The impact of language and quality education on regional and economic development: a study of 99 countries

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Language and quality education play an important role in enhancing the development of regions and economies. Education systems and language policies implemented by different countries depend upon their individual political, cultural, historic, and economic characteristics. However, it is important for each country to achieve a degree of harmony between their education and language policies (as is the case of Singapore and Ireland). This could help to improve their economic performance and accelerate the wheels of development. To investigate the impact of quality education and language on different regions and economies, this study used panel data from 99 non-English speaking economies during 2009–2017 period. Following the approach of Barro (1991) and Mankiw et al. (1992), a baseline model was augmented (Augmented Solow model) to include language and quality education indicators. In addition, the model was estimated using the Two-step system GMM test. The test also determined which variables could have a long-term impact on the development of the listed panel data (using STATA 15 software). The findings and estimations reveal that language and quality education have a positive impact on the regions and their economic growth. The impact of primary education quality is more significant than the impact of secondary education quality, while the impact of the English language on the development process is positive but not significant. The policy implications are that decision makers should adopt language policies which complement the education system and the economic strategy of the country.

Introduction

There is ample evidence to prove that the English language has macroeconomic value; both practical examples and literature can validate this. For example, using a quantitative approach, Ku and Zussman (2010) clarified the role of the English language in enhancing international trade and investment size. They concluded that the absence of a single common language could hinder the trade process and create a language barrier between two different economies. Furthermore, speaking one common language helps to decrease the transaction costs involved in the trading process (Helliwell 1999). These related costs are likely to increase due to the degree of difficulty of learning specific new languages. Therefore, to lower costs, learners should decide on a favourable linguistic portfolio, through cost and benefit analysis, and then obtain the skills which maximize return (Selten–Pool 1991). According to the findings of Oh et al. (2011), the English language has lower transaction costs, compared to French, Spanish and Arabic. Oh et al. also found that having a common language economically impacts foreign direct investment more than trading.

Furthermore, the English language plays an important role in enhancing the process of development and communication (Dávid–Szűcs 2009). The development may be of the economy, society or individuals. For example, Hall and Jones (1999) attribute the regional differences of output per worker to the differences in the social infrastructure in which languages are spoken. It was also found that there is a positive relationship between the English language and the economic growth of Europe and Asia. However, such evidence cannot be provided for some economies in Latin America and Africa (Lee 2011). Here, it is also important to consider why the impact of the English language differs from one region to another. Different studies shed light on this issue from different perspectives. In Kenya's primary schools, for instance, English language books are only useful for diligent and economically advantaged students in comparison to others (Glewwe et al. 2009). Additionally, according to Bruthiaux (2002), English language education may exacerbate income gaps in developing economies.

It is also important to shed light on the role of language policy. Usually, language policy is linked with the planning process (LPP). LPP is defined as governments' planning process to effect ways of implementing speaking or literacy applications in society (Baldauf 2004). The aim behind choosing a specific language policy is to adjust or modify the linguistic environment and hence to boost welfare (Grin 2003). Language policy impacts the socio-economic development of countries through two channels: the exposure and distance of local people's languages from the official language. To explain this with an example, having high distance and low exposure increases learning costs and reduces human capital in the economy. Simultaneously, the usage of a distant language could raise the cost of accessing health information.

It also limits desirable health behaviour as well as health care. Hence, this leads to differences in productivity and wealth (Laitin–Ramachandran 2016). Consequently, the inclusion of economics helps to ease the decision-making process for issues relating to language. This can be done using a cost and benefit analysis for different language policies (Zhang–Grenier 2012). An economic analysis thus justifies government intervention. Otherwise, based on economic theory, having no intervention could lead to market failure (Grin 2003).

As explained above, policies and institutions could help to enhance English proficiency in line with education. For example, according to Grin's (2001) study, in some economies, policies usually encourage the use of English in the education system because of a belief that English can improve the lives of people. Moreover, there is empirical evidence indicating that English language proficiency can be associated with a better overall education in specific contexts. Another perspective linking language education policies and economic policies states that, to achieve rapid economic development, it is necessary to reach a point of harmony or compatibility between these policies. For instance, Singapore achieved the highest degree of harmony between language education and its economic policies, followed by Ireland and Puerto Rico. In these different economies, there is an obvious link between English proficiency and wage increases, foreign capital, and economic growth (Suárez 2005).

Therefore, based on the findings of previous studies, it is important to mention here that English can be considered an important component of human capital along the average number of years of schooling. This assertion is justified by the nature of language as a valuable and productive asset in the labour market (Chiswick–Miller 1995). In addition, the study considered quality education as a part of the analysis, due to its importance in the economic development process. It was also proved that there is a positive relationship between quality education and economic growth.

After the pioneering works of Mankiw et al. (1992) and Barro (1991), many studies began to research the relationship between education quantity and economic development. In the literature, education by quantity was measured through different indicators. For instance, some used the rate of schooling enrolment as did Mankiw et al. (1992), Barro (1991), and Levine and Renelt (1992). Others preferred indicators such as mean years of schooling (Krueger–Lindhal 2001), rate of adult literacy (Durlauf–Johnson, 1995) or expenditure on education (Baldacci et al. 2008). Regarding the quality of education, Barro (1999), Hanushek and Kimko (2000), Hanushek and Kim (1995), Hanushek and Woessmann (2008) investigated the impact of schooling quality on economic development. Hanushek and Kimko (2000), Hanushek and Kim (1995) and Hanushek and Woessmann (2008) evaluated the quality of the labour force in terms of their intellective abilities, in mathematics and science. They found out that the quality of the labour force has a significant

impact on economic development. In addition, Barro understood that there is a positive relationship between the quality of schooling (measured using students' examination scores) and economic development.

Methodology

In this study, the choice of countries used depended on the availability of data indicators. Therefore, the initial number was 141 countries. After cleaning the data, the number dropped to 99 countries with strongly balanced data – which means that there are data for each economy for every year.

To examine the impact of language and quality education on economic growth, it was important to build a model using the panel data regression approach. In this study, the panel data (time series cross-sectional data) included 99 non-English speaking economies (N=99) in the time period between 2009–2017 (T=9). The two-step system GMM test (Dynamic panel-data estimation) was deemed more suitable for this kind of data, where the time period is less than the number of listed countries (T<N).

Solow model and its augmentation

In order to specify the model of economic growth, it was important to first consider the equation of Solow (1956), which is also known as the Cobb-Douglas production function. Therefore, the output level can be estimated as the following:

$$Y_t = k_t^{\alpha}(A_t L_t)^{1-\alpha} \quad (0<\alpha<1)$$

Where output level (Y) can be measured through technology or knowledge level (A), labour or workers (AL) and capital (K). In addition, (α) represents output's elasticity to capital and (t) is time.

According to Mankiw et al. (1992), this equation can be augmented (which is called the augmented Solow model) to include the impact of human capital (H) on the output, as the following:

$$Y_t = (A_t L_t)^{1-\alpha-\beta} K_t^{\alpha} H_t^{\beta} \quad (0<\alpha+\beta<1)$$

where β represents a variable's share in the output. In this study, the augmented Solow model is considered to be the baseline by which the analysis can be conducted.

Furthermore, evaluating the impact of human capital on output requires calculating output per capita (Y/L) as well as the logarithm of equation, to reach the steady state of income per capita (at a specific time (t)), as per the following:

$$\ln\left(\frac{Y}{L}\right)_t = a_t + \frac{\alpha}{1-\alpha}\ln(s_k)_t - \frac{\alpha}{1-\alpha}\ln(n+g+\delta)_t + \frac{\beta}{1-\alpha}\ln(h)_t + \varepsilon_t$$

where (s_k) represents physical capital investment, (n) employment growth rate, and (h) human capital. In addition, (g) and (δ) are assumed to be constant across different entities or individuals (regions or countries also). The reason is that (g)

mostly represents knowledge advancement (which is not clearly identified among nations). There is also no data which could help to measure depreciation rates (δ) across different economies. Furthermore, A(0) represents the technology, natural resources, institutions, etc. which could be different from one country to another. Based on this, A(0) can be estimated by the following equation where ln A(0)=a+ε in which (a) is constant, and (ε) is the country's discrepancy.

Dynamic-panel data estimation (Two-step system GMM)

The impact of quality education and language (as the main interest of this study) on the economic performance of different regions can be estimated using the two-step system GMM. To deal with the problem of endogeneity, difference GMM (Arellano–Bond 1991) was used first. It used the first differences and lagged variables as instruments to remove unobserved country-specific fixed effects to increase the consistency of estimation. However, in specific cases, unobserved country-specific fixed effects can be necessary or important and difference GMM could result in wrongly-specified models and weak instruments. Therefore, two-system GMM (Arellano–Bover 1995 and Blundell–Bond 1998) was used to solve the problem of the difference GMM, by eliminating weak instruments through the issue of two systems of equations (differenced equation and an equation in levels). Thus, the two system GMM improves the efficiency of estimation by its ability to eliminate the possibility of a correlation between first-differenced instruments, which are used for the variables in the levels, and for unobserved country fixed effects. The economic growth equations required for the estimation (using the two-step system GMM) are:

$$Y_{it} = \beta_1 Y_{it-1} + \beta_2 x_{it} + \beta_3 x_{it-1} + u_{it}$$

in which:

$$u_{it} = v_i + e_{it}$$

$$\Delta Y_{it} = \beta_1 \Delta Y_{it-1} + \beta_2 \Delta x_{it} + \beta_3 \Delta x_{it-1} + \Delta u_{it}$$

in which:

$$\Delta u_{it} = \Delta v_i + \Delta e_{it}$$

where (i) indicates the number of countries and (t) is related to the time period. Furthermore, (Δ) is the sign of first difference factor, (Y_{it}) is real GDP (gross domestic product), which is usually used to explain economic growth, (Y_{it-1}) is real GDP lagged by one year, (x_{it}) and (x_{it-1}) represent the explanatory variables and their lags respectively. (u_{it}) is the error in which (v_i) is equal to unobserved country fixed effects plus (e_{it}) idiosyncratic disturbance.

Finally, it was important to check the suitability and validity of the two-step system GMM test for the data (using Stata 15 software). The first check was for instrument validity using the Hansen test, in which p-value preferably should be in the range of 0.25 to 0.1. The second test is called the Arellano-Bond test (AR2), which can be used to test autocorrelation/serial correlation of the error term, where

the p-value should be higher than 0.05 to be acceptable. Based on the results, neither the Hansen test nor AR2 revealed any problem. Hence the two-step system GMM can be used to estimate the factors influencing economic growth in the model (where T is less than N).

Data and model specification

As a result, the economic growth equation takes the following dynamic form:

$$\ln(\text{GDP per capita})_{it} = \beta_0 + \beta_1 \ln(\text{GDP per capita})_{it-1} + \beta_2 \ln(S_k)_{it} + \beta_3 \ln(n+g+\delta)_{it} + \beta_4 \ln(h)_{it} + \beta_5 \ln(\text{Secondary quality education})_{it} + \beta_6 \ln(\text{Primary quality education})_{it} + \beta_7 \ln(\text{TOEFL score})_{it} + \beta_8 \ln(\text{general government consumption})_{it} + e_{it}$$

where GDP per capita should be computed by dividing output-side real GDP at chained PPP (in million US$ in 2011) by the number of persons engaged (in millions) in the labour market (data source is Penn World Tables 9.1); natural logarithm (ln) is calculated for all variables and (e) is the error term. In addition, the equation includes the lagged endogenous variable (GDP per capita$_{it-1}$) as an explanatory variable to improve the consistency of estimation. Instead of population growth (as in the Solow model), employment growth (n) was used in this model. Employment growth is calculated using the number of persons engaged in the labour market in a specific time period. In addition, $(g+\delta)$ is assumed to be 0.05 and (s_k) equals the share of gross capital formation at current PPP which is used as a proxy to physical investment. (h) indicates human capital which can be measured by the Human capital index, based on years of schooling and returns to education. All the variables are collected from the PWT 9.1 data source (Feenstra et al. 2015).

Regarding quality education, the study focuses on the quality of education in primary and secondary schools for different countries. The data source is the Legatum Prosperity Index (2019). In order to measure the quality of education in primary and secondary schools, the institute used education quality by primary and secondary attainment indicators.

To explain the impact of language on the economy, this study chose the English language for analysis. The reason is its role in international trade and regional development. The data source is TOEFL iBT tests (estimated by TOEFL score means per country). The test helps to evaluate the English language skills of individuals who have passed the test in every country. It is important to mention here, that these scores are not representative of the whole economy, but help to explain why there are differences between countries in terms of the spread and proficiency level of the English language and hence the quality of education.

Finally, general government consumption refers to all current expenditures of the government such as, purchases of goods and services and employee compensation. The data was collected from World Bank (2020) tables.

The GMM model includes year dummies which can be useful to depict the change of GDP across different counties in a specific time period. The two-step system GMM also helps to generate long run GMM coefficients in case the model includes ones. This can support the results of this study, besides the use of graphs via Stata 15 software.

Empirical results

This study investigates whether the English language and quality education can be considered determinants of economic development for 99 different regional economies. As observed in Table 1 below, the results of the model are estimated using System GMM. Based on the results, quality education in primary and secondary schools, and the English language (measured by means of TOEFL scores per country) have a positive impact on economic development. Elaborating on the results for quality education, a percentage change in secondary quality education is associated with a 0.0672% increase in economic growth in the short run. However, this result is not significant. In contrast, primary quality education impact is significant at the 10% significance level, with a percentage change in primary quality education resulting in a 0.0503% increase in economic development. Therefore, there is a positive relationship between the quality of the education system and economic performance for every specific country. These results match with the studies of Hanushek and Kimko (2000), Hanushek and Kim (1995), Lee and Lee (1995), Barro (2001) and Woessmann (2002, 2003). In addition, human capital (h) has a significant positive impact on development (at a 5% significance level). Furthermore, regional differences in economic development due to international variations in human capital could increase when quality education is considered (Woessmann 2002, 2003). As shown in Table 1, human capital's p-value is significant where a unit increase in human capital raises the economic growth by 0.517%. In the case of physical investment (S_k), the p-value is significant at 10%. Based on the results, physical investment positively enhances the economic development for countries (0.119% increase for every unit changed).

Regarding the impact of language on the economy, having one common or widely spoken language such as English, has a positive impact on the economic performance of the countries. According to the results, English proficiency (measured by TOEFL score means) does not have a significant impact on economic growth. However, it has a positive relationship with development. Therefore, for every unit increase in TOEFL score means per nation, there is a 0.0621% increase in economic growth. These results match with the work of Suárez (2005) and Seargeant–Erling (2011).

Table 1

Two-step System GMM Results (Dependent variable: ln(GDP per capita)$_{it}$

Variables	Two-step system GMM	
ln (GDP per capita)$_{it-1}$	0.731***	(0.102)
ln (n+g+δ)$_{it}$	–0.0997	(0.534)
ln (S_k)$_{it}$	0.119*	(0.0618)
ln(h)$_{it}$	0.517**	(0.248)
ln (Secondary quality education)$_{it}$	0.0672	(0.0704)
ln (Primary quality education)$_{it}$	0.0503*	(0.0293)
ln (TOEFL score)$_{it}$	0.0621	(0.188)
ln (General government consumption)$_{it}$	0.0619	(0.0617)
Year Dummies		Yes
No. of observations		693
F statistic		57036.28
Groups/Instruments		99/22
AR (2)		0.056
Hansen Statistics		0.139

Notes: *** , **, * are statistical significance at 1%, 5%, and 10% levels respectively; t-statistics (in parentheses) are based on white heteroscedasticity-consistent std. errors; p-values reported for AR(2) and Hansen statistic.

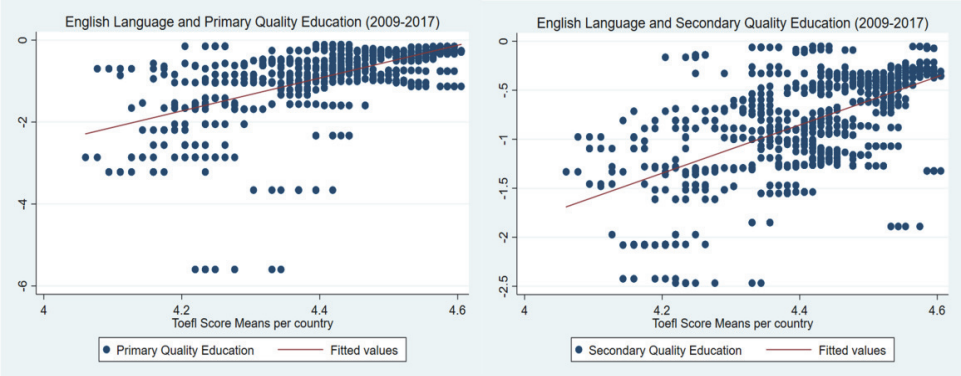
Reviewing the panel data, countries with high GDP scores are the economies where English is a second language, placed after the major native language. This observation matches with the statistics of the United Nations (McCormick 2013, Chakraborty–Kapur 2008). For example, countries which have the highest TOEFL score means (in the panel data) are Sweden, Norway, Denmark, Singapore, Finland, Austria, Luxembourg, Germany, and Belgium. Simultaneously, these economies have strong economic performances. To an extent, this order matches Education First's rankings. This organization uses the English Proficiency Index (EPI) as an indicator for the extent to which the English language is spoken in every specific country. According to Education First's annual report for 2017, Netherlands, Sweden, Denmark, Norway, and Singapore are at the top of the ranking for English proficiency. In addition, the EPI can be used to indicate development differences between different regional economies. For example, by comparing the ranking of Poland with Hungary in terms of the EPI, Poland is ranked 11th, indicating a very high proficiency, compared to Hungary at 15th position, labelled as high

proficiency. Reviewing other development indicators such as GNI per capita, Poland is slightly higher than Hungary, at $11,758.43 and $12,893.88 respectively. Comparing Austria with Hungary, Austria's rank in the EPI is eight (very high proficiency category) which is better than Hungary. Simultaneously, Austria's GNI per capita is about ($ 39,083.18), which is much higher than Hungary (EF EPI 2019a, b). However and obviously, there are other factors and issues which affect economic performance. For example, in the case of Hungary, during the last few years Hungary's regional economic development has been discussed widely. The issues explored include: poverty in the northern part of Hungary (Siposne Nandori 2014, Alpek et al. 2018, Alpek–Tésits 2019); Hungary's employment growth in different regions in the late post-socialist transition period (Lengyel–Szakálné Kanó 2013, Tagai et al 2018, Demeter 2020); the impact of foreign direct investments on the innovations systems in Hungary (Lengyel–Leydesdorff 2015, Faluvégi 2020). Therefore, the EPI could play an important role in development, but it is important to also consider other related factors to ensure a thorough and reliable study and accurate results.

This observation can be justified by considering the role of the English language in enhancing quality education which is imperative for regional development. This relationship is depicted in Figure 1. In the two scatterplots, the red line shows a positive correlation between English language score means and quality education (better overall education) in primary and secondary schools for different countries (Grin 2001). Hence these economies usually formulate their language education policies to complement the economic policy of the country, such as for Singapore and Ireland (Suárez 2005).

Figure 1

The impact of English language on the quality education of 99 nations for nine years



As observed in Table (1), the variables which have a significant p-value are Physical investment (at 10%), Human Capital (5%) and Primary quality education

(10%). These variables have significant short run coefficients. Using Stata Software, it is possible to compute long run effects for every variable using the following formula: $\frac{\beta_k}{(1-\beta_l)}$ where (*k*) represents a significant variable in the short run and (*l*) indicates ln(GDP per capita)$_{it-1}$.

Table 2

Long run GMM coefficients

Variables	Coefficients	Std. Err.
ln $(S_k)_{it}$	0.4424473**	(0.1936075)
$\ln(h)_{it}$	1.922601****	(0.4174758)
ln (Primary quality education)$_{it}$	0.1871875*	(0.1004076)

Notes: ****, **, * are statistical significances at the 0.1%, 5%, and 10% levels respectively; z-statistics (in parentheses) are based on white heteroscedasticity-consistent std. errors.

As shown in Table 2, physical investment is also significant in the long run, at the level of 0.05, Human capital is significant in the short run and highly significant in the long run at a 0.001 level, and finally, primary school quality education is significant at 10% in the long run. Furthermore, physical investment and human capital have a larger positive effect on economic growth in the long run at 0.4424473 and 1.922601 respectively, than in the short run at 0.119 and 0.517, respectively. Simultaneously, the effect of primary education quality on economic growth on the long run at 0.1871875 is higher than in the short run at 0.0503. Consequently, physical investment, human capital and primary quality education play an important role in enhancing the development process in the long term.

Conclusion

The aim of this study was to investigate the impact of quality education and language (English) on the economic growth for 99 different regions in the time period from 2009 to 2017. To achieve this, the study used GMM estimation to reduce the level of bias in the estimation and to allow the use of internal instruments for the endogenous explanatory variable. The findings reveal that quality education plays an important role in enhancing economic development. Quality education has a positive impact on economic growth. According to the results, the impact of primary education quality is more significant than the impact of secondary education quality. Therefore, decision makers should pay special attention to this issue. During the last ten years, quality education in Eastern Europe has significantly improved and increased in terms of the number of years of secondary education per worker and children's participation in learning at school. In contrast, human capital, measured by years of schooling and returns to education, reflecting the quantitative aspect of education, has a more significant influence on

the economy than the qualitative aspect. However, the quantitative and qualitative aspects of education should be taken into consideration together, especially at the time of formulation of the economic strategy.

Moreover, the impact of the English language (measured by TOEFL score means) on the development process is positive but not significant. According to the literature, evidence that could prove the impact of English on the economy is still insufficient. Furthermore, most previous studies mainly focus on the investment returns on language education and the microeconomic perspective. However, it could be possible to conclude that the influence of language on the economy is indirect. Despite that, there is no denying the role of the English language on enhancing quality education, international trade, and the level of openness in the economy. In addition, having a high EPI is not the only condition for economic success, and it is necessary to consider other factors such as the strength of institutions and policies, economic stability, the level of government contribution and consumption and other important variables. This can be clearly observed in the regional economic comparison between Hungary, Austria and Poland conducted by this study.

As regards policy implications, decision makers should formulate language education policies which can fit economic strategies to increase the level of openness and international trade. Finally, for future studies it is recommended to expand the panel data estimation to include a greater number of years as well as countries. Conducting a survey can also help to obtain feedback of students about quality education and language education in a specific economy.

Appendix

The panel data of this study includes the following (99) countries

African countries	Latin countries	European countries		Asian countries	Middle East countries
Angola	Bolivia	Austria	Romania	Bangladesh	Algeria
Botswana	Brazil	Belgium	Russian Federation	Cambodia	Bahrain
Burkina Faso	Chile	Bulgaria	Serbia	China	Egypt, Arab Rep.
Burundi	Colombia	Croatia	Slovenia	Hong Kong SAR, China	Iran, Islamic Rep.
Cameroon	Costa Rica	Cyprus	Spain	India	Iraq
Congo, Rep.	Dominican Republic	Czech Republic	Sweden	Indonesia	Israel
Gabon	Ecuador	Denmark	Switzerland	Japan	Jordan
The Gambia	El Salvador	Estonia	Turkey	Kazakhstan	Kuwait
Ghana	Guatemala	Finland	Ukraine	Korea, Rep.	Morocco
Kenya	Honduras	France	Albania	Malaysia	Qatar
Liberia	Jamaica	Germany	Armenia	Mongolia	Saudi Arabia
Mauritius	Mexico	Hungary		Nepal	United Arab Emirates
Nigeria	Nicaragua	Iceland		Pakistan	
Rwanda	Panama	Italy		Philippines	
Sierra Leone	Paraguay	Latvia		Singapore	
South Africa	Peru	Lithuania		Sri Lanka	
Tanzania	Uruguay	Luxembourg		Thailand	
Togo		Moldova		Vietnam	
Tunisia		Norway			
Uganda		Poland			
		Portugal			

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