Reviews of ECONJOURNAL-D-23-00202R1

Government expenditure, education, and productivity in the European Union: Effects on economic growth

Round 1

Reviewer 1

This paper deals with the cornerstone of any society and any government: education, and its role for economic development. This topic is not easy to address, as it has many roots and is, undoubtedly, complex. Nevertheless, the authors have been capable of posing the problem under study in a clear manner, focusing on one of the potential strands and lines of research. In addition, they do a good summarizing exercise of the results in the conclusions section.

In any case, the authors must deal with some weaknesses of the work and overcome them in order to improve the paper. These are the main comments (the first are the most severe ones):

- The review of the literature is slightly "obsolete" regarding some of the relationships addressed. In particular, sections 2.1 and 2.3. These problems have been extensively studied in the literature until nowadays, so more recent references are needed.
- Very importantly, the sample size (regarding time), is short. The authors mention this limitation in the document, and it seems strange to me the lack of availability of data prior to 2009 for certain variables. I encourage the authors to check for this avalilability again. If possible, a larger sample size would be more than welcome.
- If any table containing information is incorporated, as Table 1, the subsequent explanation must be provided. The information coming from the description of the data is essential for understanding further analyses.
- At the beginning, it seems that the authors have not carried out a logarithmic transformation of the variables (which would potentially help in the estimation process), but later, one of the variables is in logarithms (wage gains). Why? This should be explained in the document.
- The techniques employed are correct for the purpose of the work, although, as previously said, the sample size is short, so the long run is rather difficult to be analyzed with such a sample. In addition, if two methodologies are used (DOLS and FMOLS), one expects that they are going to be compared in terms of their performance, at least in the conclusions; this should be done. In addition, some evaluation and validation tests and statistics should be incorporated. The work only focuses on the estimation results.
- Have the authors considered the potential existence of multicollinearity between GPE and GID?

- The cointegration tests are not sufficiently explained.
- The references need a comprehensive review. Information is missing in certain references and there is no consistency between them (sometimes use of "vol.", sometimes not, etc.).
- The authors should be more careful with some statements, like, for example: "our
findings seem to be robust.", in page 22, a vague statemement. Necessarily, a rigurous measure for robustness must be incorporated. Or: "(i) employment in sectors with high technological content is the variable that best explains productivity", in page 23, as it depends on the method use.
- The Abstract should contain a brief reference to the most important results and/or conclusions.
- The Introduction is quite short. Even though the contribution of the paper is clearly stated, the motivation is somehow missing or not sufficiently present in the text.
- In page 5, what is the criterion for selecting those countries? Although it seems a reasonable selection, the criteria should be stated. Is it for economic reasons? Is it because of their educational systems?

Additional minor comments:
- The scales of measurement are missing in the definition of the variables in page 15.
- In tables 3.1.1, 3.1.2, 3.2.1 and 3.2.2, the authors should explain why two columns per estimation appear (it is because of using EDS or EDT, but it should be explicitly said).
- The scale is missing in Figure 4. The Gini index if oftenly expressed as a figure between 0 and 1, not in percentage.
- Some typos or sentences need to be fixed. For example: in page 3, "and those that try to measure the efficiency of spending on Education", missing "respectively" at the end?. Page 6: "which is similar to that of Portugal. Country that showed". Page 18: "residues". Page 20: "are
the main drivers of wage gains. Being this result consistent with the literatura."; "the population with higher education are that contribute positively".

Reviewer 2

The article "Government expenditure, education, and productivity in the European Union: Effects on economic growth" delves into a subject matter that has been extensively debated within academic literature, probing the fundamental drivers of economic growth.
As 2023 has been designated the "Year of Skills" in the European Union, researching on the relationship between human capital and economic growth through the impact of public spending on education (as a measure of human capital development) on productivity, wages, and thus, per capita GDP growth,

holds significant contemporary relevance.
The text is well-structured, ensuring easy readability. It incorporates an extensive literature review.
However, certain key areas for improvement are notable.
Regarding the formal aspect, the integration of illustrative figures within the literature review section, while clearly informative, could be better situated within a segment dedicated to detailing variables and the dataset. Such repositioning would ensure a more seamless correlation between graphical representation and contextual explanation.
One noteworthy inconsistency comes frome the use of descriptive figure illustrating the percentage of real growth in euros. The absence of per capita data in this context, despite the recurrent emphasis on per capita GDP in the narrative, presents a conceptual incongruity requiring rectification.
In the section discussing human capital and inequality reduction, two graphs on public spending on education and the Gini index for measuring inequality are presented.
However, the subsequent lack of in-depth analysis or incorporation of inequality measures into the analytical model raises pertinent questions regarding the section's relevance and the graph's integration.
Contrastingly, the sections on productivity and the efficiency of education spending lack accompanying graphs. It would have been insightful to observe the evolution of productivity and understand how education spending efficiency could be measured during the study period.
Some formatting issues, notably the confusion stemming from color representations for Spain and Portugal and a scale anomaly in depicting EU data before 2010, hamper the visual clarity of the presentation.
Moreover, while the article draws graph data from the World Bank database, its exclusive reliance on Eurostat data for analysis prompts queries regarding the graphs' pertinence and alignment with the analytical framework.
The selection of highlighted European countries in the graphs lacks explanation, especially considering the absence of certain regions (e.g., Nordic countries or Eastern Europe) while focusing on Southern European countries, while focusing on Southern European countries, as Portugal, Italy, and Spain.
On the other hand, the graphs indicate that the European Union data refers to the 27th year from 2020, but the last year shown in the graphs is precisely 2020. So what is the composition of the EU over the years between 2006 and 2000?
Another important issue is precisely the selection of countries. In the period considered (2006-2020), the EU has undergone transformations, since in 2013 Croatia joined as a Member State of the Union, while in 2020, the United Kingdom left the EU. So, what are the 27 countries considered? Is the UK included during the entire period? What about Croatia?
Continuing with the format, table 1 on page 16 could have been landscaped to

fit the entire table instead of dividing it into 2. Also, an issue that makes reading easier is to present the same number of decimals in all columns. It is unnecessary for up to 6 decimal places to appear in a descriptive data table. It must show a format that makes it easy to read.

As far as the theoretical review is concerned, what is being presented is an exhaustive compilation of empirical studies that show relationships between variables and their corresponding results. Still, there is yet to be an accurate compilation of the great theories on the importance of education. in economic growth, beyond Becker's human capital theory. By the way, this theory dates to 1964 (the first edition of the book that Becker published with the title "Human Capital: A Theoretical and empirical analysis, with special reference to education"). However, in the bibliography there is a reference to the 2009 edition. There is no problem with that except that it is strange, on page 3, that in the first paragraph of section 2.1 there is a reference to what Becker said in the year 2009 and in the following paragraph there is a review of the numerous works that were based on that idea and whose publication dates are prior to 2009 (in a range that goes from 1960 to 2006). It seems a bit contradictory that the studies are based on something that is published later.

Section 2.2 (page 9) on reducing inequalities includes a reference to the SDGs, but its relationship to the rest of the section is poorly understood. As is the reference to job quality (from the perspective of subjective satisfaction, not objective job quality), which ends up being almost more of a reference to self-declared life satisfaction. If a concept such as job quality is introduced, perhaps it should be dealt with in more detail. There is a large body of literature on the subject. If not, its inclusion in this section seems somewhat forced, especially as the Gini index appears below in Figure 4, rather than an indicator of job quality or life satisfaction (such as the OECD's Better Life Index). In particular, section 3 of Methodology and data uses GDP per capita growth as a variable to measure improvements in the population's standard of living, with all the debate this simplification entails (taking into account, for example, the UNDP Human Development Indices or the aforementioned OECD Better Life Index). These aspects must be taken into account in the context of the debates initiated by the Commission chaired by Stiglitz, Sen and Fitoussi, which presented the Report of the Commission on the Measurement of Economic Development and Social Progress in 2009.

With regard to the selection of variables for the model, the following issues could be raised: For example, in the case of employment in high-technology sectors, I don't know whether sectors that require a high level of knowledge, i.e. knowledge-intensive services (KIS), are included (essentially service sectors), which seems more appropriate when analysing the relationship between human capital and productivity, wages and economic growth. The classification of these sectors can be found in Eurostat, as well as that of the sectors classified as high technology (which mainly correspond to industry).

In the case of central government expenditure, I understand that all public administrations are included because, at least in the case of Spain, education is one of the subjects transferred to the Autonomous Communities, which are the ones that carry out public expenditure in this concept.
It is unclear how years worked is measured as a variable to take into account work experience. Is it a variable extracted from the Labour Force Survey? Has the variable been extracted from working life data?
Concerning the discussion of the results: at no point in the paper is there any reference to the extraordinary period studied, with a financial crisis that broke out in Europe in 2008, leading to a recession in 2009 with an initial period of fiscal expansion, but with a long period of spending cuts and restrictive fiscal policies between 2010 and almost 2014. Education was included in the budget cuts, which may explain the negative coefficient in the model.
On the other hand, although reference is made to work experience, continuous training provided by companies (or through active employment policies) is not taken into account. As highlighted in the European Year of Skills, a broader approach than that of human capital linked to educational attainment is needed. Training acquired through work experience is not intrinsically linked to educational levels, especially in the context of digital transformation, which requires digital skills at a much faster pace than the acquisition of these skills through formal education. For this reason, this vision of on-the-job training is missing throughout the document, which is then key to interpreting the results of the model and is not considered in the literature review. It would be necessary, therefore, to include some variables on the investment in training made by companies. Or even on the ongoing training carried out by workers.
The conclusions emphasise that high qualifications favour employment in high-technology sectors. But it could also be understood the other way round, because it is the sectors with a high technological content that need workers with high qualifications. So we can talk about productive structure as an explanation of economic growth.
Furthermore, the importance of work experience is highlighted as an explanation for wage growth, without any reference to the possibility of acquiring this experience and the specific competences of the job through the training provided by the company.
Finally, it should be noted that the reference to the possibility of using education spending as an instrument of fiscal policy to fulfil the distributive function of reducing inequality is striking when this aspect does not appear in the model.
In conclusion, while the article provides valuable insights into the relationship between human capital and economic growth, it requires refinement in its formatting, reconciliation of data sources, strengthening of theoretical depth and consideration of additional variables to strengthen the comprehensiveness and academic interest of its findings.

Round 2

Editor

The referees gave a minor revision. I can see that the authors have successfully addressed all concerns and I believe that there is no need to send the paper again back to the referees. I'm happy to accept the paper for publication.