2012). Marquez-Ramos and Mourelle (2019) also discuss that increasing the level of education is not necessarily associated with higher economic growth in countries where underemployment arises. Given the high unemployment rates in Mediterranean countries, one would expect education level to have a higher impact on inclusive growth in the region. In addition, education can also help promote social mobility and reduce inequality by providing opportunities for individuals to improve their socioeconomic status as well as greater social cohesion by reducing discrimination and promoting understanding among different cultural and ethnic groups.

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Second, we also wish to contribute to the existing literature on an empirical front. Unlike the literature on multi-country studies,[c] this study employs the Augmented Mean Group (AMG) to take the possible heterogeneity and cross-sectional dependence into account.

The structure of this article is as follows: theoretical framework, literature survey, data and model presentation, empirical methods and results, policy discussions, and concluding remarks.

Theoretical Framework

The human capital concept has attained a place and provided great convenience to the economic literature since the late 1950s. Influential works (Mincer 1958; Becker 1962, 1964; Schultz 1961; Denison 1962; Nelson and Phelps 1966) have integrated the role of education in the accumulation of human capital for economic growth. Within these models, human capital has contributed to improved labour force productivity and subsequent growth in national income. It has assumed that education's contribution to growth is attributable to several separate but interdependent functions (Daren 2017).

With the proliferation of Neoclassic economists, the concept has gained popularity. Economic growth theories have highlighted the role of human capital and the different other factors through which it may impact economic performance. The main theoretical approaches focusing on the relationship between human capital and economic growth have been Solow's augmented neoclassical approach (see Mankiw et al. 1992) and the endogenous growth theories of Romer (1990) and Lucas (1988). Solow's (1957) growth model extends the basic production function by adding human capital to the aggregate production function (Holland et al. 2013).

Finally, supplements by the endogenous growth theories have corrected the concept's shortcomings, and human capital has been fully integrated into the production functions as a crucial driver. Theories of endogenous growth regard education and knowledge as fundamental determinants of economic growth and assign a crucial role to education. The production of knowledge by the education sector results in self-reliant economic growth. Because the marginal return of this new factor (human capital) does not decrease. The endogenous growth models such as Lucas (1998), Romer, (1990), and Aghion and Howitt (1998) have included education in demonstrating its role in increasing the economy's innovative capacity for innovation by developing new ideas and technologies (Holland et al. 2013; Monteils 2002; Hanushek and Wößmann 2010).

A high level of per capita income per se is not adequate for sustainable development in a country. Despite rising production across the globe, the increasing number of countries where social problems are of prime importance requires a proper framework in which the relationship between economic growth and human development is better explained (Delhey and Steckermeier 2020; Easterlin and Angelescu 2012; Skidelsky and Skidelsky 2013 among others).

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Education is an effective tool that triggers a number of channels in an economy, all of which can affect sustainable development. Education is a fundamental component of the process of economic growth through the use of subjective knowledge (Monteils 2002). According to Nelson and Phelps (1966), education can facilitate the diffusion and transmission of knowledge needed to understand and process new information and successfully implement new technologies devised by others, which promotes economic growth. Education can increase the economy's innovative capacity, and new knowledge about new technologies, products, and processes encourages economic growth (Hanushek and Wößmann 2010). First of all, education increases labour productivity by increasing access to new information and/or knowledge on a specific issue (Rosenzweig 2010). Lucas (1988) shows that education and the creation of human capital could be responsible for both the differences in labour productivity and the overall level of technological progress in an economy (Daren 2017). Notice that the more educated labour ends up with better-implemented technological advances (Odit et al. 2010). Therefore, a well-designed and qualified education system promotes economic development by increasing productivity. Revoredo and Morisset (1999) state that education is the most efficient factor affecting the life-cycle income. In addition, the unemployment risk also decreases as the level of education increases (Zimmer 2016). On the other hand, the contribution of education to welfare is essential given the positive externalities for individuals or societies (Hall 2006).

A Brief Literature Survey: The Mediterranean Case

Although the existing literature on the nexus between education and economic growth is well-documented, the number of studies looking into this issue in the case of Mediterranean countries is relatively limited. Jaoul (2004) finds that the impact of higher education on the gross domestic product is positive in France whereas no significant relationship is detected in Germany. Another study in the case of France by Ozatac *et al*. (2018) indicates unidirectional causality running from education to economic growth. Tsamadias and Prontzas (2012) show for Greece that education has a positive and statistically significant impact on economic growth, while Granger causality results reveal evidence of unidirectional long-term and short-term causality from higher education to economic growth. Radić and Paleka (2020) reveal a unidirectional causality from higher education expenditure to economic growth in the short-run in Croatia. Popović et al. (2019) indicate that education affects economic development positively in Bosnia and Herzegovina. Yurtkuran and Terzi (2015) report for Turkey that the causality runs from economic growth to the number of university graduates while the number of vocational high school and high school graduates Granger causes economic growth. Guma (2014) finds a long-term and unidirectional causal relationship from higher education to GDP growth in Albania. Jihène (2013) fails to find a significant relationship between economic growth and higher education in Morocco and Tunisia. Another study in the case of Morocco by

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Hadir and Lahrech (2015) report that a high level of education is essential in the growth process. Qutb and El Shennawy (2016) find for Egypt that education has a significant positive impact on economic growth in the long-run. In the case of Algeria, Mekdad *et al.* (2014) and Becherair (2014) find that education is positively associated with economic growth while the results of Boutayeba and Ramli (2019) indicate no causality between education and economic growth. In five different groups of EU countries in which most of the EUROMED countries are included, Son et al. (2013) address the importance of education in economic growth in the EU.

Table 1 summarizes the aforementioned studies with a special focus on the Mediterranean countries by variable definition, which attempts to emphasize the shortcoming of a broader growth definition to represent sustainable development in measuring the role of education. With the exception of Tsamadias and Prontzas (2012), previous studies use output growth as the dependent variable. However, no previous study in the case of the EUROMED region has investigated the impact of education on inclusive growth, to the best of our knowledge.

Overall, the essential inference from the proceeding discussions which have motivated this study can be given as follows: the role of education in income growth is well-documented in the region whereas the role of education in inclusive growth has not yet been addressed.

Model Specification and Data

This study investigates the impact of education on economic growth in a panel group of eight Mediterranean countries over the period 2000–2017. The Euro-Mediterranean Partnership (EUROMED) countries included in the sample are the following: Croatia, Cyprus, France, Greece, Israel, Malta, Spain and Turkey.[d] The production function derived from the endogenous growth theory (Lucas 1988; Romer 1990; Grossman and Helpman 1991, among others) is described as follows:

$$y = f(k, h, t) \tag{1}$$

where y denotes output per capita, k the capital stock per capita, h the human capital accumulation, and t the technology level. Given the crucial role of human capital on inclusive growth addressed by previous studies, we also wish to examine the impact that education has on inclusive growth, which can be described as follows:

$$y^* = f(k^*, h, t) \tag{2}$$

where y^* denotes output per worker and k^* the capital stock per worker. Growth (y) is measured by per capita GDP in constant 2010 US dollars. Following the studies by Raheem *et al.* (2018), Oyinlola and Adedeji (2019) and Kouton (2020), inclusive growth (y^*) is represented by output per worker, which is measured as per worker GDP in constant 2010 US dollars. Capital stock per capita (k) is given by per capita[e] Gross Fixed Capital Formation in 2010 US dollars while capital stock per worker (k^*) is given by per worker Gross Fixed Capital Formation in 2010 US dollars.[f]

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Table 1. Previous studies by variable selection.

Author	Growth proxy	Education proxy
Jaoul (2004)	GDP growth	the number of students enrolled in each faculty (law, arts, science and medicine).
Tsamadias and Prontzas (2012)	– inclusive growth	gross secondary enrolment ratio
Jihène (2013)	– GDP growth	– the secondary school enrolment rate – the number of graduates in science and engineering
Son et al. (2013)	– GDP growth	– average number of years of education (for different levels) – quality of education (scores on skill tests)
Becherair (2014)	– GDP growth	the number of students enrolled at major education categories (primary school, secondary school and university)
Guma (2014)	– GDP growth	the number of students at high schools and universities
Mekdad et al. (2014)	– GDP growth	public spending on education (primary school, secondary school)
Hadir and Lahrech (2015)	– GDP growth	– total government expenditure on education – tertiary school enrolment – secondary school enrolment – primary school enrolment
Yurtkuran and Terzi (2015)	– GNP growth	the number of students completing different levels
Qutb and El Shennawy (2016)	– GDP growth	Government expenditure on education as share of GDP
Ozatac *et al.* (2018)	– GDP growth	government expenditure on education
Boutayeba and Ramli (2019)	– GDP growth	the number of students enrolled in secondary education
Popović *et al.* (2019)	– GDP growth	average education years
Radić and Paleka (2020)	– GDP growth	share of higher education expenditure in GDP

Education is taken as the source of human capital and measured by mean years of schooling. Finally, technology is defined by research and development expenditures as a share of GDP. All variables depending on annual observations spanning from 2000 to 2017 are converted into natural logarithms in order to interpret the slope coefficients as elasticities. Data were collected from the World Development Indicators (World Bank 2021) database except for education, which was obtained from the United Nations Development Programme Human Development Reports (2021).

Panel data forms of the functions given in equations (1) and (2) can be shown as follows:

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Table 2. Descriptive statistics.

Statistics	ln$y$	ln$y$*	ln$k$	ln$k$*	ln$h$	ln$t$
Mean	10.01753	11.03407	8.450931	9.467468	2.703420	–0.000586
Median	10.05950	11.10559	8.484155	9.531105	2.721295	–0.162481
Maximum	10.66931	11.58045	9.187684	10.10184	2.884801	1.571948
Minimum	8.947226	10.03994	7.065786	8.158500	2.406945	–1.483246
Std. dev.	0.431545	0.352732	0.469113	0.388780	0.096604	0.759743
Observations	140	140	140	140	140	140

$$y_{i,t} = \alpha_0 + \alpha_1 k_{i,t} + \alpha_2 h_{i,t} + \alpha_3 t_{i,t} + \varphi_i + \delta_t + \varepsilon_{i,t} \tag{3}$$

$$y^*_{i,t} = \beta_0 + \beta_1 k^*_{i,t} + \beta_2 h_{i,t} + \beta_3 t_{i,t} + \nu_i + \theta_t + \varepsilon_{i,t} \tag{4}$$

where i denotes the country (i=1, …, N), t the time period (t=1, …, T). φ_i and ν_i represent country-specific effects while δ_t and θ_t represent time effects. $\varepsilon_{i,t}$ is the random error term.

Table 2 presents the descriptive statistics of the data. Notice that the mean values of the variables described as per capita and per worker are close to each other. Realize also that the variable that has the greatest standard deviation is the technology level, which is quite high compared with the other variables.

Methods and Findings

First generation applications in panel data econometrics are based on the assumption of cross-sectional independence. If observations are dependent across individuals, however, estimators which depend on this might be biased (Hsiao *et al.* 2012). Therefore, one of the major concerns in current panel data econometrics is the possibility of cross-sectional dependence (Sarafidis and Wansbeek 2012; Topcu and Çoban 2017). Following the recent trends, we initially apply Pesaran's (2004) cross-sectional dependence (CD) test as a preliminary step of the empirical framework, which can be shown as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \tag{5}$$

where T denotes the time period, N the number of countries, and ρ the bilateral correlation of the residuals. Panel A of Table 3 indicates the results of Pesaran's (2004) CD test. Panel A of Table 3 indicates that the null hypothesis of cross-sectional independence is refused at the 1% level.

It is necessary to determine the order of integration of variables in the system before conducting regression analysis to avoid inconsistent results and the problem of spurious regression that may arise if non-stationary data are used (Topcu and Aras 2017). Moreover, first generation unit root tests would produce inconsistent

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Table 3. Cross-section dependency and unit root results.

	Panel A	Panel B	
Variable	CD Test	CIPS	CIPS in first difference
ln$y$	9.22[a]	–0.374	–2.461***
ln$y$*	2.94[a]	0.193	–2.568***
ln$k$	3.98[a]	1.058	–2.223**
ln$k$*	2.34[b]	0.525	–2.591***
ln$h$	17.73[a]	–3.088[a]	–
ln$t$	6.86[a]	–0.629	–1.792**

CIPS test is applied with a lag and constant. *** and ** represent 1% and 5% significance levels respectively.

results given the presence of cross-sectional dependence. We, therefore, implement a widely used second generation test. The following equation represents the mathematical form of the CIPS test proposed by Pesaran (2007):

$$CIPS(N,T) = N^{-1}\sum_{i=1}^{N} t_i(N,T) \tag{6}$$

where $CIPS(N,T)$ is an individual augmented form of the IPS test proposed by Im *et al*. (2003) while, $t_i(N,T)$ is an individual augmented form of the DF statistic, proposed by Dickey and Fuller (1979). Unit root results illustrated in Panel B of Table 3 reveal that all variables contain a unit root, with the exception of education.

Once the presence of cross-sectional dependence and the combination of the different integration levels among the variables are determined, the choice of the estimation procedure is of particular importance. In addition, the estimation procedure is expected to allow for heterogeneity as well as addressing cross-sectional dependence.

There are three empirical estimators that relax the assumption of parameter homogeneity across panel members in the panel data econometrics: the Mean Group estimator proposed by Pesaran and Smith (1995), the Common Correlated Effects Mean Group estimator developed by Pesaran (2006), and the Augmented Mean Group estimator introduced by Bond and Eberhardt (2013), Eberhardt and Teal (2010), and Eberhardt and Bond (2009). The AMG estimator is considered an alternative to the Pesaran (2006) CCEMG estimator with macro production function estimation in mind. In addition, the fact that the AMG estimator is more efficient than the MG estimator, especially when the number of individuals is small or the time period is short, makes it a better choice for small samples or short time-series data.[g] Given this information and that recently proposed mean group estimators are robust to cointegration and the combination of I(0) and I(1), this study employs the Augmented Mean Group (AMG) estimator in order to estimate the slope coefficients.

The AMG estimator extends equations (3) and (4) by including the cross-section means in order to address cross-sectional dependence.

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$$X_{it} = \alpha_{1i} Y_{it}^{*} + \alpha_{2i} R_{it} + \delta_{1i} \overline{X}_t + \delta_{2i} \overline{Y}_t^{*} + \delta_{3i} \overline{R}_t + \emptyset_i \hat{w}_t + \nu_i + \delta_t + \varepsilon_{it} \quad (7)$$

$$M_{it} = \beta_{1i} Y_{it} + \beta_{2i} R_{it} + \gamma_{1i} \overline{M}_t + \gamma_{2i} \overline{Y}_t + \gamma_{3i} \overline{R}_t + \emptyset_i \hat{w}_t + \nu_i + \theta_t + \varepsilon_{it} \quad (8)$$

where means for individuals $(\overline{X}_t, \overline{M}_t, \overline{Y}_t^{*}, \overline{Y}_t, \overline{R}_{t,})$ represent the common factors while year dummy coefficients $(\widehat{\omega}_t)$ are gathered from a traditional regression. The AMG estimator is a two-stage approach in which unobservable common factors follow a common dynamic process. In the first stage, the within-group estimator is used to obtain the individual-specific effects. In the second stage, the estimated individual-specific effects are used to estimate the slope coefficients in the second stage. The AMG estimator includes additional regressors that capture cross-sectional dependence, such as lagged dependent variables and lagged first differences of the independent variables. The following equation describes the mathematical notation of the AMG estimator:

$$\widehat{\beta_{AMG}} = N^{-1} \sum_{i=1}^{N} \widehat{\beta}_t \quad (9)$$

where $\widehat{\beta_{AMG}}$ is the average of the cross-section estimators.

Table 4 reports the results attained from the AMG estimator. A 1% increase in capital per capita increases growth by 0.237%, while a 1% increase in education level increases growth by 0.061%. On the other hand, a 1% increase in capital per worker leads to an increase in inclusive growth by 0.281% while a 1% increase in education level leads to an increase in inclusive growth by 0.303%. Despite a positive estimated coefficient, the impact of technology is statistically insignificant for each specification.

For robustness purposes, we also employ the CCEMG estimator proposed by Pesaran (2006). The regression results reported in Table 5 indicate that the results are robust to the estimator.

Policy Implications

As indicated in the MSESD (2014), education strengthens the judgement capacity of individuals, groups, communities, organizations and, as a consequence, countries to make choices for the sake of sustainable development. It also builds up innovative knowledge which improves the quality of life. Therefore, relevant authorities in Mediterranean countries should pay special attention to education policy and planning. Education governance reforms that attempt to improve educational quality will assist policymakers to achieve sustainable development goals. As noted by Odit et *al.* (2010), schooling may reduce the cost of acquiring know-how and, therefore facilitate the adoption of innovations.[h] Thus, policymakers should give priority to the policies devoted to increasing educational accountability and transparency, and reducing educational inequalities. In addition, they should follow the most recent trends in educational technology closely. Notice that greater awareness and empowerment are expected to make the region a better place to live in terms of economic outcomes as well. Policies towards a knowledge-based economy

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Table 4. Estimation results (AMG estimator).

Variable	Equation (7) (growth)	Equation (8) (inclusive growth)
ln*k*	0.237***	–
ln*k**	–	0.281***
ln*h*	0.061**	0.303**
ln*t*	0.020	0.059
Wald	69.80***	18.01***
CD-test	–0.91	–1.03
CIPS-test	–3.205**	–3.303***

Notes: Parameter estimates are calculated as sample averages. The models include a constant. CD-test is a test for cross-sectional dependence while the CIPS-test is for a unit root. Wald is the chi-square test for all slope coefficients equal to zero. CIPS test is applied with a lag and constant. Significance at the 1% and 5% levels is represented by *** and ** respectively.

Table 5. Estimation results (CCEMG estimator).

Variable	Equation (7) (growth)	Equation (8) (inclusive growth)
ln*k*	0.220***	–
ln*k**	–	0.240***
ln*h*	0.030***	0.204***
ln*t*	0.091**	0.113
Wald	50.05***	33.25***
CD-test	–0.93	–0.89
CIPS-test	–3.425**	–3.383***

Notes: Parameter estimates are calculated as sample averages. The models include a constant. CD-test is a test for cross-sectional dependence while the CIPS-test is for a unit root. Wald is the chi-square test for all slope coefficients equal to zero. CIPS test is applied with a lag and constant. Significance at the 1% and 5% levels is represented by *** and ** respectively.

are likely to bring more employment opportunities, which, in turn, increase prosperity across the region.

The findings obtained from this study do not only address straight implications such as allocating more resources towards education, including improving the quality of schools, hiring and training teachers, and providing access to technology and learning materials. In the inclusive growth process, policymakers should work to reduce barriers to education, such as cost, geographic location, and cultural or language barriers. This can include providing scholarships or financial assistance to low-income students, expanding access to online or distance learning, and promoting multilingual education. In addition, because of the well-documented evidence that investing in early childhood education has a positive impact on long-term educational outcomes and future success in life, policymakers should prioritize funding and resources towards improving access to high-quality early childhood education. Encouraging public–private partnerships is of great concern to reap the benefits of education in the inclusive growth process. To this end, policymakers should collaborate with private sector partners to improve the quality and relevance

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of education to the needs of the labour market, while also ensuring that education remains accessible and affordable for all. Last but not least, policymakers in the region should support innovation and entrepreneurship in the education sector, such as promoting new models of education delivery, encouraging the development of educational technology, and supporting social entrepreneurs who are working to address educational challenges in their communities.

The comparison of growth specifications is worth mentioning as well. Empirical results demonstrate that the main driver of output growth is physical capital, whereas inclusive growth is primarily triggered by human capital. The results obtained from the AMG estimator also reveal that the effect of physical capital stock on output growth is roughly comparable with that on inclusive growth. The evidence that technology does not have a statistically significant effect on both growth concepts might result from the fact that the majority of the Mediterranean countries in the sample are not better able to develop high value-adding technologies.

Conclusion

Adopting an endogenous growth model, this study investigates the impact of education as a channel for human capital accumulation on two different growth concepts in a panel group of eight EUROMED countries over the period 2000–2017. Empirical results obtained from the AMG estimator indicate that each determinant has a positive and statistically significant impact on both growth proxies, with the exception of the technology variable. In terms of our central focus, we find that the impact of education on inclusive growth is five times higher than that on output growth. Not surprisingly, this finding clearly emphasizes the role of education in building up the human capital stock in the EUROMED countries.

Considering the limitations of the existing study, some recommendations could be addressed for future studies. Potential subjects for future research could be the extension of the time period and the sample with the inclusion of more Mediterranean countries (given data availability). In particular, incorporating African EUROMED countries into the sample would be better able to reflect heterogeneity in the region. In addition, As noted by Liao et al. (2019), different countries have different levels of investment in education due to differences in economic levels and local government policies. Thus, a comparison between middle- and high-income countries may provide useful insights into developing a comprehensive and common education policy across the region. Finally, country–time effects, such as the importance of institutional quality or corruption, would also be worthy of investigation.

Notes

a. See the literature section, for a review in detail.

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b. Note that the concept of 'inclusive growth' is often confused with the concept of 'quality growth'. While both quality growth and inclusive growth emphasize the importance of ensuring sustainable and beneficial economic growth for everyone, they have different focuses. The inclusive growth concept used here emphasizes the need for economic growth to benefit all members of society and reduce inequality while quality growth emphasizes the importance of sustainability and environmental protection. Because the focus of this study is on ensuring that the benefits of growth are shared equitably across society (i.e., reducing poverty, and improving income equality) rather than sustainability and environmental protection, this study utilizes the inclusive growth concept.

c. To the best of our knowledge, the literature review in the next section does not provide panel data evidence across the globe unless the focus is devoted to a panel group of Mediterranean countries.

d. We basically consider the data availability in determining the time span and the sample size. Notice that it is very challenging to gather available data for the EUROMED countries. Therefore, the other countries in the region are omitted due to data restrictions.

e. We use population data to define the per capita capital variable.

f. We use employment data which was extracted from the International Financial Statistics (IMF 2021) online database to define the variables in terms of per worker.

g. In addition to its advantages, the AMG employed herein does not follow a dynamic process.

h. Odit *et al*. (2010) discuss that the skills and knowledge required to adapt new technologies to developing countries are typically scarce, so that a learning process is necessary. Learning occurs through a combination of three factors: (i) experience gleaned from the act of production, (ii) knowledge capital imported from the developed world, and (iii) conscious accumulation of know-how.

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