English Language and Economic Growth:
Cross-Country Empirical Evidence

Chew Ging LEE

Nottingham University Business School
The University of Nottingham Malaysia Campus
Selangor Darul Ehsan, Malaysia
lee.chew-ging@nottingham.edu.my

Abstract: *This paper addresses the effect of English proficiency on economic growth empirically with Barro-type cross-sectional growth regression. The empirical results provide evidence of positive correlation between initial English proficiency and economic growth only for the countries in the Asia and Europe. Therefore, countries with higher levels of English proficiency among the fraction of its population are likely to grow faster. This paper suggests that the ability to absorb knowledge is positively related to the level of English proficiency. It implies that the level of English proficiency can be viewed as a component of human capital.*

Introduction

The accumulation of knowledge is generally recognized as having positive effect on economic growth, in particular, knowledge creation through the firms' research and development activities (Romer, 1990; Grossmann and Helpman, 1991; Aghion and Howitt, 1992; Jones, 1995). At a given point of time, the stock of knowledge available to an economy is just a subset of existing stock of knowledge. New ideas and insights created by a developed economy may not be aware by others, although Keller (2002) suggests that increasing economic integration and the advent of new means of telecommunication ensure that people in all countries have access to the same stock of knowledge. This is because the rate of diffusion of new knowledge to an economy depends heavily on the economy's absorptive capabilities and the existence of international knowledge spillovers (Coe and Helpman, 1995; Coe, Helpman, and Hoffmaister, 1997; Falvey et al., 2002; Falvey et al., 2004). Therefore, the production, diffusion and absorption of knowledge determine the volume of knowledge that is available to an economy.

It is widely accepted that the majority of new knowledge created by developed countries in which English has enjoyed a special status. Furthermore, it is also recognized that developing countries enjoy efficiency gains if they adopt the knowledge created in developed countries (Caselli and Coleman, 2000; Caselli and Coleman, 2001; Hall and Jones, 1999). Crystal (2003) has provided a lengthy discussion on the growth of the influence of English language and the evidence of the importance of English language in the modern society. Since knowledge itself is largely intangible, it is difficult to quantify the stock of knowledge. If the number of internationally accepted journals and published papers can be used as a proxy for the stock of knowledge, we can conclude easily that English has become an effective means of getting access to knowledge. This is because English language has been an important medium of academic publications. For instance, German Economic Review, the official publication of the German Economic Association (Verein für Socialpolitik), and Spanish Economic Review, the official publication of the Spanish Economic Association (Asociación Española de Economía), are published in English. After 49 volumes with the majority of articles in German, the Konjunkturpolitik was relaunched as Applied Economics Quarterly at the beginning of 2003, and now publishes exclusively in English.

The impact of English on daily activities can also be examined. Machinery usually comes with instructions or manuals in English. Without a basic understanding of English, workers are generally unable to use this machinery in productive activities effectively. Keller (2002) indicates that the language of communication among R&D engineers in Germany and Italy are invariably in English in the manufacturing industry level. Based on these examples, we cannot deny that individuals are more likely to be in touch with new knowledge if they have learned English.

The importance of other languages cannot be denied. But, the importance of the English language as the international language of communication should be emphasized because knowledge is gained either by experience, learning and perception or through association

and reasoning. Sometimes, important creations and discoveries in countries where English has no special status are published in a local language. But, to enable the created knowledge to reach much further around the world and to obtain a higher recognition, they would have been translated into English. This does not mean all workers in a country must master English. It just suggests at least a fraction of workers must be fluent in English. The group of workers who are proficient in English will gain access to the new knowledge and then they can translate the learned knowledge into the local language to allow the learned knowledge to reach a wider audience.

To date, no known study in economic growth has been carried out to investigate the effect of English on growth either empirically or theoretically. A small number of studies have considered the importance of language for spillovers (Caselli and Coleman, 2001; Keller, 2002). Caselli and Coleman (2001) investigate the determinants of computer-technology adoption with a large sample of countries between 1970 and 1990. They found that the fraction of the population speaking English is statistically insignificant. Keller (2002) finds that language skills are important for international technology diffusion. He shows that speaking the same language facilitates the diffusion of technology. Hall and Jones (1999) argue that the differences in output per worker across countries can be explained by the differences in social infrastructure of which is partially determined by language. They show that the fraction of the population speaking one of the five primary Western European languages: English, French, German, Portuguese and Spanish explains the variation of social infrastructure. This variable also explains the variation of natural logarithm of output per worker. But, the fraction of the population speaking English is insignificant in these two equations.

The intention of this paper is to fill the existing gap with empirical evidence. This paper is organized as follows; the first section describes the data collected and also presents empirical evidence on the relationship between the level of English proficiency and economic growth and the last section is the conclusion.

Data

In this study, data is combined from three data sources: Sorensen and Whitta-Jacobsen (2005, table A, 390-393), TOEFL Test and Score Data Summaries: 1993-1994 and 1995-1996 Editions (www.ets.org), and Barro and Lee (2000). The description of variables and their sources are summarized in Table 1.

Table 1: Description of Variables and Their Sources

Variable	Explanation	Source
GROWTH	Average annual growth rate of real GDP per worker from 1960-2000.	Sorensen and Whitta-Jacobsen, (2005, Table A, p. 390-393)
INVEST	Average investment rate in physical capital (investment share of GDP) from 1960-2000.	Sorensen and Whitta-Jacobsen, (2005, Table A, p. 390-393)
GDP60	Real GDP per worker in 1960	Sorensen and Whitta-Jacobsen, (2005, Table A, p. 390-393)
ENGLISH93	TOEFL total score mean of examinees who took TOEFL from July 1993 through June 1995.	TOEFL Test and Score Data Summary 1995-96 Edition
ENGLISH91	TOEFL total score mean of examinees who took TOEFL from July 1991 through June 1993.	TOEFL Test and Score Data Summary 1993-94 Edition
ASIA	1 if a country is classified as Asia or Middle East, 0 otherwise by TOEFL.	TOEFL Test and Score Data Summary 1995-96 Edition
AFRICA	1 if a country is classified as Africa, 0 otherwise by TOEFL.	TOEFL Test and Score Data Summary 1995-96 Edition
EUROPE	1 if a country is classified as Europe, 0 otherwise by TOEFL.	TOEFL Test and Score Data Summary 1995-96 Edition
SCHOOL60	Average schooling years in the group of the population aged 15 and above in year 1960.	Barro and Lee (2000)

Initially, the fraction of population speaking English compiled by Hall and Jones (1999) that has been used by Caselli and Coleman (2001) is intended to be utilized as the proxy for English proficiency. However, on further investigation this data was found to be unsuitable for this study. Firstly, there are only 35 countries with positive values; others had a value equal to zero. Secondly, this data contains only information about the fraction of population who use English as the "first" language. Thirdly, the reliability of this data has been questioned. For instance, the value for Singapore is 0.089, Sri Lanka 0.009, Philippines 0, India 0 and Malaysia 0 in Hall and Jones (1999). However, the English language has been widely used in the commercial sector of the above-mentioned five countries. English language is also taught as a compulsory subject at least at high school level in these five countries. Lastly, the data of Hall and Jones does not provide a measure of English proficiency for the fraction of population who know English.

To determine the suitability of a variable as the proxy for English proficiency, we probably have to go through a heated debate similar to the case for the proxies for human capital and environmental pollution. Based on the illustration in the Introduction, it is

anticipated that the rate of absorption of knowledge for an economy would be greater if a larger size of the population has a better command of English. A proxy that can capture these two dimensions: the fraction of population who know English and the level of English proficiency of this group of individuals have to be identified. Currently, there is no data source that can capture these two dimensions.

Recognizing that the perfect proxy for English proficiency required by this study may not be available, this study will look for a close proxy which is widely available in the public domain. Since TOEFL and IELTS are two of the widely recognized tests of English proficiency, this study intends to consider the scores of one of the tests as the measure of English proficiency. Generally, these two tests are used to evaluate the ability of an individual to use and understand English in an academic setting. Although both tests consist of four parts: Listening, Reading, Writing and Speaking, they are assessed differently and have different measure of competence in each part. For instance, IELTS test is scored on a scale of 0 to 9 and the Internet-based TOEFL test is scored on a scale of 0 to 120. The mean score of IELTS for a country is not available in the public domain. The mean score of TOEFL can be downloaded from www.ets.org. Since the mean score of TOEFL examinees is the only widely recognized measure of English proficiency that is available in the public domain, it is used as the proxy for English proficiency of a fraction of the population who can speak English. The mean score of TOEFL examinees is not a perfect proxy required for this study. It does not fully capture the fraction of population who can speak English because TOEFL exams are taken by those who plan to live, work or study abroad, particularly in the US, UK, Canada, Australia and New Zealand. Therefore, only a small fraction of the individuals in a country enroll in TOEFL exams.

The number of TOEFL examinees also varies considerably from one country to another. The number of TOEFL examinees may reflect the amount of resources allocated in the provision of English teaching and also the fraction of population who have some competence in the English language. The mean score of TOEFL examinees may reflect the average proficiency level of the mentioned group of individuals. Creating a new variable by allowing the mean score of TOEFL examinees to interact with the data of Hall and Jones (1999) has been avoided because this only generates a sample with 35 positive values. Although there are limitations associated with the mean score of TOEFL examinees, it is the only widely available measure for English proficiency.

English language TOEFL Test and Score Data Summary: 1993-1994 Edition provides the earliest available information on TOEFL scores. The number of examinees for TOEFL Test and Score Data Summary varies from one country to another. For instance, in 1993-1994 Edition among the countries where score means are reported, the lowest number of examinees is 34 and highest is 260513. Since outliers can distort average, countries with low number of examinees are excluded. Only countries with at least 1000 examinees are included. The cut-off point of at least 1000 examinees is chosen arbitrarily. A higher cut-off point is avoided so that a reasonable sample size can be maintained.

Crystal (2003, pp. 62-65) identifies seventy-five economies in which English has held or continues to hold a special status as either the primary language or second language. These economies include New Zealand, United States, Singapore and others. In these countries, the use of English is high among the general population. Therefore, this group of countries has been omitted from this study because TOEFL is designed to measure the English proficiency of people whose native language is not English. Although this group of countries is the main creators of knowledge in terms of the aggregate volume of created knowledge, some of them are not major creators of knowledge individually. High percentage of knowledge is transmitted from some of these countries to others. Putting these data sources together, the total number of usable observations is only 43 economies, as reported in Table 2. Some of the included countries have to be recognized by this study, for example France, Switzerland and others are major creators of knowledge also.

Table 2: Economies Included in This Study

Argentina	Dominican Republic	Israel	Portugal
Austria	Ecuador	Italy	Romania
Belgium	Egypt	Japan	Spain
Bolivia	El Salvador	Jordan	Sweden
Brazil	Ethiopia	Korea	Switzerland
Chile	Finland	Mexico	Syria
China	France	Morocco	Taiwan, China
Colombia	Greece	Netherlands	Thailand
Costa Rica	Guatemala	Norway	Turkey
Cyprus	Indonesia	Panama	Venezuela
Denmark	Iran	Peru	

Dummy variables are created for different regions based on the classifications of TOEFL Test and Score Data Summaries. In this study, countries have been grouped under the classifications of Middle East and Asia regions into a single regional dummy. The Asia regions are included in this group because there are only four countries classified under Middle East region and traditionally the countries under these two TOEFL classifications are classified as Asian countries in the atlas. All regional dummies are not used as intercept dummies that are the common approach in existing empirical studies (Barro, 1991, 1997; Easterly and Levine, 1995; Feng, 2003). They will be used as slope dummies to interact with either ENGLISH91 or ENGLISH93.

Results

The Barro-type cross-sectional growth regression is utilized in this study. This cross-sectional regression captures conditional convergence by introducing the initial GDP per capita that is measured by real GDP per worker in 1960, GDP60, as an independent variable. GROWTH is the dependent variable used in this study. There is a possibility of

the endogeneity problem arising in this research due to the reverse causality between economic growth and English proficiency. For instance, economic growth leads to increased demand for English speaking employees and thus to higher English proficiency. To tackle this issue, initial English proficiency is used as an independent variable. Mean scores of TOEFL obtained from the TOEFL Test and Score Data Summaries: 1993-1994 and 1995-1996 Editions computed from paper-based TOEFL test are used as the initial English proficiency level. They are denoted as TOEFL91 and TOEFL93, respectively. Both TOEFL91 and TOEFL93 are used to represent the initial English proficiency level in different regression model because in the earlier cross-country studies related to human capital, it has been observed that the empirical results are highly sensitive to the choices of proxy and the types of dataset been used. Since GROWTH is the average annual growth rate of real GDP per worker from 1960-2000 and the year associated with either TOEFL91 or TOEFL91 is within the whole period, the issue related to endogeneity may not be fully addressed.

The panel data estimation methods, which are commonly used in the estimation growth equation, for instance the works of Baldacci, Clements, Gupta, and Cui (2008) and Caselli et al. (1996), was not used in this study because it is not possible to obtain long enough data for the mean score of TOEFL of each selected country. New TOEFL tests have been developed over the last decade. Initially, the TOEFL test was paper-based. However, in 1998, the computer-based TOEFL test was introduced. Subsequently, the Internet-based TOEFL test was developed in September 2005. With the introduction of Internet-based TOEFL tests, computer-based TOEFL tests were discontinued in September 2006. Currently, paper-based TOEFL test is offered on a limited basis to support the Internet-based TOEFL testing network. The maximum score of each test is different. For instance, the maximum score of Internet-based TOEFL test is 120, paper-based TOEFL test is 677 and computer-based TOEFL test is 300.

The regression results are reported in Tables 3, 4 and 5. It has been noted that, in the existing empirical studies, the significance of one independent variable can be affected by the choices of data and groups of independent variables used (Levine and Renelt, 1992; Sala-i-Martin, 1997). Equation (1) is the base model, which captures common control variables observed in the literature and the proxy for initial English proficiency is only introduced in the remaining equations. Two control variables (INVEST and GDP60) were used to keep the regression models simple and to prevent the debate on the suitability of other variables. INVEST and GDP60 are both statistically significant at 1% level for all equations reported in Table 3. They showed the expected result. These results are consistent with previous studies.

ENGLISH91 and ENGLISH93 are statistically insignificant in (2) and (3), respectively. But, they have the expected positive result. The lack of significance of the coefficient of either ENGLISH91 or ENGLISH93 warrants some careful analysis. At this stage, it is premature to conclude that English proficiency has no impact on economic growth because it is assumed that the effects of English proficiency are homogeneous across continents. Whether English proficiency has an effect on economic growth is a problem of the specification of a model. To overcome this problem, slope regional dummies were

introduced into (4) and (5) of the study. ENGLISH91 and ENGLISH93 are still statistically insignificant. The signs for both of them are different. ENGLISH91 has a negative sign which against the argument that the level of English proficiency has a positive effect on economic growth. Among the slope regional dummies, only ASIA and EUROPE are significant. There are only 3 countries associated with AFRICA. The low number of observations in AFRICA may be the reason why this slope dummy is statistically insignificant. Comparing (4) and (5), each regional dummy has same sign and similar magnitude. Based on F-test, ENGLISH91 and ENGLISH91xAFRICA are jointly insignificant even at 10% level in (4). ENGLISH93 and ENGLISH93xAFRICA of (5) are also jointly insignificant at 10% level. Therefore, these jointly insignificant variables are omitted to estimate (6) and (7).

In (6) and (7), all left-hand side variables are significant at 1% level. The coefficient of each left-hand side variable for these two equations has a similar magnitude. Both these final equations also have $\overline{R}^2$ of slightly above 0.7. All the earlier equations have $\overline{R}^2$ lower than both these two final equations reported in Table 3. Interaction terms between ASIA and either ENGLISH91 or ENGLISH93 are significant at 1% level as reported. The same conclusion also applies to interaction terms between EUROPE and either ENGLISH91 or ENGLISH93. This implies that the level of English proficiency has a positive impact on the economic growth of Asian and European economies only. The economies in other regions do not enjoy the positive effects of English language on growth probably due to internal factors, such as political instability, market distortion, policy uncertainty and lack of political freedom. These internal factors may disrupt market activities and threaten the effective use of human capital.

Table 3: Regression Results: GROWTH as the Dependent Variable

	Equation						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
INTERCEPT	9.98×10^{-3} $(3.84 \times 10^{-3})^b$	5.69×10^{-3} (0.0292)	4.71×10^{-3} (0.0306)	0.0135 (0.0265)	8.64×10^{-3} (0.0265)	0.0137 $(3.76 \times 10^{-3})^a$	0.0137 $(3.76 \times 10^{-3})^a$
GDP60	-1.26×10^{-6} $(1.86 \times 10^{-7})^a$	-1.29×10^{-6} $(2.33 \times 10^{-7})^a$	-1.29×10^{-6} $(2.25 \times 10^{-7})^a$	-1.19×10^{-6} $(1.73 \times 10^{-7})^a$	-1.19×10^{-6} $(1.67 \times 10^{-7})^a$	-1.22×10^{-6} $(1.41 \times 10^{-7})^a$	-1.22×10^{-6} $(1.40 \times 10^{-7})^a$
INVEST	0.1400 $(0.0170)^a$	0.1397 $(0.0171)^a$	0.1397 $(0.0171)^a$	0.0783 $(0.0223)^a$	0.0787 $(0.0221)^a$	0.0728 $(0.0218)^a$	0.0727 $(0.0217)^a$
ENGLISH91		8.52×10^{-6} (5.58×10^{-5})		-3.11×10^{-6} (4.79×10^{-5})			
ENGLISH93			1.04×10^{-5} (5.76×10^{-5})		6.00×10^{-6} (4.66×10^{-5})		
ENGLISH91x AFRICA				8.47×10^{-6} (1.13×10^{-5})			
ENGLISH93x AFRICA					8.89×10^{-6} (1.13×10^{-5})		
ENGLISH91x ASIA				2.93×10^{-5} $(8.70 \times 10^{-6})^a$		2.84×10^{-5} $(8.90 \times 10^{-6})^a$	
ENGLISH93x ASIA					2.94×10^{-5} $(8.52 \times 10^{-6})^a$		2.82×10^{-5} $(8.79 \times 10^{-6})^a$
ENGLISH91x EUROPE				2.62×10^{-5} $(6.38 \times 10^{-6})^a$		2.62×10^{-5} $(5.46 \times 10^{-6})^a$	
ENGLISH93x EUROPE					2.56×10^{-5} $(6.17 \times 10^{-6})^a$		2.60×10^{-5} $(5.42 \times 10^{-6})^a$
$\widetilde{R}^2$	0.5598	0.5487	0.5488	0.6992	0.6994	0.7096	0.7096

[a] Statistically significant at the 1% level in a two-tailed test.
[b] Statistically significant at the 5% level in a two-tailed test.
[c] Statistically significant at the 10% level in a two-tailed test.
Standard errors are in the parentheses and are constructed from White's (1980) heteroskedasticity-consistent covariance matrix.

To keep the models simple, the regression models obtained in Table 3 have only two control variables: INVEST and GDP60. These regression models lack a general education variable, which may lead to misspecification of model. Furthermore, some researchers may suggest that the results in Table 3 are obtained because the English language variable has acted as a proxy for general education. To check whether the results of English language variable are robust to the inclusion of other common independent variables and to prevent the misspecification of model, initial average years of schooling, SCHOOL60, is introduced in the regression models reported in Table 4. Recognizing that the interaction of the dummy variable associated with African countries and initial English proficiency is insignificant in the earlier results and there are only three African countries in this sample, ENGLISH91xAFRICA and ENGLISH93xAFRICA are omitted.

Table 4: Regression Results: GROWTH as the Dependent Variable

	Equation				
	(8)	**(9)**	**(10)**	**(11)**	**(12)**
INTERCEPT	0.0115 $(0.0047)^b$	0.0109 (0.0333)	0.0107 (0.0354)	0.0338 (0.0321)	0.0295 (0.0332)
GDP60	-1.32×10^{-6} $(2.4 \times 10^{-7})^a$	-1.33×10^{-6} $(2.5 \times 10^{-7})^a$	-1.33×10^{-6} $(2.43 \times 10^{-7})^a$	-1.24×10^{-6} $(1.95 \times 10^{-7})^a$	-1.25×10^{-6} $(1.91 \times 10^{-7})^a$
INVEST	0.1273 $(0.0296)^a$	0.1273 $(0.0309)^a$	0.1273 $(0.0311)^a$	0.0542 (0.0352)	0.0550 (0.0354)
SCHOOL60	4.5×10^{-4} (1.1×10^{-3})	4.4×10^{-4} (1.2×10^{-3})	4.4×10^{-4} (1.2×10^{-3})	6.6×10^{-4} (1.0×10^{-3})	6.2×10^{-4} (1.1×10^{-3})
ENGLISH91		1.05×10^{-6} (6.18×10^{-5})		-3.57×10^{-5} (5.6×10^{-5})	
ENGLISH93			1.46×10^{-6} (6.5×10^{-6})		-2.73×10^{-5} (5.72×10^{-5})
ENGLISH91x ASIA				2.77×10^{-5} $(8.57 \times 10^{-6})^a$	
ENGLISH93x ASIA					2.78×10^{-5} $(8.44 \times 10^{-6})^a$
ENGLISH91x EUROPE				2.87×10^{-5} $(6.99 \times 10^{-6})^a$	
ENGLISH93x EUROPE					2.82×10^{-5} $(6.82 \times 10^{-6})^a$
$\bar{R}^2$	0.5429	0.5302	0.5302	0.7007	0.6998

[a] Statistically significant at the 1% level in a two-tailed test.
[b] Statistically significant at the 5% level in a two-tailed test.
[c] Statistically significant at the 10% level in a two-tailed test.
Standard errors are in the parentheses and are constructed from White's (1980) heteroskedasticity-consistent covariance matrix.

Table 5: Regression Results: GROWTH as the Dependent Variable

	Equation			
	(13)	**(14)**	**(15)**	**(16)**
INTERCEPT	0.0116 $(4.8 \times 10^{-3})^b$	0.0116 $(0.0048)^b$	0.0254 $(4.6 \times 10^{-3})^a$	0.0253 $(4.6 \times 10^{-3})^a$
GDP60	-1.35×10^{-6} $(2.51 \times 10^{-7})^a$	-1.35×10^{-6} $(2.5 \times 10^{-7})^a$	-1.3×10^{-6} $(2.0 \times 10^{-7})^a$	-1.3×10^{-6} $(1.99 \times 10^{-7})^a$
INVEST	0.1258 $(0.0282)^a$	0.1259 $(0.0281)^a$	0.0630 $(0.0241)^b$	0.0630 $(0.0240)^b$
ENGLISH91x SCHOOL60	9.92×10^{-7} (1.8×10^{-6})		-4.82×10^{-6} $(2.0 \times 10\text{-}6)^b$	
ENGLISH93x SCHOOL60		9.7×10^{-7} (1.79×10^{-6})		-4.77×10^{-6} $(1.98 \times 10^{-6})^b$
ENGLISH91x SCHOOL60x ASIA			7.44×10^{-6} $(2.31 \times 10^{-6})^a$	
ENGLISH93x SCHOOL60x ASIA				7.39×10^{-6} $(2.29 \times 10^{-6})^a$
ENGLISH91x SCHOOL60x EUROPE			6.84×10^{-6} $(1.67 \times 10^{-6})^a$	
ENGLISH93x SCHOOL60x EUROPE				6.79×10^{-6} $(1.65 \times 10^{-6})^a$
$\bar{R}^2$	0.5442	0.5441	0.7170	0.7166

[a] Statistically significant at the 1% level in a two-tailed test.
[b] Statistically significant at the 5% level in a two-tailed test.
[c] Statistically significant at the 10% level in a two-tailed test.
Standard errors are in the parentheses and are constructed from White's (1980) heteroskedasticity-consistent covariance matrix.

Equation (8) is the base model reported in Table 4 with the addition of SCHOOL60 but without any initial English proficiency and the interaction terms of dummy variables. The results associated with GDP60 and INVEST are similar to those obtained from (1). SCHOOL60 is statistically insignificant but its estimated coefficient has the expected positive sign. The proxies for initial English proficiency are introduced in (9) and (10). SCHOOL60 is still statistically insignificant. The results for other independent variables are similar to those obtained from (2) and (3). Interaction terms, ASIAxENGLISH91 and EUROPExENGLISH91, are introduced into (9) for the estimation of (11). To estimate (12), interaction terms, ASIAxENGLISH93 and EUROPExENGLISH93, are added to (10). In both (11) and (12), INVEST becomes statistically insignificant. Initial English proficiency variable in both equations is statistically insignificant with negative sign. The interaction terms of initial English proficiency with either ASIA or EUROPE are

statistically significant at 1% level with sign and magnitude similar to the earlier estimated equations.

Table 4 has produced surprising results indicating that initial schooling is not correlated with economic growth. Furthermore, investment becomes statistically insignificant when the interaction terms between initial English proficiency and regional dummy variables have been introduced as additional independent variables. Instead of analyzing the effects of initial English proficiency and initial schooling separately in this study, these two variables have been allowed to interact to obtain a new proxy for initial human capital: ENGLISH91xSCHOOL60 or ENGLISH93xSCHOOL60. Table 5 provides the results of the estimated models where this new proxy for initial human capital has been introduced as an independent variable. Equations (13) and (14) are the base models with 3 independent variables: GDP60, INVEST and either ENGLISH91xSCHOOL60 or ENGLISH93xSCHOOL60. All these independent variables are significant at 1% level, except ENGLISH91xSCHOOL60 in (13) and ENGLISH93xSCHOOL60 in (14). These two new proxies for initial human capital are allowed to interact with ASIA and EUROPE dummy variables in the estimation of (15) and (16). In both equations, all independent variables are statistically significant at least at 5% level. All these independent variables have the expected signs with the exception of the estimated coefficient of either ENGLISH91xSCHOOL60 or ENGLISH93xSCHOOL60. The negative estimated coefficient of the initial human capital in each estimated equation implies that for Latin American and African countries, this initial human capital and economic growth are negatively correlated. However, for Asian and European countries the initial human capital is positively correlated with economic growth because in absolute value the estimated coefficient of ENGLISH91xSCHOOL60 is smaller than that of either ENGLISH91xSCHOOL60xASIA or ENGLISH91xSCHOOL60xEUROPE and the estimated coefficient of ENGLISH93xSCHOOL60 is smaller than that of either ENGLISH93xSCHOOL60xASIA or ENGLISH93xSCHOOL60xEUROPE.

The empirical results reported in Tables 3, 4 and 5 are unable to find statistically significant correlation between economic growth and the proxy for initial English proficiency if the effects of initial English proficiency are treated homogeneously across continents. With the introduction of interaction terms between continental dummy variables and initial English proficiency into the regression models, statistically significant correlation between economic growth and the proxy for initial English proficiency can be found for countries in Asia and Europe. Therefore, there is no unanimous evidence to support the positive contribution of English proficiency to economic growth across all countries. English proficiency will have a positive impact on economic growth if the increase in English proficiency is complemented with a minimum threshold of physical capital, technology, political stability, good governance and other factors. The improvement in English proficiency without sufficient accumulation of physical capital, technology and social capital will be add significantly to the economic growth of a country. This probably explains why English proficiency does not contribute to the economic growth of the countries outside Asia and Europe. Hence, English proficiency can be seen as a necessity but not sufficient condition for economic growth.

Conclusion

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The spectacular growth of Asian countries can be attributed to the heavy investment in the creation of human capital that fosters a English-speaking culture and promotes a climate of the use of English. An increase in English proficiency will directly accelerate the knowledge absorptive capabilities of workers. A similar argument can be applied to European economies, which also enjoy a positive growth rate. This study does not find any evidence about the effects of English language on the economic growth of Latin American and African countries. This indicates that a satisfactory understanding of the effect of English language on economic growth requires an appreciation of how the formation of institutions, stability and certainty can encourage the accumulation of knowledge. It is important not to forget the fact that even if this study is able to find a positive relationship between the proficiency level of English and the growth rate in a cross-sectional data, establishing this relationship can be very difficult under different empirical framework and different measures for the proficiency level of English.

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