An Empirical Investigation of Precolonial and Colonial Legacies to Current Economic Growth Rates

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Abstract

We examine the effects of precolonial and colonial legacies on the current economic growth rates of ex-colonies. We find that precolonial legacies have significant positive relationships with current economic growth rates, as well as high model explanatory power. In contrast, colonial legacies have ambivalent effects on current economic growth rates. In the latter case, we capture the positive and negative significant relationships using immigration from the colonial ruler countries and colonial duration, respectively. Here, we find that Neo-European countries have benefited from the dominant positive effects of their colonial legacy, but that Sub-Saharan African ex-colonies are dominated by negative effects. In the case of Korea, the overall effect of the colonial legacy is not substantially different from zero, and the country's current high economic growth rate originates mainly from the precolonial legacy.

JEL Classification: N10, O40, O47, O50.

Keywords: Precolonial legacy; positive and negative effects of colonial legacy; current economic growth rate; ex-colonies; Neo-European economic growth rate; Sub-Saharan African economic growth rate; Korean economic growth rate.

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1 Introduction

Identifying the factors affecting economic growth rates in different countries is a popular research topic in the field of economic development and growth. For example, Glaeser, La Porta, Lopez-de-Silane, and Shleifer (2004) identify human capital as an important factor. As another example, Acemoglu, Johnson, and Robinson (2001) examine institutional quality as another factor affecting economic growth.

Identifying these factors, along with their roles, is often a primary goal. These factors and roles are critical, as they can be used to argue effective government policies or to inform the key factors for economic growth. Nevertheless, there is little agreement on the roles of different factors, particularly in the case of ex-colonial economies. For example, Bockstette, Chanda, and Putterman (2002) and Chanda and Putterman (2007) argue that the post-war economic growth rates of Korea, Hong Kong, and India originated from the relatively advanced technology levels and sophisticated governing structures of the traditional countries. On the other hand, Acemoglu, Johnson, and Robinson (2002) claim that the legacies of the traditional countries were defunct during the colonial periods of the ex-colonies and, thus, adversely affected the modern economic growth rates of these countries. Based on empirical investigations, Grier (1999) and Feyrer and Sacerdote (2009) claim that ex-colonies with a long colonial duration show greater economic performance, without controlling for other factors discussed below. On the other hand, Bertocchi and Canova (2002) empirically show that the economic growth rates of African countries accelerated after being decolonized. Furthermore, Price (2003) empirically finds that the economic growth rates of African ex-colonies are negatively correlated with the colonial duration variable or that they show no statistically significant correlation.

Therefore, one goal of this study is to provide a comprehensive view that can treat these different arguments in a single framework, enabling us to evaluate the different views. Here, we empirically examine the current economic growth rates of 64 ex-colonies using the factors identified in prior studies as being correlated with these growth rates.

These factors are mainly classified as precolonial and colonial legacy variables. The precolonial legacy variables are proxies that capture the social standards of the ex-colonies before they were colonized. They are constructed by indexing features such as the political system, technology level, population density, and urbanization (*e.g.*, Bockstette, Chanda, and Putterman, 2002; Chanda, and Putterman 2007; Comin, Easterly, and Gong 2010; Acemoglu, Johnson, and Robinson, 2001; Bandyopadhyay and Green, 2012, *etc.*). As detailed below, these variables are positively correlated with each other and with Olsson and Hibbs's (2005) biogeography index, which measures favorable biogeographical conditions that accelerated the Neolithic revolution. In this way, different chronological experiences of the Neolithic revolution can be associated with current social and economic statuses, as argued by Diamond (1997). We use the precolonial legacy variables to capture the effects of historical features on the current economic growth rates. In the same vein, the colonial legacy variables are the proxies of colonial experiences. There are different views on how colonial experiences have affected current economic growth rates. Using colonial duration, Grier (1999), Feyrer and Sacerdote (2009), Bertocchi and Canova (2002), and Price (2003) empirically show contrasting results, as mentioned earlier. Acemoglu, Johnson, and Robinson (2001, 2002), among others, argue that colonial experiences left both positive and negative legacies to current economies. They empirically affirm that greater numbers of immigrants from the colonial ruler countries resulted in more positive economic activities. However, they do not control for the negative effects.

Our comprehensive model framework employs colonial duration and the immigrant ratio to capture possible positive or negative effects of colonial legacies, and we also control for other precolonial legacies. In this way, different views on colonial legacies can be properly evaluated within a single framework (*e.g.*, Bockstette, Chanda, and Putterman, 2002; Chanda and Putterman, 2007; Acemoglu, Johnson, and Robinson, 2002, *etc*.). Our model framework is also built on initial condition variables that prior studies have identified, theoretically and empirically, as being correlated with current economic growth rates. Typical examples include GDP per capita in the 1960s and the human capital variables suggested by the conditional convergence hypothesis, income distribution, and the socioeconomic status of a developing country (*e.g.*, Barro, 1991; Perotti, 1996; Deininger and Olinto, 1999; Adelman and Morris, 1967; Temple and Johnson, 1998, *etc*.).

A further goal of this study is to evaluate the current economic growths of different ex-colonies using our model framework. This serves the dual purpose of affirming our empirical model estimation, in line with prior literature, and resolving the issues relevant to the economic growths of these ex-colonies. That is, our model consistently explains the wide variation in the economic growth rates of the sample observations, including Korea, Sub-Saharan African, and Neo-European ex-colonies.

First, Korea is one of the few examples of successful economic growth since the 1960s, which existing literature regards as an exceptional case (*e.g.*, Easterly, 1995). Prior literature on the origin of this success is classified into four different views. First, Amsden (1989), Wade (1990), and the World Bank (1993), among others, address the role played by the government between the 1960s and 1970s in the economic success of Korea. Effective government policies and interventions were key to the success, according to Amsden (1989) and Wade (1990), while the World Bank (1993) points out the market- and export-oriented economic policies as the main reasons for the success. Second, Rodrik (1995) and Temple and Johnson (1998), among others, note that better initial conditions in Korea than in other countries contributed to the economic growth. Rodrik (1995) empirically finds that the Korean economic growth rates between 1960 and 1985 are mostly explained by the relatively equal income distribution and the country's high school enrollment rate. Temple and Johnson (1998) compare Adelman and Morris's (1967) social development index across countries and find that Korea was in a favorable condition for high economic growth. Third, Eckert (1991), Hsiao (2003), and Kim (2006), among others, argue that the high economic growth in Korea was rooted in the country's colonial experiences. According to their views, new capital stocks and advanced technologies were introduced by the Japanese colonial government, and these became the seeds for the high economic growth. Kohli (1994) argues that the colonial government was the most efficient and inclusive state that had ever existed in the Korean peninsula, and Lee (2000) claims that the tax and legal systems of Korea were reorganized more efficiently to protect property rights during the Japanese colonial period. Finally, others argue that the high economic growth in Korea is the result of the traditional Korean economy itself. Kim (1970, 1971), Kwon (1969, 2004), Kang (1973), Hideki (1977), and Miyajima (1994), among others, argue that precolonial and traditional Korea enjoyed a high level of social standards relative to other countries. Furthermore, Korea underwent an economic modernization process even before the colonial period. They further assert that the modernization process stopped during the Japanese colonial period and resumed after being decolonized, resulting in the high economic growth in 1960s and 1970s (*e.g.*, Woo 2008, Lee 2012). Note that these different views on Korea's economic success are addressed in parallel with the different views on the factors that determine the economic growth of ex-colonies. Therefore, we empirically examine these views using our model and data that include Korea and, thus, examine which views are more relevant to the Korean economy. We find that the Korean economic success is rooted in the precolonial legacies and the favorable initial conditions. In addition, we find that the colonial legacies made almost no contribution to the current economic growth rate.

Second, Sub-Saharan African ex-colonies have suffered from low economic growth since the 1960s. Barro (1991), Englebert (2000) and Block (2001), among others, report that the average economic growth rate of the Sub-Saharan African countries is lower than other countries by $1.1\% \sim 1.8\%$. Furthermore, they find that the Sub-Saharan Africa dummy has significant explanatory power for the economic growth rate. Sachs and Warner (1997), Bhattacharyya (2009), Easterly and Levine (1997), Temple and Johnson (1998), Price (2003), and Acemoglu, Johnson, and Robinson (2001, 2002) explain the low economic growth rates in terms of the countries' geographical aspects, ethnic diversities, social capabilities, or the qualities of institutions. Nevertheless, the Sub-Saharan Africa dummy is still statistically significant, even with these variables included in their empirical models. Our empirical model is designed to accommodate all these different views on the Sub-Saharan dummy, and we find that its explanatory power no longer exists in our model estimations. As a result, the current low economic growth rates of Sub-Saharan African ex-colonies can be viewed as the consequence of the low precolonial legacy levels.

Finally, the economic growth rates of Neo-European ex-colonies can also be viewed as another extreme case. As mentioned earlier, prior literature examines their economic growth without separating the positive and negative effects of colonial legacies (*e.g.*, Acemoglu, Johnson, and Robinson, 2001, 2002; Bandyopadhyay and Green, 2012, *etc.*), although these two contrasting effects are believed to coexist. Therefore, we re-examine the Neo-European ex-colonies to find the dominant effect on the current economic growth rates by specifying our model in a way that captures the negative effects. From our empirical model, we find that the high growth rates of Neo-European ex-colonies are the result of the positive effects of colonial legacies, affirming the reversal-of-fortune hypothesis of Acemoglu, Johnson, and Robinson (2001, 2002).

The remainder of this paper is structured as follows. Section 2 examines the key economic data of 64 countries that have had colonial experiences. Based on these data, we discuss the theoretical and empirical issues relevant to the goals of this study. In particular, we examine the relationships among the precolonial and colonial legacy variables, along with other factors that are well known in prior literature. In Section 3, we specify and estimate a benchmark model for the current economic growth rates of the 64 ex-colonies, which enables us to capture the negative and positive effects of colonial legacies as well as the effects of precolonial legacies. Section 4 specifies a number of variations of the benchmark model and affirms the empirical findings in Section 3 by estimating these models. In particular, we include many other factors that are examined in prior literature on the current economic growth rate, and show that the benchmark model estimations are robust to these inclusions. Here, we also evaluate the main factors that determine the current economic growth in Korea, Sub-Saharan African, and Neo-European ex-colonies. Section 5 provides a summary and conclusion to the paper. Finally, we provide a list of the 64 ex-colonial countries in the appendix, along with the data sources used in our empirical analysis and relevant website information. For the readers' convenience, we have collected the data sets into a single file, which is available at the following URL: <http://web.yonsei.ac.kr/jinseocho/research.htm>.

2 Data and Hypotheses

We first examine the empirical features of key economic variables associated with the economic growth rates of the 64 ex-colonial countries and discuss the roles they play in our empirical analysis.

<<<<<<<<<<<<<< Insert Table 1 around here. >>>>>>>>>>>>>

Table 1 provides the descriptive statistics of the key variables, along with the average economic growth rate of each ex-colony from 1960 to 2000. The average of the 64 economic growth rates is about 1.5%, although the values vary considerably, from -1.53 to 5.78%.[1] Korea ranks first, as shown in columns 5 and 6 of Table 1. For this reason, the Korean economic growth rate has been a popular research topic in the field of economic growth.

The other key variables are classified into three subsets: initial condition, precolonial legacy, and colonial legacy variables. The initial condition variables are those that describe the economic circumstances of each ex-colony in the early 1960s and that affect the economic growth rate. The first initial condition variable is the per capita GDP of each country in 1960. The per capita GDP is well known to be related to the economic growth rate (*e.g.*, Barro, 1991). The per capita GDP of Korea in 1960 is about USD 1,570 using the purchasing power parity (PPP) exchange rate of 1996. This figure is notably lower than the average of the 64 ex-colonies, namely USD 2,814, and Korea ranks 40th among the 64 countries. This shows that Korea was in a position to follow the other ex-colonies. The second initial condition variable is human capital, which is also known to be closely related to the economic growth rate (*e.g.*, Barro, 1991; Barro and Lee, 2000). Two measures are used in our study: the average schooling years per capita and the primary school enrollment rate. Both were measured in 1960. The data on average schooling years are obtained from the adult population aged 25 and over, and there are 53 observations in the sample. The average schooling years in Korea is 3.23 years, which is higher than the average of 2.98 years, and ranks 13th in the 53 ex-colonies. The primary school enrollment rate of Korea is about 94%, which is far higher than the average of 67%. Here, Korea ranks 30th in the 96 observations, which also include countries without colonial experiences. This enrollment rate is also high when compared with other countries in terms of income standard. By regressing the enrollment rate against the per capital GDP in 1960, the projected enrollment rate is about 30 percentage points lower than the observed enrollment rate.[2] Based on these observations, the human capital level condition of Korea in 1960 was in a favorable condition for economic growth. Third, the Adelman and Morris index is considered as our fourth initial condition variable. Adelman and Morris (1967) measure the socioeconomic development status of 74 developing countries, and Temple and Johnson (1998) empirically find that the index has high explanatory power for the economic growth rate between 1960 and 1968. The index is measured by weighing 22 socioeconomic variables, including enrollment rate, income distribution,

[1] The list of the 64 ex-colonial countries is provided in the appendix to this paper. Note that although the growth rate of Taiwan from 1960 to 2000 is higher than that of Korea, Taiwan is omitted from our dataset. This is because some precolonial and colonial legacy variables are not available for Taiwan, and are essential to our empirical analysis.

[2] The estimation result is calculated as follows: enrollment rate $= -115.71 + 24.58$ log(per capita GDP in 1960). The sample size is 85 with $R^2 = 0.48$, and the t-statistic of the coefficient (24.58) is 8.73, computed using the robust standard error. Here, we did not restrict the data scope to the ex-colonies only.

literacy, and so on. The descriptive statistics of the index are reported in Table 1, and show that Korea ranks 12th among the 64 countries. The final initial condition variable measures the distributional status of each country. Perotti (1996) and Deininger and Olinto (1999) empirically show that equal income or wealth distribution leads to higher economic growth. The land ownership Gini coefficient and the share of middle income class are used for this purpose, and are measured between 1960 and 1970 and in the early 1960s, respectively. Here, the middle income class is defined as the share of the third and fourth income quintiles. As Table 1 shows, Korea exhibits a superior status to other ex-colonies. For both variables, Korea ranks first among the ex-colonies based on the available data observations. The superior status of Korea is mainly the result of the land reforms implemented by the Korean government in the 1950s (*e.g.*, Alesina and Rodrik, 1994).

According to the conditional convergence hypothesis, Korea was in a favorable condition for high economic growth in terms of these initial condition variables. The education and income levels were favorable in Korea in 1960 relative to the other ex-colonies, which means that Barro's (1991) conditional convergence hypothesis predicts the high economic growth of Korea well. In addition to these variables, the empirical findings of Rodrik (1995) predicted high economic growth for Korea. The distributional and socioeconomic status of Korea was also in a favorable condition for economic growth.

The initial condition variables are not the only variables that affect the economic growth of ex-colonies. We classify the other variables related to historic legacies into precolonial and colonial legacy variables. The precolonial legacy variable is a proxy that describes the social or economic standard of each ex-colony before being colonized. In the same vein, if a variable was formed by colonial experiences and potentially affects current economic activities, we refer to it as a colonial legacy variable. The descriptive statistics of these variables are also shown in Table 1.

According to Diamond (1997), the cause of current variations in economic performance in different countries can be traced to the legacies from the Neolithic period. Countries with earlier experiences of the Neolithic revolution could have larger populations, more advanced technologies, and more sophisticated political systems than other countries. By exploiting this hypothesis, we regress the current economic growths against the variables that capture the features of the Neolithic revolution. The selected precolonial legacy variables are the date of agriculture, technology level in AD 1500, the population density in AD 1500, the state antiquity indices in AD 50 and AD 1950, and the urbanization rate in AD 1500. These variables were all formed before the 64 ex-colonies were colonized, except for the state antiquity index in AD 1950.

Before examining the roles of the precolonial legacy variables in our analysis, we first discuss how they can be properly used as proxies for the consequences of the Neolithic revolution. For this purpose, we first estimate the correlation coefficients between Olsson and Hibbs's (2005) biogeography index and the precolonial legacy variables. The biogeography index is computed by measuring favorable bio-conditions that accelerate the Neolithic revolution. In particular, prevalent plants and domesticable animals are key variables used to compute the index, and are mostly determined by biogeographic factors that are invariant over time. Diamond (1997) explains that earlier agricultural experiences are expedited by favorable biogeographical conditions, and Olsson and Hibbs (2005) present empirical evidence in support of this argument. Therefore, we use the biogeography index as a proxy variable for the likelihood that the Neolithic revolution took place in each country. The estimated correlation coefficients are reported in Table 2. The values are strictly positive, implying that the selected variables are closely related to the Neolithic revolution. Table 2 also shows that the estimated correlation coefficients among the precolonial legacy variables are positive. Thus, there must be close and strong positive interrelationships among the precolonial legacy variables.

<<<<<<<<<<<<<< Insert Table 2 around here. >>>>>>>>>>>>>>

We now examine the roles played by the precolonial legacy variables in our analysis. There is a growing literature that uses these variables in the fields of economic growth and development. First, the years from the agricultural transition to the present are provided for each country, as per Putterman and Trainor (2006). We refer to this as the date of agriculture. By the definition of the Neolithic revolution, we may regard the date of agriculture as the years from the Neolithic revolution. Olsson and Hibbs (2005) and Bleaney and Dimico (2011) empirically find that there is a positive correlation between the current income level and the date of agriculture by examining the worldwide data observations. We employ the date of agriculture as our precolonial variable and exploit this aspect. Second, Comin, Easterly, and Gong (2010) introduce the technology level index. They measure the technology levels of 112 countries in 1000 BC, AD 0, and AD 1500, and empirically show that there is a positive correlation between the current income level and the technology level index. We use this index as one of our precolonial variables. Third, Acemoglu, Johnson, and Robinson (2001) consider the population density in AD 1500 in each country as a pre-modern income variable to explain their so-called reversal-of-fortune hypothesis, as reviewed below. They observe that the variable is positively correlated with other pre-modern indices. Bandyopadhyay and Green (2012) use a population density data set obtained from the Food and Agricultural Organization (FAO) for the same purpose. We use both population densities as our precolonial variables. Fourth, Putterman (2007) provides an index that measures the status of a political system. Note that different Neolithic periods result in variations in the political systems of each country, according to Diamond (1997). For each country, Putterman (2007) classifies political systems as government, chiefdom, and tributary systems, and scores the system over every 50 years from AD 1 to AD 1950 using pre-specified rules. He then delivers different index values by summing the scores and discounting older scores using several discount rates. This is called the state antiquity index. Chanda and Putterman (2007) show that these indices are positively correlated with the economic growth of ex-colonies. The state antiquity index, computed as the sum of 5%-discounted scores from AD 1 to AD 1950, is selected as one of our main precolonial variables, along with other state antiquity indices.[3] Finally, Bandyopadhyay and Green (2012) use Chandler's (1987) urbanization index as a supplement to the population density in Acemoglu, Johnson, and Robinson (2002). This index provides the most comprehensive quantity information on historical urbanization, and is used as another index for precolonial legacies.

We distinguish between precolonial legacy variables and colonial legacy variables, which were formed by colonial experiences. Most studies use the precolonial legacy variables to examine the economic growth in samples that include all countries. Thus, the empirical findings from such studies may not be the same as those obtained from samples of ex-colonies only.[4] Although Chanda and Putterman (2007) focus on samples of ex-colonies only, they do not control for the colonial legacy variables, which are important to explaining current ex-colonial economic activities (*e.g.*, Acemoglu, Johnson, and Robinson, 2001). This may lead to an omitted variable bias. Therefore, in the present study, we reinvestigate the precolonial legacy variables by focusing on samples from ex-colonial countries only, and by controlling for the other colonial legacy variables.

Table 1 reports the descriptive statistics of the precolonial legacy variables. As before, we explain these statistics by comparing Korea with other ex-colonies. Note that the agriculture date of Korea is 26th of 103 countries, which include the 64 ex-colonies. In terms of the technology level in AD 1500, Korea ranks second, following Hong Kong, among 72 ex-colonies.[5] Furthermore, the population level of Korea ranks third among 90 countries and ranks first in terms of Putterman's (2007) state antiquity index AD for 1950.

We next examine the colonial legacy variables. Colonial legacies may have positive and negative effects on current economic growth. Therefore, we capture the colonial legacies by employing different variables that exhibit these effects. First, we note that Acemoglu, Johnson, and Robinson (2001, 2002) and Easterly and Levine (2012) provide a hypothesis on the positive legacies from immigrants from colonial ruling countries. According to the hypothesis, Europeans considered endemic diseases, such as malaria, and the population density of ex-colonies as the most important factors for immigration. They preferred ex-colonies

[3]Refer to the Appendix for more detailed definitions of the other state antiquity indices.

[4]Refer to table 1 of Nunn (2014 in section 7.6.1), in which different estimates are obtained for the effects of the population density in AD 1500 for ex-colonial and non-colonial economies.

[5]As further examples, the United Kingdom and Spain rank first among 112 countries in terms of the technology level in AD 1500. China ranks 16th and first in the world and among non-western countries, respectively. Korea ranks 17th in the world and first among the ex-colonies. Refer to Comin, Easterly, and Gong (2010) for more details on the index.

with a lower settler mortality and a lower population density. Furthermore, they argue that the number of European settlers affected institutions in ex-colonies. The ex-colonies with larger numbers of settlers created "inclusive institutions," similar to those of European countries, that emphasized private property rights. On the other hand, the ex-colonies with fewer immigrants maintained "extractive institutions" that were more oriented to extracting natural resources. Moreover, these different ruling systems affected economic activities even after the ex-colonies were politically independent from their ruling countries. The ex-colonies with institutions favorable for private property rights could continue promoting a high level of economic activities. By this hypothesis, they place the United States, Canada, Australia, and New Zealand at one extreme, and Peru and Bolivia at the opposite extreme. Note that the latter countries belonged to the Inca civilization and enjoyed the returns of a higher standard of civilization than was the case in the former countries. In essence, the ex-colonies with few settlers became poor, whereas the ex-colonies with a greater number of immigrants became rich. Acemoglu, Johnson, and Robinson (2001, 2002) point out this change of status, and refer to it as the reversal of fortune.

We accommodate this hypothesis by including the immigrant ratio as one of the regressors for the current economic growth rate. Acemoglu, Johnson, and Robinson (2001) provide most of the data observations needed for this study, measured in 1900. Korean data are collected from Etemand (2000). Here, the immigration ratio is defined as the ratio of Japanese residents in Korea to the total population of Korea in 1913. According to Table 1, the average immigrant ratio in the 1900s is about 11%. The so-called Neo-European countries, such as the United States, Canada, Australia, and New Zealand, had immigrant ratios greater than 87% (87.5% for the United States). On the other hand, 55 of 102 countries had very small immigrant ratios of less than 1%. Most ex-colonies had immigrant ratios less than 2%, including Korea.[6] On the other hand, Argentina, Brazil, and Venezuela had immigrant ratios as high as 60%, 40%, and 20%, respectively.

Next, we estimate the correlation coefficients between the log of the immigrant ratio and the precolonial legacy variables. The estimation results are reported in Table 2. Here, we can see that the log of the population density is negatively correlated with the log of the immigrant ratio. This result reflects what Acemoglu, Johnson, and Robinson (2001, 2002) point out, namely that more Europeans immigrated to the ex-colonies with lower population densities. The log of the immigrant ratio is also negatively correlated with other precolonial legacy variables. According to the hypothesis, the ex-colonies with fewer immigrants developed political ruling systems to exploit natural resources. The estimated negative correlation coefficients imply that the negative effects of colonial rule may dominate the positive effects of the precolonial legacies.

[6]There are several different statistics on the ratio, although they are more or less similar. The statistics yearbook of the colonial government in Korea reports that the immigrant ratio was 1.76% and 2.00% in 1913 and 1920, respectively. According to Etemand (2000), the ratio is 1.8% in 1913. Kim (2006) estimates the ratio and reports 1.58% and 1.78% in 1913 and 1920, respectively.

Furthermore, the immigrant ratio alone cannot distinguish between the positive and negative effects of the colonial legacies, although immigration must have been a significant channel through which positive and/or negative legacies were left to the ex-colonies, as noted by Acemoglu, Johnson, and Robinson (2001, 2002) and Easterly and Levine (2012).

Therefore, we include the colonial duration variable as our next colonial legacy variable, and use it to supplement the immigrant ratio in measuring the effects of colonial legacies. By including the colonial duration variable, we intend to control for possibly existing negative effects. For the ex-colonies with fewer immigrants, a longer period of colonial rule means that the negative effects are more likely to be revealed by the colonial duration variable.

The current study is not the first attempt to relate the colonial duration variable to current economic growth. Prior studies report different empirical findings. Grier (1999) empirically shows that current economic growth is positively related with the colonial duration variable, but without controlling for the number of immigrants and the other variables that distinguish between ruling systems. Note that the immigrant ratio is likely to increase if the colonial duration increases, as can be verified by a simple regression.[7] On the other hand, Price (2003) empirically finds that the current economic growth rate is negatively or nonsignificantly correlated with the colonial duration variable by restricting data observations to African ex-colonies only. This finding differs to that of Grier (1999) and implies that a more precise estimation result is obtainable by controlling for precolonial and colonial legacy variables at the same time, and an omitted variable bias can be avoided.

We report the descriptive statistics of the colonial duration variable in Table 1. Most colonial duration data observations are available in Grier (1999). We use her data for all countries except Australia and New Zealand, which were officially and politically independent from the United Kingdom in 1901 and 1907, respectively (*e.g.*, Chanda and Putterman, 2007; Olsson, 2009). We let these independence years be our data observations by following Chanda and Putterman (2007) and Olsson (2009).[8] The ex-colonies experienced 158 years of colonial rule, on average, but with much variation. The longest duration is 513 years (Cape Verdi), and the second longest is 498 years (Guinea-Bissau). On the other hand, the shortest duration is Iraq, with 15 years. The colonial duration of Korea is 35 years. Another aspect of the colonial duration is revealed by sorting them according to the continents to which the ex-colonies belong. The North and South American ex-colonies averaged 293 and 248 duration years, respectively. The next longest duration occurred in Africa (107 years on average). Asian countries experienced 56 years on average. In terms of

[7]The coefficient is estimated as 0.64 with a t-statistic of 8.29.

[8]This modification does not yield different conclusions.

colonial ruling countries, the countries with the longest and shortest ruling periods are Portugal and France, respectively. This additional information may also be used to distinguish between the positive and negative effects of colonial legacies.

As the final colonial legacy variable, we consider the year of independence. Easterly and Levine (2003, 2012) note that the sooner the independence year, the higher is the expected economic growth, because an established political and economic system is built over time. Thus, earlier independence years are likely to lead to higher levels of economic growth. Table 1 reports the descriptive statistics of the independence year. The earliest independence year is 1776, when the United States became independent from the United Kingdom. The latest independence year is 1997, when Hong Kong became independent from the United Kingdom. Most ex-colonial countries were independent in the early 1960s after World War II, and the colonial history started when Christopher Columbus discovered the new continent. The main interest here lies in examining how different independence years affect the current economic growth rate after controlling for the other precolonial and colonial legacy variables.

All data sources and detailed information are provided in the Appendix.

3 Models and Estimation Results

We specify a linear model for the economic growth following the work of Barro (1991):

$$Y_i = \alpha^* + \boldsymbol{\beta}^{*\prime}\mathbf{A}_i + \boldsymbol{\gamma}^{*\prime}\mathbf{B}_i + \boldsymbol{\delta}^{*\prime}\mathbf{C}_i + U_i,$$

where Y_i denotes the economic growth rate of the i-th country; $\mathbf{A}_i$ is the set of variables that are conventionally included for the regression of economic growth; $\mathbf{B}_i$ is the set of variables that are included to examine how they affect the economic growth rate; and $\mathbf{C}_i$ is the set of variables that are already well known to potentially affect the economic growth rate. More specifically, we let $\mathbf{A}$ include the per capita GDP in 1960 and the primary school enrollment rate or schooling years.[9] These variables are typically used to explain the economic growth rate using Barro's (1991) conditional convergence hypothesis and the human capital theory. We follow the same convention. The variable set $\mathbf{B}$ includes one of the precolonial legacy variables in Table 1 and other colonial legacy variables, namely colonial duration years, the immigrant ratio, and the year of independence. Since our main interests here are in examining whether these variables affect the cur-

[9]Although these two variables are used as proxies for human capital, they have different properties. The primary school enrollment rate has an upper bound of 100%. If this bound is reached, it can no longer discriminate the quality of human capital. On the other hand, schooling years does not have this restriction. Furthermore, the sample size of the school enrollment rate is greater than that of the schooling years. In this study, we use both, although this does not change our findings.

rent economic growth rate, the variables in **B** are the core explanatory variables in terms of the goals of this study. Finally, the variable set **C** includes continent dummies, colonial ruler dummies, legal origin dummy, geographical variables such as latitude, and other macroeconomic variables such as investment rate, income, or asset distributive index. These are other factors that may affect economic growth or are used to control for the other factors. A number of prior studies use these as factors that affect economic growth (*e.g.*, Levine and Renelt, 1992). Thus, we use them to verify whether our estimations are robust.

<<<<<<<<<<<<<< Insert Tables 3 and 4 around here. >>>>>>>>>>>>>>

The estimation results are reported in Tables 3 and 4, which are obtained by separately estimating the model using the average of schooling years and the primary school enrollment rate as proxies for human capital, respectively. The precolonial legacy is measured by the proxy variable, technology level AD 1500.

We briefly summarize the estimation results. First, Barro's (1991) conditional convergence hypothesis is affirmed by our estimations. The signs of β_1^* and β_2^* are obtained as predicted. Second, the R^2 value of each model is relatively high. About 3/4 of the total variation in the economic growth rates is explained by these models. Third, all estimated parameters are significant, except the independence year in Table 4. The coefficients of the technology level AD 1500 and colonial duration variable are significant at the 1% level.

<<<<<<<<<<<<< Insert Table 5 around here. >>>>>>>>>>>>>

Before examining the estimates in more detail, we predict the economic growth rate using the model estimates. Table 5 shows the prediction results of the Korean economic growth rate. According to the estimates in Tables 3 and 4, the predicted growth rates are 5.54% and 5.53%, respectively. The realized economic growth rate was 5.78%. Thus, the model estimates imply that the Korean economic growth rate is not an outlier. This further implies that there was no secret method that led to the high economic growth in Korea. This interpretation can also explain the low economic growth rates of the Sub-Saharan African countries. Table 5 shows that their economic growth rate is well predicted by the model estimates in Tables 3 and 4. These predictions show that our models efficiently explain the high economic growth rate of Korea and the low growth rate of the Sub-Saharan African countries.

We now examine the model estimation results in more detail. We focus on Table 3 because Table 4 can be examined in a similar way. First, there is a positive relationship between the economic growth rate and the technology level AD 1500 variable. The difference between Models 2 and 3 lies in the addition of the technology level AD 1500 variable to the GDP per capita and schooling years. After this addition, the associated R^2 value more than doubles, from 0.35 to 0.65. Then, Model 4 adds the colonial duration and independence year variables to the explanatory variables in Model 3, and Model 5 adds the log of the immigrant ratio to the variables in Model 4. In all cases, the estimated coefficient of the technology level AD 1500 variable is positive and significant at the 1% level. This aspect is more evident if we estimate the model using the two-stage least squares (2SLS) estimation method. Here, we employ the state antiquity index AD 500 and the date of agriculture as our instrumental variables. This enables us to correct any existing bias resulting from the endogenous variables and to avoid potential problems of reverse causality. Model 7 shows the estimation results. The estimated coefficient of the technology level AD 1500 variable is greater than those in the previous models. The F-statistic of the first-stage regression is significant, and there is no evidence of over-identification based on Hansen's (1982) J-test statistic. This implies that the two instrumental variables do not affect the economic growth rate, other than through the technology level AD 1500 variable.[10] Table 3 also estimates Model 8 using the worldwide samples. Here, the estimated coefficient of the technology level AD 1500 variable decreases significantly, although it is still positive. The ex-colonies must have benefited more from the precolonial legacies than did those colonies without colonial experiences. In summary, the precolonial legacies must have significantly affected the current economic growth of the ex-colonies: the precolonial legacy variables cannot be ignored in explaining the economic growth rates of the ex-colonies, even after these countries were decolonized.

We now compute the marginal contribution of the technology level AD 1500 variable to current economic growth by focusing on the Korean and Sub-Saharan African economies. The other variables are assumed to be the same, but the technology level AD 1500 variable is assumed to be the average technology level of all ex-colonies, namely 0.38. The actual Korean technology level was 0.85 in AD 1500. By this modification, the economic growth rate is lowered to 2.94% and 3.01% according to the estimates in Model 7 of Table 3 and Model 6 of Table 4, respectively.[11] These predictions are similar and lower than the realized economic growth rate of 5.78%. This implies that the precolonial legacies played significant roles in the Korean economic growth rate. In other words, the high economic growth rate in Korea cannot be explained without the country's precolonial legacies. As another example, we consider the Sub-Saharan African countries. Their average economic growth rate and technology level AD 1500 are about 0.59% and 0.27%, respectively. If their technology level AD 1500 values are modified to 0.85 (*i.e.*, the level of Korea), the predicted economic growth rate becomes 3.79%.[12] This prediction is similar to that of Malaysia and ranks 5th, implying that the low economic growth rates of the Sub-Saharan African countries are mainly

[10]The first-stage least squares estimation shows that the instrumental variables are significant at the 5% level.

[11]These figures are obtained as follows: $5.54 + 5.51 \times (0.38 - 0.85)$ and $5.54 + 5.39 \times (0.38 - 0.85)$, respectively.

[12]This figure is obtained as $0.57 + 5.51 \times (0.85 - 0.27)$.

due to the low precolonial legacy levels. Figure 1 shows the partial effect of the technology level AD 1500 variable on economic growth using the estimates in Model 5 of Table 4, which show a high positive correlation between the two.

Next, we examine the effects of the colonial legacy variables on the current economic growth rate. From the estimation results, the effects of the colonial legacy variables are uncertain. According to the estimation results of Model 6 in Table 3, the coefficient of the log of the immigrant ratio is positive, as expected. On the other hand, the coefficient of the colonial duration variable is negative. This means that the colonial duration variable captures the negative effects of colonial experiences. To examine these two opposite aspects in more detail, we compare Models 4 and 6 in Table 3. The coefficient of the colonial duration variable is -0.59 in Model 4, and -0.64 in Model 6, in which we control for the immigrant ratio. That is, the negative effects of the colonial duration variable are aggravated by controlling for the immigrant ratio. In the same way, the positive effects of the immigrant ratio are amplified after controlling for the colonial duration variable. Although Model 5 estimates the coefficient of the immigrant ratio to be nonsignificant at the 5% level, it becomes significant after simultaneously controlling for the colonial duration and the year of independence variables. This is evident if we compare the estimation results in Models 4 and 5. Therefore, we conclude that the colonial legacies must have had two opposite effects on the current economic growth. Figure 2 shows the partial effect of the immigrant ratio on economic growth, obtained by controlling for the other variables in Model 5 of Table 4. In the same vein, Figure 3 shows the partial effect of the colonial duration, obtained by controlling for the other variables in Model 6 of Table 3 and the continent dummies. These figures affirm the positive and negative effects of the immigrant ratio and colonial duration, respectively.

These estimation results imply that the overall effect of the colonial legacy variables is determined more by a particular circumstance in each country. For example, the immigrant ratios of Neo-European countries are high. Thus, their current economic growth may have benefited from their colonial legacies. On the other hand, the Sub-Saharan African countries, with few immigrants and long colonial durations, could not exploit the legacies, as pointed out by Heldring and Robinson (2012).

Although these estimation results are similar to those of Acemoglu, Johnson, and Robinson (2001, 2002) and Easterly and Levine (2012), our estimations are not identical to theirs. They do not separate the negative and positive effects, although they admit that the colonial experience has opposite effects on economic growth, as shown here.

We further affirm the estimation results by estimating the counterfactual economic growth rates of the ex-colonies. If the United States had not been a colony, its counterfactual economic growth rate is 0.71%[13], which is obtained by letting the colonial duration and the log of immigrant ratio be zero in Model 6 of Table 4. This is about 28∼29% level of the realized economic growth rate. On the other hand, if the Sub-Saharan African countries were not colonies, their counterfactual average growth rate becomes 0.90%[14] using Model 7 of Table 3, which is higher than the realized growth rate by about 1.6 times. We further compute the counterfactual economic growth rate of Korea in a similar manner. According to Model 7 of Table 3 and Model 6 of Table 4, the counterfactual economic growth rates are about 5.51% and 5.37%, respectively. These figures are smaller than those predicted by the model estimation results by 0.02% and 0.14% points, respectively.[15] This result implies that the portion of the colonial legacies that have contributed to the Korean economic growth rate is between 0.34% (=0.02/5.78) and 2.42% (=0.14/5.78) from 1960 to 2000,[16] which is not significantly different from zero. In other words, in the case of Korea, the high economic growth could be achieved even without the colonial experience, which is different to the United States and the Sub-Saharan African countries.

4 Robustness Tests

In this section, we conduct robustness tests for the models estimated in Section 3. These tests are motivated by the concerns that there are possibly omitted variables in the economic growth rate model or that the technology level AD 1500 variable may not be a proper proxy for the precolonial legacies. To handle these problems, we employ possibly omitted variables that affect the precolonial and colonial legacies, such as continent dummies, colonial ruler dummies, geographical variables, macroeconomic variables, and the income and wealth distributive index. After adding these variables, we estimate the models again and examine whether our estimation results show significant changes. Furthermore, we consider other variables

[13]This figure is obtained as $2.54 + 0.49 \times 1.56 - 0.58 \times 4.47$, where 2.54 is the model predicted growth rate, 1.56 is the colonial duration years/100, 4.47 is the log (immigrant ratio), and the others are the estimated coefficients from Model 6 of Table 4.

[14]This figure is obtained as $0.57 + 0.66 \times 0.87 - 0.43 \times 0.56$, where 0.57 is the model predicted growth rate, 0.87 is the colonial duration years/100, 0.56 is the log(immigrant ratio), and the others are the estimated coefficients from Model 7 of Table 3.

[15]By Model 7 of Table 3, the counterfactual economic growth rate is obtained as $5.53 + 0.66 \times 0.35 - 0.43 \times 0.59$, where 5.53 is the model prediction, 0.35 is the colonial duration years/100, and 0.59 is the log(immigrant ratio). The others are model coefficients. Model 6 of Table 4 computes the counterfactual economic growth rate as $5.54 + 0.49 \times 0.35 - 0.58 \times 0.59$. The figures are defined in the same way as for Model 7 of Table 3.

[16]These figures are computed as $0.02/5.78$ and $0.14/5.78$, respectively, and do not accommodate the possible effects of the human capital that were accumulated in Korea during the colonial period. According to Furukawa (1990), the primary school enrollment rate of Korea was 51% just before becoming independent from Japan, and increased to 95% from 1956 to 1960. The Japanese colonial government paid far less attention to raising human capital in Korea than did other colonial rulers, given that the average primary school enrollment rate of the ex-colonies was 66% in the 1960s. Refer to Woo and Kahm (2011) for empirical investigations of the Korean primary school enrollment rates between 1930 and 1960.

that can be used as proxies for the precolonial legacies, as discussed in Section 2.

4.1 Robustness Tests for Possibly Omitted Variable Bias

In this subsection, we correct for a possibly existing omitted variable bias. First, Model 1 of Table 6 modifies the estimation results by adding continent dummies to Model 6 of Table 3. Here, we consider the continents of Asia, Africa, the North and South America. Model 2 adds the colonial ruler dummy variable instead of the continent dummies. The colonial ruler dummy is defined as one if the United Kingdom, France, or Spain are the colonial rulers, and zero otherwise. Model 3 includes the colonial ruler dummy and continent dummies together. Model 4 replaces the year of independence with the year of colonization.

<<<<<<<<<<<<<< Insert Table 6 around here. >>>>>>>>>>>>>>

These modifications affect our estimations, and we summarize their implications as follows. First, none of these modifications change the implications of the previous estimations. The estimated coefficients for the technology level AD 1500 and colonial duration variables maintain the same signs and remain significant. Second, the colonial ruler dummy might have affected the model estimation in a different way. More specifically, North (1990) and Landes (1998) point out that the ex-colonies ruled by the United Kingdom show higher economic growth rates than those ruled by France and Spain. They explain that this is mainly because the United Kingdom had more favorable institutions for private entrepreneurship, trade, and innovation than did the other countries. On the other hand, Grier (1999) notes that the educational aspects of the United Kingdom were superior to those of the other countries, which contributed to economic growth more than the qualities of institutions did. However, Acemoglu, Johnson, and Robinson (2001), criticize these views and emphasize that the disease environments of the ex-colonies ruled by the United Kingdom attracted more Europeans than did other ex-colonies. As a result, more Europeans emigrated to the UK ex-colonies.[17] Note that the colonial ruler dummies are significant for Models 2 to 4. We further exclude Korea, Brazil, and Indonesia from the samples and estimate the models again. These countries are eliminated because most ex-colonies were ruled by the United Kingdom, France, and Spain (and mainly the United Kingdom and France). Thus, the estimation results may be different if the ex-colonies were ruled by these countries. Furthermore, Korea showed the highest growth rate, so it might be an outlier in terms of the colonial ruler dummy. Nevertheless, Models 5 and 6 deliver the same qualitative estimation results, and we find no significantly different coefficient values among the colonial ruler dummies. Models 7 and 8

[17] The average immigrant ratio of 23 French ex-colonies is 0.96%, whereas that of 37 UK ex-colonies is 2.29%. Here, the United States, Canada, Australia, and New Zealand are excluded from the 37 samples.

show the estimation results obtained after excluding the United States, Canada, Australia, and New Zealand. These countries are different to the others because they were developed as settler colonies. The estimation results in Models 7 and 8 are not significantly different. Third, existing literature has different views on how the legal origin affected the economic growth rate. According to La Porta, Lopez-de-Silane, Shleifer, and Vishny (1997), La Porta Lopez-de-Silane, and Shleifer (1998, 2008) and Mahoney (2001), the common law system of the United Kingdom brings about more favorable environments for economic activities than does the French civil law system. On the other hand, Acemoglu and Johnson (2005) and Klerman, Mahoney, Spamann, and Weinstein (2011) argue that there is no direct interrelationship between the legal origin and economic growth. We examine these different views by estimating Model 9 and by restricting the samples to the common law and civil law systems only.[18] According to our estimation of Model 9, we find no evidence that the common law system is superior to the civil law system in terms of economic growth. Furthermore, the legal origin dummy does not modify the interpretations of our prior estimation results.

<<<<<<<<<<<<< Insert Table 7 around here. >>>>>>>>>>>>>

Next, we estimate the model using other proxies for precolonial legacies. The results are reported in Table 7. Model 1 replaces the technology level AD 1500 variable with the urbanization index AD 1500 proposed by Chandler (1987). Models 2 and 3 are estimated using the population density AD 1500 variable provided by Acemoglu, Johnson, and Robinson (2002) and Bandyopadhyay and Green (2012), respectively. Acemoglu, Johnson, and Robinson (2002) estimate the population density using the population in McEvedy and Jones (1978) and dividing it by the area of total arable land in McEvedy and Jones (1978). Bandyopadhyay and Green (2012) divide the same population by the area of potentially arable land. Models 4 and 5 use the state antiquity index AD 1950 suggested by Putterman (2007) and the product of the state antiquity index AD 1950 and the population density as another proxy variable, respectively. These estimations show that the economic growth rate is positively and significantly related with these proxy variables at the 1% level. Furthermore, the interrelationship between economic growth and the colonial duration variable is negatively significant, even after these replacements. Except for Model 2, these negative relationships are significant at the 1% level, and Model 2 reports a significant relationship at the 10% level.

One of the interesting aspects of these model estimation results can be found in Models 6 and 7 of Table 7. These two models use the state antiquity index AD 50 and the technology level 1000 BC as proxies for the precolonial legacies, respectively. From these, we can see that the proxies still significantly affect the economic growth rate, even though they were formed more than 2,000 and 3,000 years ago, respectively.

[18]Korea adopts the German law system. Therefore, we omit Korea from this sample.

Figures 4 and 5 show the partial effects between the growth rate and these two proxy variables, respectively. From the figures, we do not observe a particular outlier that dominates the other observations and leads to the reported estimation results. By this, we infer that current economic growth needs to be linked to prehistoric legacies.[19]

We compute the counterfactual predictions for the economic growth using the estimations in Table 7. We focus on the Korean economic growth rate and use Model 4 to examine the effect of the state antiquity index AD 1950 on economic growth. According to the estimation results, the predicted growth rate is 5.75%, which is almost identical to the realized growth rate of 5.78%. We now maintain the values of the other variables and change the state antiquity index value AD 1950 of Korea from 8.18 to the average of the index values, namely 3.20. Form this, the modified growth rate is obtained as 3.66%.[20] This is about 64% of the predicted and realized economic growth rate, implying that the state antiquity index AD 1950 explains about 1/3 of the Korean economic growth rate from 1960 to 2000. If we predict the economic growth rate by supposing that Korea had not been colonized, the economic growth rate is predicted as 5.62%.[21] The growth rate reduces by 0.13 percentage points. That is, the portion contributed by the Japanese colonial government to the Korean economic growth rate is about 2.2% ($= 0.13/5.75$). This empirical evidence does not support the view that the Japanese colonial government was an efficient and developmental state (*e.g.*, Kohli, 1994).

4.2 Robustness Tests using Geographical, Ethnic, and Religious Variables

We now examine how geographical, ethnic, and the Sub-Saharan Africa dummy variables affect the estimations. According to Sachs and Warner (1997) and Gallup, Sachs, and Mellinger (1999), geographical variables such as temperature, endemic, soil, and transportation system affect economic growth through health, productivity, and transaction costs. Furthermore, they argue that a low economic growth rate is mainly due to these geographical issues. In particular, Bloom and Sachs (1998) claim that malaria critically affects the economic growth rate, and that the Sub-Saharan African countries lose an economic growth rate of 1.3% every year from malaria. On the other hand, Easterly and Levine (1997) focus on the effect of ethnic diversity on economic growth and argue that ethnic fragmentation is the main cause of the low economic growth in the African countries. We accommodate these claims by including the malaria ecology index, landlocked country dummy, and ethnic diversity index variables in the original models.

<<<<<<<<<<<<< Insert Table 8 around here. >>>>>>>>>>>>>

[19] Readers can refer to Spolaore and Wacziarg (2013) for a survey on this topic.

[20] This is obtained as $5.75 + (3.20 - 8.18) \times 0.42$.

[21] This is obtained as $5.75 + 0.46 \times 0.35 - 0.49 \times 0.59$, where 5.75 is the predicted economic growth rate by Model 4 in Table 7, 0.35 is the colonial duration/100, and 0.59 is the log(immigrant ratio). The others are estimated coefficients.

The estimation results are contained in Models 1 and 2 of Table 8. We find no significant relationship between these variables and economic growth. Although we do not report the estimation results for the sake of brevity, we also estimated the models by including other geographical variables such as the share of a country's population in temperature ecozones, average temperature, average number of frost days per month in winter, latitude, the portion of the country's land area within 100 km of the coast, the portion of the population residing in the area within 100 km of the coast, and so on. None of these variables were significant and, thus, did not change the previous model estimation results qualitatively.

As another factor of economic growth, we include a religion variable to accommodate Max Weber's hypothesis that religions have a close relationship with economic growth (see Barro and McCleary, 2003). In Model 3 of Table 8, we include the portions of Catholics, Protestants, and Muslims in each country and estimate their effects on the economic growth rate. The religion variable is significant at about the 9% level, but this does not change our previous model estimation results.

We show our model estimation results in Model 4 of Table 8 in terms of the Sub-Saharan African countries. Barro (1991) reports that the Sub-Saharan Africa dummy is statistically significant in explaining the economic growth rate, and since then, researchers have attempted to identify the roles of this variable. Englebert (2000) and Block (2001) report that the average economic growth rate of the Sub-Saharan African countries is lower than the other countries by 1.1%$\sim$1.8%. Sachs and Warner (1997) and Bhattacharyya (2009) explain this low economic growth rate by resorting to geographical aspects, while Easterly and Levine (1997) claim ethnic diversity as its cause. Then, Temple and Johnson (1998) focus on social capability, and Price (2003) focuses on colonial legacies as possible causes, while Acemoglu, Johnson, and Robinson (2001, 2002) examine the qualities of institutions as the main cause of the low growth rate. Nevertheless, the Sub-Saharan Africa dummy is still statistically significant, even if these variables are included in their models.

On the other hand, our estimation of Model 4 shows that the Sub-Saharan Africa dummy is no longer significant. This model estimation implies that the technology level AD 1500 variable is able to explain the low economic growth rate of the Sub-Saharan African countries. As we discussed earlier, the low precolonial legacy levels of the Sub-Saharan African countries are the main causes of their low growths. This is evident from the fact that the Sub-Saharan dummy variable becomes nonsignificant after including the proxy variable for the precolonial legacies. To examine this aspect in more detail, we estimate Model 5 in Table 8. Here, we include the landlocked dummy and ethnic diversity variables, but exclude the technology level AD 1500 variable. As expected, the Sub-Saharan Africa dummy becomes statistically significant at the 5% level. The estimated coefficient value is about -1.23, which is similar to the estimate in prior literature (*e.g.*, Bloom and Sachs, 1998). We can see that the landlocked dummy and ethnic diversity variables are significant at the 1% and 10% levels, respectively, but they fail to exclude the Sub-Saharan country dummy variable from this model.[22]

We further examine the roles of social capability and the poor quality of institutions by including the Adelman and Morris index and the quality of law as a proxy for the quality of institutions. Because the institutional quality may have a reverse causality problem, we estimate the model using the 2SLS estimation method. Hall and Jones (1999) suggest using latitude as a proper instrumental variable for the quality of law. As an additional instrumental variable, we employ the near coast variable, which is the percentage of the land area within 100 km of the ice-free coast of each country. This latter variable satisfies the exclusion condition. Furthermore, because the hypotheses related to this estimation do not apply to ex-colonies only, we estimate the model using the worldwide samples. As a result, the immigrant ratio and colonial durations are excluded from the set of explanatory variables. These specifications are summarized in Models 6 and 7. Here, we can see that the variables are all statistically significant at the 1% level. That is, high levels of social capability and law quality lead to high economic growth rates. Nevertheless, we can also see that these two variables fail to make the Sub-Saharan dummy variable nonsignificant. The Sub-Saharan dummy is still negative and statistically significant at the 5% level. Therefore, we can say that these two variables are not the most important factors, although they do lead to a low economic growth rate.[23]

Model 8 estimates the original model by using the state antiquity index AD 1950 as an alternative proxy for the precolonial legacies. We can see that the Sub-Saharan dummy is no longer statistically significant and that the state antiquity index AD 1950 has a positive relationship with the economic growth rate. This estimation supports the finding that the most important factor for the low growth rates of the Sub-Saharan African countries is more closely related to their low levels of colonial legacies than their ethnic diversities, colonial legacies, or geographical factors.

[22] Diamond's (1997) hypothesis can also be associated with this estimation result that the precolonial legacies make the geographical factors nonsignificant. He argues that geographical factors indirectly influence economic growth through history, so that the geographical disadvantage of the Sub-Sahara African countries cannot alone resolve every problem associated with low economic growth rate. Over the course of time, the geographical factors have already influenced the other factors, and have again acted as the causes of the current low economic growth rates.

[23] For brevity, we do not report the other estimation results using the other proxy variables for the quality of institutions. Instead of the reported index, we also estimated the model using the indices of government effectiveness, government corruption, and constraint on executive (*e.g.*, La Porta, Lopez-de-Silane, Shleifer, and Vishny, 1999). From these estimations, we obtain the same qualitative results as in our prior estimations. That is, these variables are significantly related to current economic growth at the 1% level, but they do not succeed in making the Sub-Saharan Africa dummy variable nonsignificant. In other words, the dummy is negative and significant at the 1% level.

4.3 Robustness Tests using Macroeconomic Variables and Coup Frequency

We now examine the estimation results when nine macroeconomic and coup frequency variables are included in the model. Prior studies have found that all of these are significant explanatory variables for economic growth (*e.g.*, Barro, 1991; Levine and Renelt 1992; Sachs and Warner 1997; Sala-i-Martin, 1997a, 1997b; Sala-i-Martin, Doppelhofer, and Miller, 2004). Models 1 to 5 in Table 9 estimate that the average investment rate, coup frequency, real exchange rate overvaluation, and population increase rate are significantly related to the economic growth rate, whereas the average inflation rate is nonsignificant. Model 6 includes these significant variables, the four colonial ruler dummies, and three continent dummies. Models 7 and 9 replace the technology level AD 1500 variable with the state antiquity index AD 1950 and the population density, respectively. Although these models are specified by employing many explanatory variables, the precolonial legacy indices and colonial duration variable are statistically significant and maintain the same signs as before.

<<<<<<<<<<<<< Insert Table 9 around here. >>>>>>>>>>>>>

We specifically examine the core estimation results. The most interesting estimations are those of Model 1 and Models 6 to 9 of Table 9. If the precolonial legacies contribute to the economic growth by increasing investments, the precolonial legacy variable has to be nonsignificant after including the investment rate variable. On the contrary, the precolonial legacy index maintains the same sign and remains statistically significant. This implies that the precolonial legacies must have affected economic growth in a way other than through the contribution of investment to economic growth. In the same way, the colonial duration variable maintains a negative sign and remains statistically significant. This implies that the colonial experience still negatively affects economic growth, although its overall impact on the investment increase is uncertain.

<<<<<<<<<<<<< Insert Table 10 around here. >>>>>>>>>>>>>

Then, we estimate models using other macroeconomic variables. Table 10 estimates the model using the life expectancy, real exchange rate distortion, the ratio of natural resource exports to GDP, and the share of government investments. Models 1 to 4 of Table 10 estimate the models by separately including these variables and show that the variables are all significant. Model 5 includes all the variables simultaneously, and Model 6 adds the continent and colonial dummies to the three significant variables, except for the share of government investments, which is nonsignificant in Model 5. Models 7 and 8 replace the technology level AD 1500 variable with the state antiquity index AD 1950 and the population density AD 1500 variable, respectively. Irrespective of these changes, the precolonial legacy and colonial duration variables are significant, with the same signs as before. Furthermore, they are all significant at the 1% level, except Model 7, in which the colonial duration variable is significant at the 5% level. This implies that the model estimation results on the precolonial and colonial legacies are robust to the inclusion of these macroeconomic and coup frequency variables.

4.4 Robustness Tests using Income Distributive Variables

Finally, we examine how the model estimation results are affected by including income distribution variables. The literature shows that in cross-sectional data, particularly for less developed countries, these variables have positive relationships with the economic growth rate (*e.g.*, Galor, 2009; Neves and Silva, 2014). For our examination, we use two income distribution variables: the land Gini coefficient of the 1960s, as provided by Deininger and Olinto (1999), and the middle-class ratio of Perotti (1996). According to the prior literature, the land Gini coefficient and the middle-class ratio are negatively and positively related with the economic growth rate, respectively. The estimations in Table 11 confirm this expectation. At the same time, including the income distribution variables does not change the main results of this study. That is, the precolonial legacy and colonial duration variables are still positively and negatively related with the economic growth rate, respectively, at the 1% level, even after including the income distribution variable.

<<<<<<<<<<<<<< Insert Table 11 around here. >>>>>>>>>>>>>>

5 Summary and Conclusion

This study examines the effects of precolonial and/or colonial legacies on the current economic growth rate of ex-colonies. For this purpose, proxy variables for the precolonial and colonial legacies are added to Barro's (1991) economic growth model as additional explanatory variables. The date of agriculture, the technology level AD 1500, the population density AD 1500, the state antiquity index AD 1950, and the urbanization index are used as proxies for the precolonial legacies. On the other hand, the colonial duration and immigrant ratio variables are used as proxies for colonial legacies.

In terms of the precolonial and colonial legacies, our findings are as follows. First, irrespective of the precolonial variable included in the model, it has a significantly positive relationship with the current economic growth rate. Furthermore, the model's explanatory power is high. This implies that there is a close and strong relationship between the current economic growth rate and the precolonial legacies and, furthermore, that the variations in the current economic growth rates of the ex-colonies can be explained primarily by the precolonial legacies. Second, colonial legacies have ambivalent effects on the current economic growth rate. That is, the immigrant ratio has a positively significant relationship with the economic growth rate, and the colonial duration variable has a negatively significant relationship. As a result, the overall effect of colonial legacies on the current economic growth rate is uncertain, and is determined by the special circumstance of each ex-colony. For example, the United States has a dominant positive effect. On the other hand, the growth rates of the Sub-Saharan African ex-colonies are dominated by the negative effects. In the case of Korea, the overall effect of colonial legacy is not substantially different from zero. This implies that the current high economic growth rate of Korea is mainly the consequence of precolonial legacies. This result differs from those in previous studies that the high Korean economic growth rate was formed during the colonial period.

6 Appendix

6.1 Country List

The following countries are used for our data analysis.

Algeria	Argentina	Australia	Bangladesh	Barbados
Benin	Bolivia	Brazil	Burkina Faso	Cameroon
Canada	Chad	Chile	Colombia	Congo, Rep.
Costa Rica	Cote d'Ivoire	Dominican Republic	Ecuador	Egypt, Arab Rep.
El Salvador	Gabon	Ghana	Guatemala	Guinea
Honduras	Hong Kong	India	Indonesia	Israel
Jamaica	Jordan	Kenya	Korea	Lesotho
Madagascar	Malawi	Malaysia	Mali	Mauritius
Mexico	Morocco	Mozambique	New Zealand	Nicaragua
Niger	Nigeria	Pakistan	Panama	Paraguay
Peru	Philippines	Senegal	South Africa	Sri Lanka
Syrian Arab Republic	Togo	Trinidad and Tobago	Uganda	United States
Uruguay	Venezuela	Zambia	Zimbabwe	

6.2 Data Sources

Here, we provide the sources of the data used in our empirical examinations. These are provided in the order that they appear in the paper. When the URLs that contain the data sets are available, we provide these too.

- Growth rate of GDP per capita (*GR*): the average growth rate of GDP on purchasing power parity (PPP) per capita of each country between 1960 and 2000. The unit of GDP is USD of 1997. Glaeser, La Porta, Lopez-de-Silanes, and Shleifer (2004; the original data series is the *RGDPL* series of Penn World Tables, version 6.1).

<http://faculty.tuck.dartmouth.edu/rafael-laporta/research-publications>.

- Growth rate of GDP per capita (*GDPR*): the average growth rate of GDP on purchasing power parity (PPP) per capita of each country in 1960. Data source is the same as *GR*.

- Average schooling years per capita (*SKULY*): the average schooling years of the adult population aged 25 and over in 1960. Barro and Lee (2000).

  <http://www.cid.harvard.edu/ciddata/ciddata.html>.

- Primary school enrollment ratio (*SKULR*): the primary school enrollment ratio of each country in 1960. Barro and Lee (2000).

  <http://www.cid.harvard.edu/ciddata/ciddata.htm>.

- Land ownership Gini coefficient (*LGINI*): the land ownership Gini coefficient of each country for the period 1960–1970. Deininger and Olinto (1999).

  <http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-2375>.

- Share of the middle class (*MIDCLS*): the share of the third and fourth quintiles in income distribution of each country in early 1960s. Perroti (1996).

- Adelman and Morris index (*ADELMO*): the socioeconomic development index constructed by Adelman and Morris (1967). The index is computed by measuring 20 variables for 71 developing countries. These variables include the school enrollment rate, income distribution status, literacy, and so on. Temple and Johnson (1998; the original data are from Adelman and Morris, 1967).

- Date of agriculture (*AGRI*): the years from the agricultural transition to the present for each country, where the present is AD 2000. Putterman and Trainor (2006).

  <http://www.econ.brown.edu/fac/louis_putterman/>.

- Technology Levels (*TECHNOs*): the technology level of each country in AD 1500, AD 0, 1000 BC. TECHNOs are distinguished by attaching the years (*e.g.*, TECHNO AD 1500). Comin, Easterly, and Gong (2010).

  <http://www.hbs.edu/faculty/Pages/profile.aspx?facId=438581&facInfo=fea>.

- Population density 1 (*POPDEN1*): the ratio defined as (Total population)/(Arable land area) of each country in AD 1500. Acemoglu, Johnson, and Robinson (2002; the original data are from McEvedy and Jones, 1978).

  <`http://economics.mit.edu/faculty/acemoglu/data/ajr2002`>.

- Population density 2 (*POPDEN2*): the ratio defined as (Total population)/(Potentially arable land area) of each country in AD 1500. The potentially arable land area data are provided in the Food and Agricultural Organization (FAO). Bandyopadhyay and Green (2012).

  <`http://sticerd.lse.ac.uk/_new/publications/series.asp?prog=EOPP`>.

- State antiquity indices (*STATEs*): For every 50 years, Putterman (2007) scores the political system of each country from AD 1 to AD 1950. The scores range from 0 to 50, and they are determined by accommodating the existence of a government, the proportion of the territory covered by the government, and the fact that a government is indigenous or externally established. We denote the 5%-discounted sum of the scores from AD 50 to AD XX as *STATE AD XX*. Putterman's webpage provides *STATE AD 50* and *STATE AD 1950* (version 3.1):

  <`http://www.econ.brown.edu/fac/louis_putterman/antiquity%20index.htm`>.

  Sometimes, we simply denote *STATE AD 1950* as *STATE* for brevity. Chanda and Putterman (2007) also provide *STATE AD 500* and *STATE AD 1000*:

  <`http://bus.lsu.edu/achanda/research.htm`>.

- Urbanization rate (*URBR*): the percentage of people residing in cities with a population greater than 20,000. Bandyopadhyay and Green (2012; the original data are from Chandler, 1987).

- Biogeographic endowmwnt (*BIOGEO*): the first principal component of biogeographical components *Plants* and *Animals* as defined by Olsson and Hibbs (2005).

  <`http://www.douglas-hibbs.com/HibbsArticles/hibbs_downloadable.htm`>.

- Immigrant ratio (*IMMIGR*): the percentage ratio of Europeans or settlers from colonial ruler countries to the total population in each country in 1900; for Korean data, this is defined as the ratio of Japanese residents in Korea to the total population of Korea in 1913. Acemoglu, Johnson, and Robinson (2001) provide most data used in this study; Korean data are collected from Angeles (2007; the original data are from Etemand, 2000).

- Colonial duration (*DURTN*) and independence year (*INDEPY*): colonial duration is defined as the difference between the independence year and the colonization year (*COLOY*). Olsson (2004; the original data are from Grier, 1999, and CIA, 2003; Australia and New Zealand data are from Chanda and Putterman, 2007).

- Continent dummies (*CNTNTD*): dummy variables indicating Asia, Africa, North America, South America, and Oceania. Nunn and Puga (2012).

  <http://diegopuga.org/data/rugged/>.

- Colonial dummies (*COLDUM*): a dummy variable indicating ex-colonies.

- Colonial ruler dummies (*COLRUD*): dummy variables indicating UK, France, Spain, and other colonial rulers. Nunn and Puga (2012).

  <http://diegopuga.org/data/rugged/>.

- Neo-European country dummy (*NEOEUROPE*): a dummy variable indicating Neo-European countries.

- Legal origin dummies (*LEGORGD*): dummies identifying the legal origin of each country's commercial law tradition according to English commercial law or French commercial codes. La Porta, Lopez-de-Silane, Shleifer, and Vishny (1999).

  <http://faculty.tuck.dartmouth.edu/rafael-laporta/research-publications>.

- Malaria ecology (*MALA*): a spatial index throughout the world that relates the stability of malaria transmission to biological characteristics of vector mosquitoes. Weil (2005; the original data are from Kiszewski, Mellinger, Spielman, Malaney, Sachs, and Sachs, 2004).

  <http://ebookbrowsee.net/weil-lab-data-xls-d103077605>.

- Landlocked country dummy (*LNDLCKD*): a dummy variable indicating whether a country is landlocked. Nunn and Puga (2012).

  <http://diegopuga.org/data/rugged/>.

- Ethnic diversity index (*ETHDVI*): probability that two randomly selected individuals from a country are from different ethnolinguistic groups, as defined by Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003).

  <http://dash.harvard.edu/handle/1/4553003>.

- Ratios of religions (*RELIGN*): percentages of Catholic, Protestants, Muslim religions in each country's population in 1980. La Porta, Lopez-de-Silane, Shleifer, and Vishny (1999).

  `<http://faculty.tuck.dartmouth.edu/rafael-laporta/research-publications>`.

- Sub-Saharan Africa dummy (*SAHARAD*): a dummy variable indicating Sub-Saharan African countries. Nunn and Puga (2012).

  <http://diegopuga.org/data/rugged/>.

- Rule of law index (*RLAW*): six aggregate indicators of each country in 2000 constructed by Kaufmann, Kraay, and Zoido-Lobaton (2002) that correspond to six fundamental concepts of governance. Rodrik, Subramanian, and Trebbi (2004).

  <http://www.hks.harvard.edu/fs/drodrik/research.html>.

- Absolute latitude (*LATI*): the distance from the equator to each country. La Porta, Lopez-de-Silane, Shleifer, and Vishny (1999).

  <http://faculty.tuck.dartmouth.edu/rafael-laporta/research-publications>.

- Near coast (*NECO*): the percentage of the land area within 100 km of the nearest ice-free coast in each country.

  <http://diegopuga.org/data/rugged/>.

- Investment rate (*INVR*): the average investment rate of each country between 1960 and 2000. Weil (2005; the original data are from Penn World Table 6.1.).

  <http://ebookbrowsee.net/weil-lab-data-xls-d103077605>.

- Coups frequency (*COUPS*): the average number of revolutions and coups per year between 1970 and 1985. Sachs and Warner (1997; the original data are from Barro and Lee, 2000).

  <http://www.cid.harvard.edu/ciddata/ciddata.html>.

- Real exchange rate overvaluation (*OVEREXCHNGR*): the degree to which the exchange rate of each country is overvalued, on average, between 1960 and 1998. Easterly and Levine (2003).

  <http://faculty.haas.berkeley.edu/ross_levine/papers.htm>.

- Population increase rate (*POPINCR*): the population increase rate of each country between 1960 and 2000. Weil (2005).

<http://ebookbrowsee.net/weil-lab-data-xls-d103077605>.

- Inflation rate (*INFR*): the average inflation rate of each country between 1960 and 1990. Sachs and Warner (1997).

  <http://www.cid.harvard.edu/ciddata/ciddata.html>.

- Life expectancy (*LIFE*): life expectancy of each country in 1960. Sala-i-Martin (1997a, 1997b).

  <http://www.columbia.edu/~xs23/data/millions.htm>.

- Real exchange rate distortion index (*EXCHNGRDIST*): the real exchange rate distortion used by Levine and Renelt (1992; the original data are from Dollar, 1992).

- Ratio of natural resource exports to GDP (*NATUALEXP*): the ratio of natural resource exports to GDP of each country in 1970. Natural resource exports are the sum of exports of primary agriculture, fuels, and minerals. Sachs and Warner (1997).

  <http://www.cid.harvard.edu/ciddata/ciddata.html>.

- Share of government investments (*PUBINV*): the average share of public investment of GDP of each country between 1960 and 1965. Sala-i-Martin (1997a, 1997b).

  <http://www.columbia.edu/~xs23/data/millions.htm>.

References

ACEMOGLU, D., JOHNSON, S., AND ROBINSON, J. (2001): "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91, 1369–1401.

ACEMOGLU, D., JOHNSON, S., AND ROBINSON J. (2002): "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, 117, 1231–1294.

ACEMOGLU, D. AND JOHNSON, S. (2005): "Unbundling Institutions," *Journal of Political Economy*, 113, 949–995.

ADELMAN I. AND MORRIS, C. (1967): *Society, Politics and Economic Development*. Baltimore: The Johns Hopkins University Press.

ALESINA A. AND RODRIK, D. (1994): "Distributive Politics and Economic Growth," *Quarterly Journal of Economics*, 109, 465–490.

ALESINA, A., DEVLEESCHAUWER, A., EASTERLY, W., KURLAT, S., AND WACZIARG, R. (2003): "Fractionalization," *Journal of Economic Growth*, 8, 155–194.

AMSDEN, A. (1989): *Asia Next Giant: South Korea and Late Industrialization*. New York: Oxford University Press.

ANGELES L. (2007): "Income Inequality and Colonialism," *European Economic Review*, 51, 1155–1176.

BANDYOPADHYAY, S. AND GREEN, E. (2012): "The Reversal of Fortune Thesis Reconsidered," *Journal of Development Studies*, 48, 817–831.

BARRO, R. (1991): "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, 106, 407–443.

BARRO, R. AND LEE, J. (2000): "International Data on Educational Attainment: Updates and Implications," CID Working Paper, Harvard University.

BARRO, R. AND MCCLEARY, R. (2003): "Religion and Economic Growth," Working paper, Harvard University.

BERTOCCHI, G. AND CANOVA, F. (2002): "Did Colonization Matter or Growth? An Empirical Exploration into the Historical Causes of Africa's Underdevelopment," *European Economic Review*, 46, 1851–1871.

BHATTACHARYYA, S. (2009): "Root Causes of African Underdevelopment," *Journal of African Economies*, 18, 745–780.

BLEANEY, M. AND DIMICO, A. (2011): "Biogeographical Conditions, the Transition to Agriculture, and Long-Run Growth," *European Economic Review*, 55, 943–954.

BLOCK, S. (2001). "Does Africa Grow Differently?," *Journal of Development Economics*, 65, 443–467.

BLOOM, D. AND SACHS, J. (1998): "Geography, Demography, and Economic Growth in Africa," *Brookings Papers on Economic Activity*, 1998:2, 207–295.

BOCKSTETTE, V., CHANDA, A., AND PUTTERMAN, L. (2002): "States and Markets: The Advantage of an Early Start," *Journal of Economic Growth*, 7, 347–369.

CHANDA, A. AND PUTTERMAN, L. (2007): "Early Starts, Reversals and Catchup in the Process of Economic Development," *Scandinavian Journal of Economics*, 109, 387–413.

CHANDLER, T. (1987): *Four Thousand Years of Urban Growth: An Historical Census*. Lewiston, NY: The Edwin Mellen Press.

CIA (2003): *The World Factbook*.

COMIN, D., EASTERLY, W., AND GONG, E. (2010): "Was the Wealth of Nations Determined in 1000 BC?," *American Economic Journal: Macroeconomics*, 2, 65–97.

Dollar, D. (1992): "Outward-Oriented Developing Economics Really Do Grow More Rapidly: Evidence from 95 LDCs 1976–1985," *Economic Development and Cultural Change*, 40, 523–544.

DIAMOND, J. (1997): *Guns, Germs and Steel: The Fates of Human Societies*. London: W W Norton & Company.

DEININGER, K. AND OLINTO, P. (1999): "Asset Distribution, Inequality, and Growth," Policy Research Working Papers, World Bank.

EASTERLY, W. (1995): "Explaining Miracles: Growth Regressions Meet the Gang of Four," in Ito and Krueger (eds): *Growth Theories in Light of the East Asian Experience*. Chicago: University of Chigago Press.

EASTERLY, W. AND LEVINE, R. (1997): "'Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, 112, 1203–1250.

EASTERLY, W. AND LEVINE, R. (2003): "Tropics, Germs, and Crops: the Role of Endowments in Economic Development," *Journal of Monetary Economics* 50, 3–40.

EASTERLY, W. AND LEVINE, R. (2012): "The European Origins of Economic Development," NBER Working Paper. 18162.

ECKERT, C. (1991): *Offspring of Empire: The Kochą́ang Kims and the Colonial Origins of Korean Capitalism, 1876-1945*. Seattle: University of Washington Press.

ENGLEBERT, P. (2000): "Solving the Mystery of the Africa Dummy," *World Development*, 28, 1821–1835.

ETEMAND, B. (2000): *La Possession du Monde: Poids et Messeurs de la Colonization*. Brussels: ED

FEYRER, J. AND SACERDOTE, B. (2009): "Colonialism and Modern Income: Islands as Natural Experiments," *Review of Economics and Statistics*, 91, 245–262.

FURUKAWA, N. (1990): "Primary School Enrollment in the Colonial Korea," *Educational History Review*, 2, 136–174 (in Korean).

GALLUP, J., SACHS, J., AND MELLINGER, A. (1999): "Geography and Economic Development," *International Regional Science Review*, 22, 179–232.

GALOR, O. (2009): "Inequality and Economic Development: An Overview," Working Paper, Brown University,
<http://www.brown.edu/Departments/Economics/Papers/2009/2009-3_paper.pdf>.

GLAESER, E., LA PORTA, R., LOPEZ-DE-SILANE, F., AND SHLEIFER, A. (2004): "Do Institutions Cause Growth?," *Journal of Economic Growth*, 9, 271–303.

GRIER, R. (1999): "Colonial Legacies and Economic Growth," *Public Choice*, 98, 317–335.

HALL, R. AND JONES, C. (1999): "Why Do Some Countries Produce So Much More Output Than Others?," *Quarterly Journal of Economics*, 114, 83–116.

HANSEN, L. (1982): "Large Sample Properties of Generalized Methods of Moments Estimators," *Econometrica*, 50, 1029–1054.

Hideki, K. (1977): *Formation and Development of Capitalism in Korea*. Tokyo: Ryuukeishosha (in Japanese).

HELDRING, L. AND ROBINSON, J. (2012): "Colonialism and Development in Africa," NBER Working Paper, No. 18566.

HSIAO, F. (2003): ""Miracle Growth" in the Twentieth Century: International Comparisons of East Asian Development," *World Development*, 31, 227–257.

KAUFMANN, D., KRAAY, A., AND ZOIDO-LOBATÓN, P. (2002): "Governance Matters II: Updated Indicators for 2000-01," Policy Research Working Paper, No. WPS 2772, Washington DC: World Bank.

KANG, M. (1973): *The Development of Commercial Capital in Late Joseon Period*. Seoul: Korea University Press (in Korean).

KIM, N. (2006): *The Economic Growth in Korea, 1910–1945*. Seoul: Seoul National University Press (in Korean).

KIM, Y. S. (1970): *A Study of the Agricultural History of Late Joseon. I*. Seoul: Iljogak (in Korean).

KIM, Y. S. (1971): *A Study of the Agricultural History of Late Joseon. II*. Seoul: Iljogak (in Korean).

KISZEWSKI, A., MELLINGER, A., SPIELMAN, A., MALANEY, P., SACHS, S., AND SACHS, J. (2004): "A Global Index Representing the Stability of Malaria Transmission," *American Journal of Tropical Medicine and Hygine*, 70, 486–498.

KLERMAN, D., MAHONEY, P., SPAMANN, H., AND WEINSTEIN, M. (2011): "Legal Origin or Colonial History?," *Journal of Legal Analysis*, 3, 379–409.

KOHLI, A. (1994): "Where Do High Growth Political Economies Come From? The Japanese Lineage of Korea's "Developmental State," *World Development*, 22, 1269–1293.

KWON, B. (1969): *A Study of the Agricultural Fabric Manual Industry in Late Lee Joseon Dynasty*. Daegu: Institute of Management and Economy Research, Yeungnam Universty. (in Korean)

KWON, B. (2004): *A Study of Industry Histroy in Korea*. Daegu: Yeungnam University Press.

LA PORTA, R., LOPEZ-DE-SILANE, F., AND SHLEIFER, A. (1998): "Law and Finance," *Journal of Political Economy*, 106, 1113–1155.

LA PORTA, R., LOPEZ-DE-SILANE, F., AND SHLEIFER, A. (2008): "The Economic Consequences of Legal Origins," *Journal of Economic Literature*, 46, 285–332.

LA PORTA, R., LOPEZ-DE-SILANE, F., SHLEIFER, A., AND VISHNY, R. (1999): "The Quality of Government," *Journal of Law, Economics, and Organization*, 15, 222-279.

LA PORTA, R., LOPEZ-DE-SILANE, F., SHLEIFER, A., AND VISHNY, R. (1997): "Legal Determinants of External Finance," *Journal of Finance*, 52, 1131–1150.

LANDES, D. (1998): *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. New York: W.W. Norton & Co.

LEE, H. (2012): "18th Centry of Korean Economy as a Preparatory Stage for Modern Economic Growth," *The Korean Histroical Review*, 213, 97–126.

LEE, Y. (2000): *The Historical Specialities of Korean Market Economy and Democracy*. Seoul: Korea Development Institute (in Korean).

LEVINE, R. AND RENELT, D. (1992): “A Sensitivity of Cross-country Growth Regression,” *American Economic Review*, 82, 942–963.

MAHONEY, P. (2001): “The Common Law and Economic Growth: Hayek Might be Right,” *Journal of Legal Studies*, 30, 503–525.

MCEVEDY, C. AND JONES, R. (1978): *Atlas of World Population History*. New York: Facts on File.

Miyajima, H. (1994): “The Formation of Small Family Society in East Asia,” Yuzo, M., Naoaki, H., Hamashita, and T., Miyajima, H. eds., *Long-Term Social Change*, 67–96. Tokyo: Tokyo University Press (in Japanese).

NEVES, P. AMD SILVA, S. (2014): “ Inequality and Growth: Uncovering the Main Conclusions from the Empirics,” *Journal of Development Studies*, 50, 1–21.

NORTH, D. (1990): *Institutions, Institutional Change and Economic Performance*. New York: Cambridge University Press.

NUNN, N. (2014): “Historical Development,” Aghion, P. and Durlauf, S. eds., *Handbook of Economic Growth*, vol., 347-402. San Diego, CA: Elsevier B.V.

NUNN, N. AND PUGA, D. (2012): “Ruggedness: The Blessing of Bad Geography in Africa,” *Review of Economics and Statistics*, 94, 20–36.

OLSSON, O. (2004): “Unbundling Ex-Colonies: A Comment on Acemoglu, Johnson, and Robinson (2001),” Working paper, Department of Economics, Goteborg University.

OLSSON, O. (2009): “On the Democratic Legacy of Colonialism,” *Journal of Comparative Economics*, 37, 534–551.

OLSSON, O. AND HIBBS, A. (2005): “Biogeography and Long-Run Economic Development,” *European Economic Review*, 49, 909–938.

PEROTTI, R. (1996): “Growth, Income Distribution, and Democracy: What the Data Say,” *Journal of Economic Growth*, 1, 149–187.

PRICE, G. (2003): "Economic Growth in a Cross-section of Nonindustrial Countries: Does Colonial Heritage Matter for Africa?," *Review of Development Economics*, 7, 478–495.

PUTTERMAN L. AND TRAINOR, C. (2006): *Agricultural Transition Year Country Data Set*. <http://www.econ.brown.edu/fac/Louis_Putterman>.

PUTTERMAN, L. (2007): *State Antiquity Index (Statehist) Data Set*. <http://www.econ.brown.edu/fac/Louis_Putterman>.

RODRIK, D. (1995): "Getting Interventions Right: How South Korea and Taiwan Grew Rich?," *Economic Policy*, 10, 55–107.

RODRIK, D., SUBRAMANIAN, A., AND TREBBI, F. (2004): "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development," *Journal of Economic Growth*, 9, 131-165.

SACHS, J. AND WARNER, A. (1997): "Sources of Slow Growth in African Economies," *Journal of African Economies*, 6, 335-365.

SALA-I-MARTIN, X., DOPPELHOFER, G., AND MILLER, R. (2004): "Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach," *American Economic Review*, 94, 813–835.

SALA-I-MARTIN, X. (1997a): "I Just Ran 2 Million Regressions," *American Economic Review*, 87, 178–183.

SALA-I-MARTIN, X. (1997b): "I Just Ran Four Million Regressions," NBER Working Paper, No. 6252.

SPOLAORE, E. AND WACZIARG, R. (2013): "How Deep Are the Roots of Economic Development?," *Journal of Economic Literature*, 51, 325–369.

TEMPLE, J. AND JOHNSON, P. (1998): "Social Capability and Economic Growth," *Quarterly Journal of Economics*, 110, 965–990.

WADE, R. (1990): *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization*. Princeton: Princeton University Press.

WEIL, D. (2005): *Economic Growth*. Boston: Addison Wesley.

WOO, D. (2008): *The Economic Legacy of Traditional Chosun Dynasty*, *Quarterly Review of Korean History*, 68, 273–300 (in Korean).

Woo, D. and Kahm, H. (2011): “Road to School: Primary School Participation in Korea, 1911–1960,” Discussion Paper, Yonsei Economic Research Institute.

World Bank (1993): *The East Asian Economic Miracle: Economic Growth and Public Policy*. New York: Oxford University Press.

	Mean	Std. Error	Max.	Min.	Korea	Rank	Sample Size
Growth Rate (%) 1960–2000	1.50	1.52	5.78	−1.53	5.78	1	64
Initial Conditions							
GDP Per Capita (*GDPR*)	2814	2679	12413	422	1570	40	64
Primary School Enrollment Ratio (*SKULR*)	66.65	32.01	118.	5.	94.	30	96
Average Schooling Years Per Capita (*SKULY*)	2.98	2.31	9.56	0.17	3.23	19	53
Land Ownership Gini Coefficient (*LGINI*)	68.7	15.47	92.3	33.85	33.85	42	42
Share of Middle-Class Income (*MIDCLS*)	0.33	0.05	0.41	0.22	0.41	1	47
Adelman and Morris Index (*ADELMO*)	−0.02	0.98	1.91	−1.86	0.85	12	64
Precolonial Legacy Indicators							
Date of Agriculture (*AGRI*)	3860	2351	10500	362	4500	26	103
Technology Level (*TECHNO*) AD1500	0.34	0.26	0.88	0.00	0.85	2	76
log(Population) (*LPOPDEN1*)	0.73	1.61	4.61	−3.83	3.70	3	90
State Antiquity Index AD 1950/100 (*STATE*/100)	3.20	2.05	8.18	1.88	8.18	1	94
Urbanization Rate (*URBR*)	2.62	4.09	21.	0.	NA	NA	65
Colonial Indicators							
Immigrant Ratio (*IMMIGR*)	11.71	23.22	100.	0.	1.8	43	101
Colonial Duration (*DURTN*)	158.68	127.31	513.	12.	35.	101	107
Independence Year (*INDEPY*)	1930	57	1997	1776	1945	34	107

Table 1: DESCRIPTIVE STATISTICS OF KEY ECONOMIC VARIABLES OF EX-COLONIES. This table classifies the key variables into three categories and shows the average, standard error, maximum, and minimum values. Refer to the Appendix for the descriptions of the variables.

	AGRI	*TECHNO*	log(*POPDEN1*)	*STATE*
AGRI	1.00			
TECHNO	0.72	1.00		
log(*POPDEN1*)	0.62	0.71	1.00	
STATE	0.67	0.74	0.67	1.00
BIOGEO	0.72	0.86	0.66	0.65
log(*IMMIGR*)	−0.33	−0.50	−0.58	−0.27

Table 2: CORRELATION COEFFICIENTS OF PRECOLONIAL INDICATORS. *AGRI*, *TECHNO*, *POPDEN1*, *STATE*, *BIOGEO*, and *IMMIGR* stand for "data of agriculture," "technology level," "population density 1," "state antiquity index AD 1950," "biogeography," and "immigrant ratio," respectively. Refer to the Appendix for the description of each variable. The correlation coefficients are computed using 77 countries. The correlation coefficients between "log(*IMMIGR*)" and the other variables are estimated using ex-colonies, and 99, 74, 94, and 90 samples are used to compute the correlation coefficients between log(*IMMIGR*) and *AGRI*, *TECHNO AD 1500*, log(*POPDEN1*), and *STATE*, respectively.

Samples	The Ex-Colonies							The World
Models	1	2	3	4	5	6	7	8
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	OLS
log(*GDPR*)	0.18	-0.84^{***}	-0.58^{***}	-0.74^{***}	-0.94^{***}	-1.15^{***}	-1.19^{***}	-0.80^{***}
	0.92	-3.25	-3.02	-4.16	-3.20	-3.98	-4.02	-3.20
log(*SKULY*)		1.21^{***}	1.47^{***}	1.55^{***}	1.39^{***}	1.46^{***}	1.47^{***}	0.98^{***}
		5.84	7.01	9.16	6.45	8.79	8.57	3.43
TECHNO AD 1500			4.19^{***}	4.61^{***}	4.85^{***}	5.16^{***}	5.51^{***}	2.52^{***}
			6.77	7.89	6.91	8.28	7.40	7.05
DURTN/100				-0.59^{***}		-0.64^{***}	-0.66^{***}	
				-2.71		-4.16	-4.14	
INDEPY				-0.01^{***}		-0.01^{***}	-0.01^{**}	
				-2.73		2.50	-2.43	
log(*IMMIGR*)					0.30	0.39^{*}	0.43^{**}	
					1.46	1.87	1.98	
R^2	0.01	0.30	0.65	0.70	0.67	0.73	0.73	0.53
Sample Size	64	53	42	42	42	42	42	62
F-Statistics							22.17	
Over-identification p-val.							0.51	

Table 3: MODEL ESTIMATION RESULTS. *GDPR*, *SKULY*, *TECHNO*, *DURTN*, *INDEPY*, and *IMMIGR* stand for "growth rate of GDP per capita," "average schooling years per capita," "technology level," "colonial duration," "independence year," and "immigrant ratio," respectively. Refer to the Appendix for the description of each variable. Model 7 uses "state antiquity index AD 1950" and "date of agriculture" as the instrumental variables. The F-statistic of the same model is from the 1st-stage LS model. The over-identification p-value is computed using Hansen's (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors, except in the sixth model.

Samples	The Ex-Colonies						The World
Models	1	2	3	4	5	6	7
Estimation Method	OLS	OLS	OLS	OLS	OLS	2SLS	OLS
log(*GDPR*) 1960	-0.90^{***}	-0.61^{***}	-0.62^{***}	-0.86^{***}	-1.05^{***}	-1.17^{***}	-0.80^{***}
	-4.27	-3.33	-3.66	-3.28	-4.32	-4.44	-5.61
log(*SKULR*) 1960	0.04^{***}	0.05^{***}	0.05^{***}	0.04^{***}	0.04^{***}	0.04^{***}	0.04^{***}
	7.90	9.49	10.14	7.74	9.42	8.47	8.90
TECHNO AD 1500		3.54^{***}	3.50^{***}	3.98^{***}	4.05^{***}	5.39^{***}	2.22^{***}
		6.04	6.21	6.25	6.62	6.31	6.84
DURTN/100			-0.40^{*}		-0.48^{***}	-0.49^{***}	
			-1.71		-2.64	-2.64	
INDEPY			-0.00		-0.00	-0.00	
			-1.26		-0.65	-0.85	
log(*IMMIGR*)				0.21	0.41^{**}	0.58^{***}	
				1.30	2.31	2.76	
R^2	0.42	0.67	0.69	0.67	0.72	0.71	0.64
Sample Size	62	52	52	52	52	51	74
F-Statistics						22.34	
Over-identification p-val.						0.17	

Table 4: MODEL ESTIMATION RESULTS. *GDPR*, *SKULR*, *TECHNO*, *DURTN*, *INDEPY*, and *IMMIGR* stand for "growth rate of GDP per capita," "primary school enrollment ratio," "technology level," "colonial duration," "independence year," and "immigrant ratio," respectively. Refer to the Appendix for the description of each variable. Model 6 uses "state antiquity index AD 1950" and "date of agriculture" as the instrumental variables. The F-statistic of the same model is from the 1st-stage LS model. The over-identification p-value is computed using Hansen's (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

	Realized Growth Rate (1)	Predicted Growth Rate 1 (2)	Predicted Growth Rate (3)	(2)/(1)	(3)/(1)
Korea	5.78	5.53	5.54	0.96	0.96
Hong Kong	5.43	5.03	4.81	0.93	0.89
Indonesia	3.33	2.63	3.35	0.79	1.01
United States	2.47	2.92	2.54	1.18	1.03
Mexico	1.98	0.91	0.94	0.46	0.47
Philippines	1.32	2.16	2.18	1.64	1.65
Southern African Countries	0.59 (19)	0.57 (11)	0.50 (19)	0.97	0.85

Table 5: COMPARISONS OF REALIZED AND PREDICTED ECONOMIC GROWTH RATES. The predicted economic growth rates (1) and (2) are obtained using the last models in Tables 3 and 4, respectively. The variable denoted by "Southern African Countries" means the average growth rates of the Sub-Saharan African countries. The figures in the parentheses are the numbers of the Sub-Saharan African countries.

Models	1	2	3	4	5	6	7	8	9
log(*GDPR*)	-1.11^{***}	-0.84^{***}	-0.84^{***}	-0.85^{***}	-0.80^{***}	-0.82^{***}	-1.01^{***}	-0.65^{***}	-0.96^{***}
	-4.37	-2.96	-3.22	-3.27	-2.71	-2.99	-3.81	-2.34	-3.61
log(*SKULY*)	1.19^{***}	1.21^{***}	1.12^{***}	1.12^{***}	1.21^{***}	1.09^{***}	1.21^{***}	1.18^{***}	1.05^{***}
	5.81	5.58	4.66	4.69	5.40	4.25	5.88	4.78	4.55
TECHNO AD 1500	3.23^{***}	4.65^{***}	3.50^{***}	3.53^{***}	4.74^{***}	3.40^{***}	3.18^{***}	3.57^{***}	3.15^{***}
	3.04	7.62	3.39	3.43	7.42	3.16	2.77	3.27	2.89
DURTN/100	-0.74^{***}	-0.53^{***}	-0.55^{***}	-0.91^{**}	-0.60^{***}	-0.61^{**}	-0.78^{***}	-0.59^{***}	-0.63^{***}
	-4.34	-3.14	-2.71	-2.01	-2.79	-2.02	-3.72	-2.84	-3.85
log(*IMMIGR*)	0.55^{**}	0.29^{*}	0.36	0.36	0.28	0.38	0.55^{***}	0.31	0.47
	2.51	1.70	1.56	1.58	1.63	1.58	2.53	1.35	2.30
INDEPY	-0.00	-0.01^{**}	-0.00		-0.01	-0.00	-0.00	-0.00	-0.00
	-1.13	-2.05	-0.68		-1.98	-0.69	-0.04	-0.12	-0.90
log(*COLOY*)				-6.05					
				-0.96					
CNTNTD-Asia	1.82		1.07	1.08		1.25	0.49	-0.72	1.59
	1.56		0.89	0.90		0.93	0.41	-0.71	1.41
CNTNTD-Africa	0.45		0.22	0.24		0.32	-0.94	-1.60^{*}	0.32
	0.56		0.25	0.28		0.32	-0.93	-1.79	0.43
CNTNTD-South America	0.87		0.92	0.84		0.86	-0.13	-0.23	1.00^{*}
	1.46		1.44	1.34		1.35	-0.29	-0.54	1.66
CNTNTD-North America	0.89		0.98	0.90		0.96			0.92
	1.53		1.54	1.49		1.56			1.54
COLRUD-UK		-0.85^{***}	-0.80^{***}	-0.77^{***}				-0.57^{***}	
		-3.62	-3.01	-2.88				-2.25	
COLRUD-France		-1.44^{***}	-1.20^{***}	-1.17^{***}	-0.65	-0.44		-1.06^{**}	
		-2.92	-2.55	-2.52	-1.34	-0.94		-2.44	
COLRUD-Spain		-1.21^{***}	-1.21^{***}	-1.22^{***}	-0.18	-0.23		-1.54^{***}	
		-3.55	-3.23	-3.27	-0.37	-0.32		-4.31	
LEGORGD-UK									0.34
									1.28
R^2	0.76	0.77	0.78	0.79	0.69	0.71	0.76	0.80	0.71
Sample Size	42	42	42	42	39	39	38	38	41

Table 6: ROBUSTNESS TEST 1 USING CONTINENT, COLONIAL RULER, AND LEGAL ORIGIN VARIABLES. *GDPR*, *SKULY*, *TECHNO*, *DURTN*, *INDEPY*, and *IMMIGR* stand for "growth rate of GDP per capita," "average schooling years per capita," "technology level," "colonial duration," "independence year," and "immigrant ratio," respectively. *COLOY* denotes "colonization year," which is defined as the difference between "independence year" and "colonial duration." Furthermore, *CNTNTD*, *COLRUD*, and *LEGORGD* are "continent dummy," "colonial ruler dummy," and "legal origin dummy," respectively. Refer to the Appendix for the description of each variable. Models 1, 2, 3, and 4 are estimated using all ex-colonies; Models 5 and 6 are estimated by excluding Brazil, Korea, and Indonesia; Models 7 and 8 are estimated using data sets excluding the United States, Canada, Australia, and New Zealand; and Model 9 is estimated by excluding Korea. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

Models	1	2	3	4	5	6	7
Estimation Method	OLS	OLS	OLS	2SLS	OLS	2SLS	2SLS
log(*GDPR*)	-0.98^{***}	-1.13^{***}	-1.16^{***}	-1.02^{***}	-1.21^{***}	-0.60^{***}	-0.67^{***}
	-3.44	-5.57	-6.30	-4.21	-6.58	-3.23	-2.82
log(*SKULR*)	0.04^{***}	0.04^{***}	0.04^{***}	0.04^{***}	0.04^{***}	0.04^{***}	0.04^{***}
	5.95	6.42	6.07	8.26	6.38	7.78	4.91
URBR	0.09^{***}						
	3.55						
log(*POPDEN1*)		0.27^{***}					
		2.60					
log(*POPDEN2*)			0.29^{***}				
			5.16				
STATE/100				0.42^{***}			
				6.48			
STATE $\times$ log(*POPDEN2*) /100					0.05^{***}		
					4.98		
STATE AD 50						0.04^{***}	
						7.76	
TECHNO 1000 BC							2.34^{***}
							5.64
DURTN/100	-0.82^{***}	-0.32^{*}	-0.72^{***}	-0.46^{***}	-0.68^{***}	-0.77^{***}	-0.58^{***}
	-4.14	-1.68	-3.48	-3.79	-3.60	-4.00	-2.03
log(*IMMIGR*)	0.26	0.65^{***}	0.71^{***}	0.49^{***}	0.59^{***}	0.00	0.29
	1.39	3.93	4.68	2.80	4.25	0.01	1.05
INDEPY	-0.00	0.00	-0.00	0.00	0.00	-0.01	-0.00
	-0.08	0.50	-0.38	0.15	0.24	-1.36	-0.22
R^2	0.62	0.69	0.72	0.75	0.74	0.89	0.81
Sample Size	44	60	53	51	53	41	41
F-Statistics				48.73		56.03	47.90
Over-identification p-val.				0.57		0.39	0.69
COLRUD		Yes	Yes		Yes	Yes	Yes
CNTNTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: ROBUSTNESS TEST 2 USING PRECOLONIAL INDEX. *GDPR*, *SKULR*, *URBR*, *POPDEN1*, *POPDEN2*, *STATE*, *STATE AD 50*, *TECHNO*, *DURTN*, *INDEPY*, and *IMMIGR* stand for "growth rate of GDP per capita," "primary school enrollment rate," "urbanization rate," "population density 1," "population density 2," "state antiquity index AD 1950," "state antiquity index AD 50," "technology level," "colonial duration," "independence year," and "immigrant ratio," respectively. Furthermore, *CNTNTD* and *COLRUD* are "continent dummy" and "colonial ruler dummy," respectively. In particular, *STATE* is the Putterman's index value of AD 1950 discounted by his 5% rate; *STATE AD 50* is the Putterman's index value of AD 50; POPDEN1 and POPDEN2 are estimated by Acemoglu, Johnson, and Robinson (2001) and Bandyopadhyay and Green (2012), respectively. Owing to the shortage of samples, we let *CNTNTD* be 1 if a country belongs to Africa or North America; and 0 if it belongs to South America. For Models 6 and 7, *CNTNTD* is 0 if the country belongs to South America; and 1 if it belongs to Asia, Africa, or North America. *COLRUD* is 1 if the colonial rulers are the United Kingdom, France, or Spain, and 0 otherwise. Refer to the Appendix for the descriptions of the other variables. The instrumental variables for *STATE* in Model 4 are *STATE AD 500* and *TECHNO AD 1500*; the instrumental variables for *STATE AD 50* in Model 6 are *TECHNO 1000 BC* and "biogeography"; and the instrumental variables for *TECHNO 1000 BC* in Model 7 are "date of agriculture" and "biogeography." The F-statistics denoted by 2SLS estimation method are from the 1st-stage LS model. The over-identification p-values are computed using Hansen's (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

Samples	The Ex-Colonies					The World		
Models	1	2	3	4	5	6	7	8
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	OLS
log(*GDPR*)	-1.18^{***}	-1.30^{**}	-1.08^{***}	-1.15^{***}	-1.25^{***}	-1.79^{***}	-1.58^{***}	-0.79^{***}
	-3.82	-4.99	-3.55	-4.00	-4.83	-5.82	-6.34	-4.02
log(*SKULY*)	1.50^{***}	1.38^{***}	1.33^{***}	1.42^{***}	0.98^{***}	0.29	0.35^{**}	1.01^{***}
	5.37	6.92	5.58	7.78	5.45	1.39	2.44	5.99
TECHNO AD 1500	5.23^{***}	4.56^{***}	4.13^{***}	4.73^{***}				
	7.71	5.96	5.87	4.84				
STATE AD 50/100								0.26^{***}
								4.15
DURTN/100	-0.63^{***}	-0.72^{***}	-0.55^{***}	-0.66^{***}	-0.42^{***}			
	-3.96	-4.90	-3.53	-4.16	-2.32			
log(*IMMIGR*)	0.40^{***}	0.42^{**}	0.33^{**}	0.36^{*}	0.28^{*}			
	1.98	2.08	2.05	1.69	1.84			
INDEPY	-0.01^{**}	-0.01^{**}	-0.01^{***}	-0.01^{**}	0.01^{**}			
	-2.50	-2.34	-3.66	-2.01	2.41			
MALA	0.01							
	0.24							
LNDLCKD		-0.52			-1.06^{***}			
		-1.19			-2.77			
ETHDVI		-0.41			-1.11^{*}			
		-0.81			-1.69			
Religion Dummy								
p-value			[0.09]					
ADELMO						1.11^{***}		
						3.69		
RLAW							1.41^{***}	
							5.91	
SAHARAD	0.01			-0.28	-1.23^{**}	-0.92^{**}	-1.60^{***}	-0.60
	0.24			-0.55	-2.33	-2.52	-4.06	-1.34
R^2	0.73	0.74	0.72	0.73	0.59	0.49	0.61	0.49
Sample Size	42	42	41	42	53	46	73	73
F-Statistics							23.31	
Over-identification p-val.							0.21	

Table 8: ROBUSTNESS TEST 3 USING GEOGRAPHICAL, ETHNIC, AND RELIGIOUS VARIABLES. *DGPR*, *SKULY*, *TECHNO*, *STATE AD 50*, *DURTN*, *IMMIGR*, *INDEPY*, *MALA*, *LNDLCKD*, *ETHDVI*, *ADELMO*, *RLAW*, and *SAHARAD* stand for "growth rate of GDP per capita," "average schooling years per capita," "technology level," "state antiquity index AD 1950," "colonial duration," "immigrant ratio," "independence year," "malaria ecology," "landlocked country dummy," "ethnic diversity index," "Adelman-Morris index," "rule of law index," and "Sub-Saharan Africa dummy," respectively. Furthermore, The "Religious Dummy" shows the p-value of the F-statistic that tests the coefficients of Catholic, Protestant, Muslim, and the other dummy variables are zero. Refer to the Appendix for the descriptions of the other variables. The instrumental variables used for Model 8 are *LATI* and *NECO*. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

Models	1	2	3	4	5	6	7	8	9
Estimation Method	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS	OLS	2SLS
log(*GDPR*)	-0.65^{***}	-0.92^{***}	-1.00^{***}	-0.94^{***}	-0.83^{***}	-1.20^{***}	-1.16^{***}	-1.16^{***}	-0.97^{***}
	-2.70	-3.85	-3.02	-4.13	-2.93	-3.99	-5.60	-4.93	-3.70
log(*SKULR*)	1.18^{***}	1.52^{***}	1.37^{***}	1.53^{***}	1.62^{***}	1.05^{***}	0.78^{***}	0.79^{***}	1.08^{***}
	6.36	7.66	5.86	7.86	6.70	3.79	3.44	4.11	2.48
TECHNO AD 1500	3.36^{***}	4.39^{***}	2.88^{***}	3.67^{***}	4.12^{***}	3.28^{***}			
	5.12	5.51	4.47	5.18	5.21	2.62			
STATE/100							0.20^{**}		
							2.43		
log(*POPDEN2*)								0.19^{**}	
								2.27	
TECHNO 1000 BC								1.42^{**}	
								2.33	
DURTN/100	-0.48^{***}	-0.60^{***}	-0.67^{***}	-0.48^{***}	-0.55^{**}	-0.63^{**}	-0.54^{***}	-0.66^{**}	-0.74^{**}
	-3.04	-3.48	-3.52	-2.78	-2.95	-2.32	-2.82	-2.17	-2.43
log(*IMMIGR*)	0.18	0.53^{***}	0.52^{***}	0.40^{***}	0.53^{**}	0.12	0.37^{**}	0.46^{***}	0.39
	0.91	2.84	2.60	2.40	2.56	0.50	2.36	2.62	1.33
INDEPY	-0.01^{**}	-0.01	-0.01^{**}	-0.00	-0.00	-0.01^{**}	-0.01^{***}	-0.01^{***}	-0.01
	-2.16	-1.46	-2.12	-0.87	-1.00	-2.43	-2.64	-3.34	-1.07
INVR	0.10^{***}					0.09^{**}	0.10^{***}	0.10^{***}	0.06^{***}
	3.51					2.51	3.47	4.56	2.75
COUP		-1.02^{***}				-0.88^{**}	-1.13^{***}	-0.80^{*}	-0.71^{*}
		-2.68				-2.51	-3.42	-1.85	-1.93
OVEREXCHNGR			-0.01^{***}			-0.01^{***}	-0.01^{***}	-0.01^{***}	-0.01^{*}
			-5.23			-3.53	-3.47	-3.74	-1.77
POPINCR				-0.007^{***}		-0.004	-0.005^{**}	-0.005^{**}	-0.004
				-2.91		-0.94	-2.35	-1.86	-1.62
INFR					-0.01				
					-0.95				
R^2	0.72	0.68	0.63	0.70	0.65	0.80	0.82	0.84	0.81
Sample Size	52	52	42	52	49	39	41	43	32
F-Statistics						11.49	23.04		12.24
Over-identification p-val.						0.69	0.31		
COLRUD						YES	YES	YES	YES
CNTNTD						YES	YES	YES	YES

Table 9: ROBUSTNESS TEST 4 USING MACROECONOMIC VARIABLES. *DGPR*, *SKULR*, *TECHNO*, *STATE*, *POPDEN2*, *DURTN*, *IMMIGR*, *INDEPY*, *INVR*, *COUP*, *OVEREXCHNGR*, *POPINCR*, *INFR*, *COLRUD*, and *CNTNTD* stand for "growth rate of GDP per capita," "primary school enrollment rate," "technology level," "state antiquity index AD 1950," "population density 2," "colonial duration," "immigrant ratio," "independence year," "investment rate," "coups frequency," "real exchange rate overvaluation," "population increase rate," "inflation rate," "colonial ruler dummy," and "continent dummy," respectively. *COLRUD* is 1 if the colonial rulers are the United Kingdom, France, or Spain, and 0 otherwise. *CNTNTD* is 1 if a country belongs to Asia, Africa, North or South America, and 0 otherwise. For Model 10, we let *COLRUD* be 0 if a country belongs to South America because Oceanic observations are not available. Refer to the Appendix for the descriptions of the other variables. The instrumental variables for *TECHNO AD 1500* in Model 7 are log(*POPDEN2*) and *STATE AD 500*; the instrumental variables for *STATE* in Model 8 are *TECHNO AD 1500* and *STATE AD 500*; and the instrumental variable for *TECHNO 1000 BC* in Model 10 is "biogeography," so that we do not need the over-identification test. The F-statistics denoted by 2SLS estimation method are from the 1st-stage LS model. The over-identification p-values are computed using Hansen's (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

Models	1	2	3	4	5	6	7	8
Estimation Method	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS
log(*GDPR*)	-1.62^{***}	-1.31^{***}	-1.17^{***}	-1.25^{***}	-1.64^{***}	-1.53^{***}	-1.47^{***}	-1.17^{***}
	-6.17	-5.73	-4.45	-4.28	-7.46	-6.69	-6.38	-3.39
log(*SKULY*)	0.88	1.30^{***}	1.34^{***}	1.39^{***}	0.76^{***}	0.59	0.32^{***}	0.36^{**}
	5.05	9.03	8.36	10.46	5.75	4.31	2.65	1.96
TECHNO AD 1500	4.68	4.56^{***}	4.36^{***}	5.36^{***}	3.92^{***}	3.42^{***}		
	8.84	7.85	6.53	11.45	6.43	3.74		
STATE/100							0.38^{***}	
							3.97	
log(*POPDEN2*)								0.53^{***}
								3.27
DURTN/100	-0.51^{***}	-0.79^{***}	-0.58^{***}	-0.60^{***}	-0.55^{***}	-0.47^{***}	-0.36^{**}	-0.62^{**}
	-3.03	-5.28	-3.34	-3.84	-3.62	-2.62	-2.21	-2.38
log(*IMMIGR*)	0.35^{**}	0.48^{***}	0.33^{*}	0.56^{***}	0.44^{***}	0.33^{*}	0.51^{***}	0.44^{**}
	1.98	2.91	1.88	2.84	2.62	1.90	3.66	2.05
INDEPY	-0.01^{*}	-0.01^{**}	-0.01^{**}	-0.01^{*}	-0.01^{*}	-0.01	-0.005^{**}	-0.01^{*}
	-1.89	-2.28	-2.42	-1.91	-1.65	-1.58	-2.25	-1.83
LIFE	0.09^{***}				0.07^{***}	0.10^{***}	0.13^{***}	0.12^{***}
	4.34				4.56	5.11	5.66	4.73
EXCHNGRDIST		-0.01^{**}			-0.01^{***}	-0.01^{**}	-0.01^{***}	-0.00
		-2.48			-3.04	-2.28	-3.64	-0.62
NATUALEXP			-1.35^{**}		-0.78	-1.00^{*}	0.22	-0.54
			-2.43		-1.41	-1.74	0.33	-0.55
PUBINV				-6.25^{***}	-2.02			
				-3.03	-0.86			
R^2	0.81	0.77	0.76	0.78	0.88	0.89	0.90	0.83
Sample Size	42	42	41	41	40	41	41	37
F-Statistics							21.67	35.04
Over-identification p-val.							0.23	
COLRUD						YES	YES	YES
CNTNTD						YES	YES	YES

Table 10: ROBUSTNESS TEST 5 USING MACROECONOMIC VARIABLES. *DGPR*, *SKULY*, *TECHNO*, *STATE*, *POPDEN2*, *DURTN*, *IMMIGR*, *INDEPY*, *LIFE*, *EXCHNGRDIST*, *NATUALEXP*, *PUBINV*, *COLRUD*, and *CNTNTD* stand for “growth rate of GDP per capita,” “average schooling years per capita,” “technology level,” “state antiquity index AD 1950,” “population density 2,” “colonial duration,” “immigrant ratio,” “independence year,” “life expectancy,” “real exchange distortion index,” “ratio of natural resource exports to GDP,” “share of public investment,” “colonial ruler dummy,” and “continent dummy,” respectively. Refer to the Appendix for the descriptions of the other variables. *COLRUD* is 1 if the colonial rulers are the United Kingdom, France, or Spain, and 0 otherwise. *CNTNTD* is 1 if a country belongs to Asia, Africa, or North or South America; and 0 otherwise. The instrumental variables for *STATE* in Model 7 are *STATE AD 1000* and *TECHNO AD 1500*; and the instrumental variable for log(*POPDEN2*) in Model 10 is *TECHNO AD 1500*, so that we do not need the over-identification test. The F-statistics denoted by 2SLS estimation method are from the 1st-stage LS model. The over-identification p-values are computed using Hansen’s (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

Models	1	2	3	4	5	6	7	8
Estimation Method	OLS	OLS	OLS	OLS	2SLS	OLS	OLS	OLS
log(*GDPR*)	-0.98^{***}	-0.73^{***}	-0.88^{***}	-1.06^{***}	-0.62^{***}	-0.89^{***}	-1.05^{***}	-1.02^{***}
	-3.86	-2.33	-2.05	-4.41	-1.67	-2.27	-4.12	-4.02
log(*SKULR*)	1.57^{***}	1.99^{***}	1.83^{***}	1.92^{***}	2.97^{**}	2.93^{***}	2.16^{***}	2.19^{***}
	6.90	4.57	4.45	11.90	7.64	7.93	7.43	7.82
TECHNO AD 1500	4.25^{***}			4.44^{***}			5.99^{***}	5.76^{***}
	6.08			5.05			3.15	3.30
STATE AD 50		0.02^{***}			0.06^{***}			
		2.64			7.34			
TECHNO 1000 BC			2.67^{***}			3.20^{***}		
			3.60			6.17		
DURTN/100	-0.49^{***}	-0.46^{***}	-0.56^{***}	-1.03^{***}	-1.02^{***}	-0.74^{***}	-0.89^{***}	-0.79^{***}
	-2.73	-2.69	-2.29	-5.83	-3.80	-3.50	-2.90	-2.98
log(*IMMIGR*)	0.75^{***}	0.26	0.57^{***}	0.43^{**}	-0.12	0.14	0.35	0.51
	4.17	1.61	2.37	2.39	-0.51	0.57	1.33	1.33
INDEPY	-0.00	-0.00	0.00	-0.01^{***}	-0.01^{**}	-0.01	-0.01	-0.01
	-0.78	-0.90	0.58	-2.80	-2.35	-0.91	-1.11	-1.63
log(*LGINI*)	-1.53^{***}	-2.31^{***}	-1.50^{*}					
	-2.24	-3.37	-1.84					
log(*MIDCLS*)				2.48^{***}	1.85^{**}	2.93^{***}	3.15^{***}	2.26^{**}
Early 1960s				3.15	2.27	4.77	4.26	2.42
R^2	0.74	0.60	0.69	0.84	0.81	0.82	0.85	0.87
Sample Size	33	37	30	32	29	29	32	32
F-Statistics					15.76			
Over-identification p-val.					0.56			
COLRUD								YES
CNTNTD							YES	YES

Table 11: ROBUSTNESS TEST 6 USING INCOME DISTRIBUTIVE VARIABLE. *GDPR*, *SKULR*, *TECHNO*, *STATE AD 50*, *DURTN*, *IMMIGR*, *INDEPY*, *LGINI*, *MIDCLS*, *COLRUD*, and *CNTNTD* stand for "growth rate of GDP per capita," "primary school enrollment rate," "technology level," "state antiquity index AD 50," "colonial duration," "immigrant ratio," "independence year," "land GINI coefficient," "share of middle class," "colonial ruler dummy," and "continent dummy," respectively. *COLRUD* is 1 if the colonial rulers are the United Kingdom, France, or Spain, and 0 otherwise. *CNTNTD* is 1 if a country belongs to Asia, Africa, or North or South America, 0 otherwise. Refer to the Appendix for the descriptions of the other variables. The instrumental variables for *STATE AD 50* in Model 5 are *TECHNO AD 1500* and date of agriculture. The F-statistics denoted by 2SLS estimation method are from the 1st-stage LS model. The over-identification p-values are computed using Hansen's (1982) J-test statistic. The statistics denoted by ***, **, and * mean that they are significant at the 1%, 5%, and 10% levels, respectively. The figures below the estimated coefficients are t-statistics estimated by the robust standard errors.

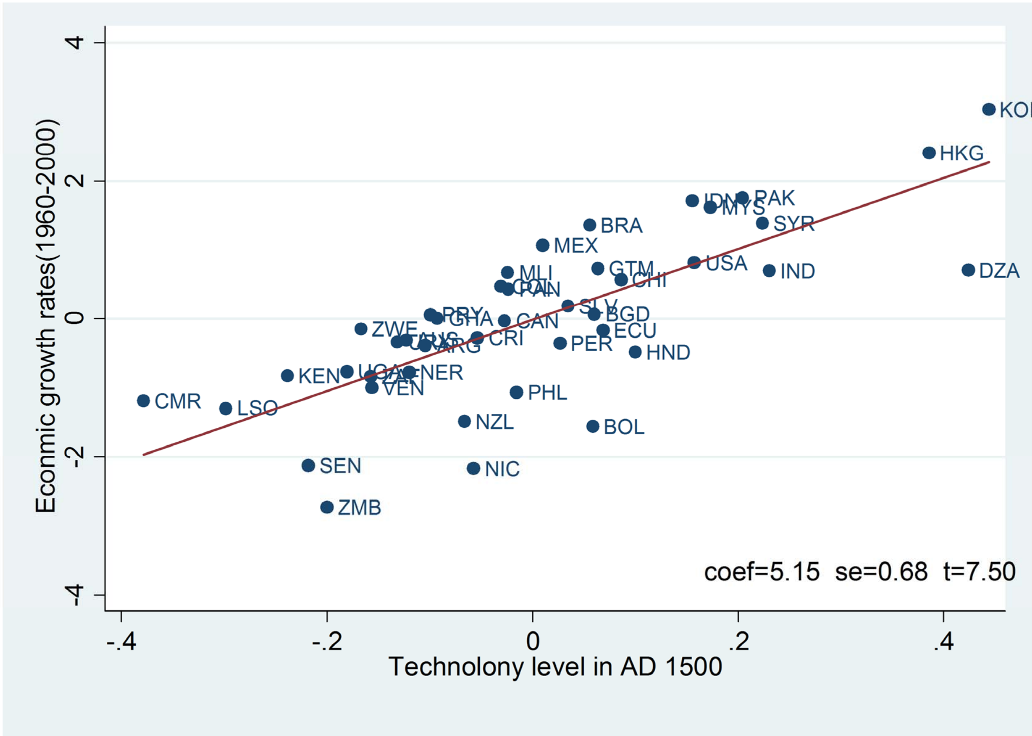

Figure 1: THE PARTIAL EFFECT OF TECHNOLOGY LEVEL AD 1500 ON THE ECONOMIC GROWTH RATE (1960-2000)

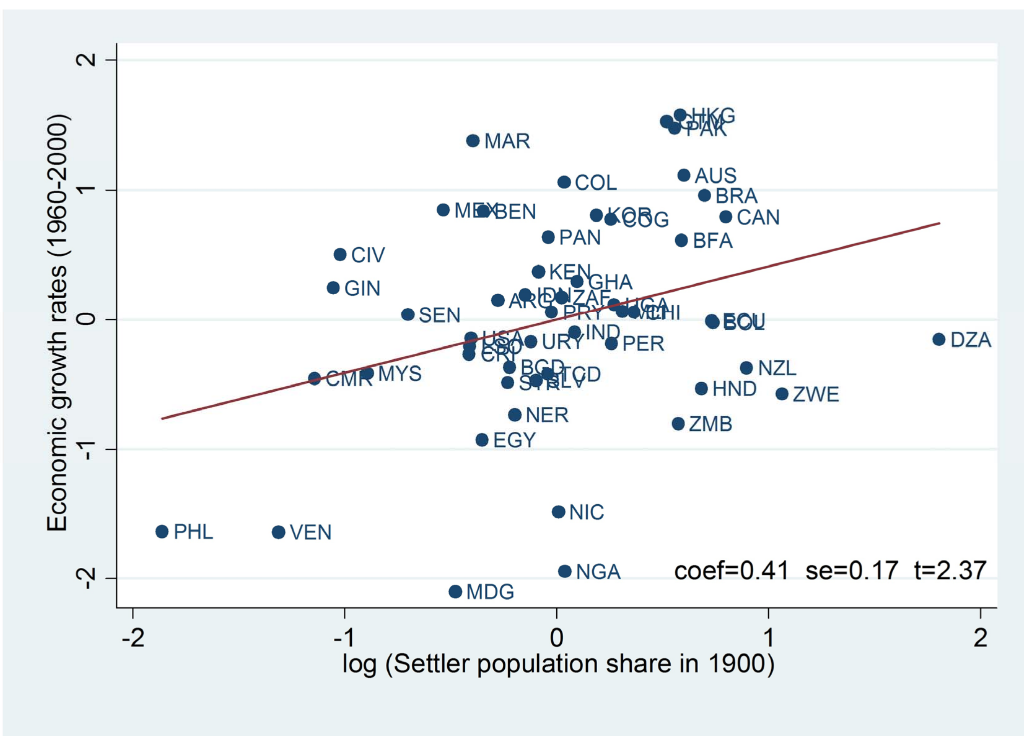

Figure 2: THE PARTIAL EFFECT OF IMMIGRANT RATIO AD 1900 ON THE ECONOMIC GROWTH RATE (1960-2000)

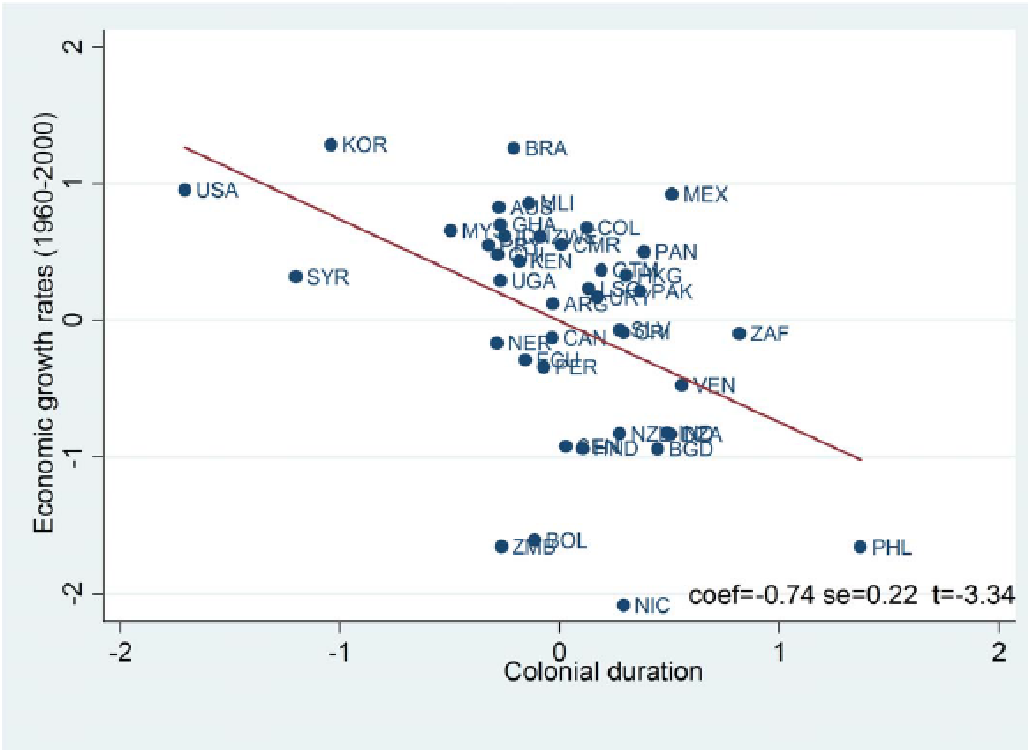

Figure 3: THE PARTIAL EFFECT OF COLONIAL DURATION ON THE ECONOMIC GROWTH RATE (1960-2000)

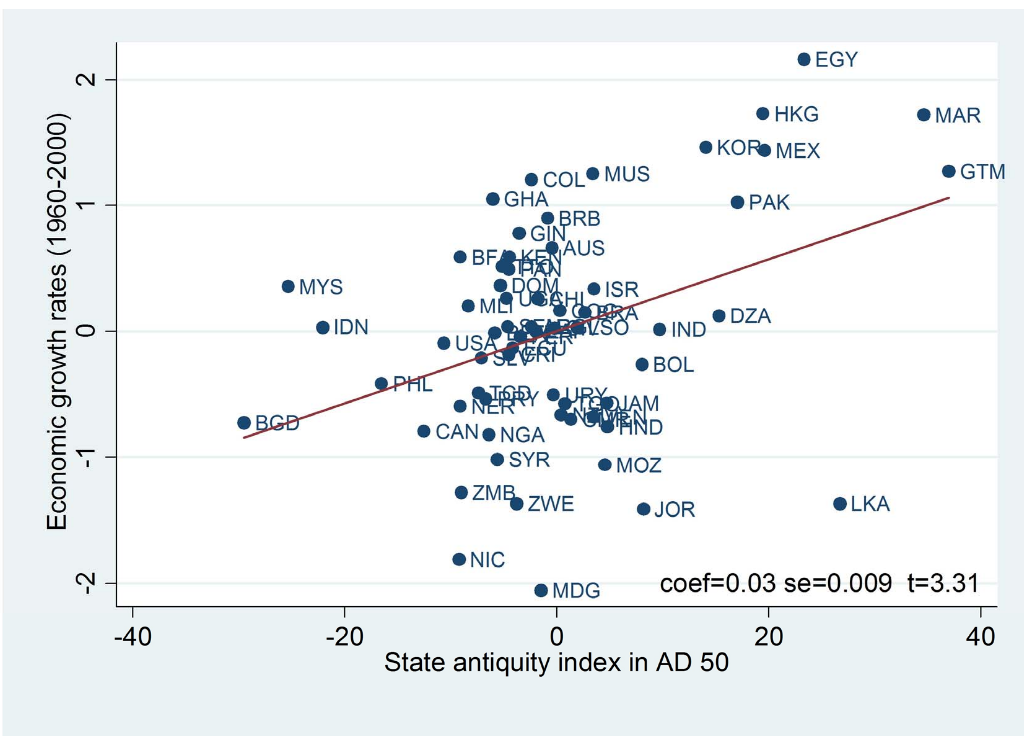

Figure 4: THE PARTIAL EFFECT OF THE STATE ANTIQUITY INDEX AD 50 ON THE ECONOMIC GROWTH RATE (1960-2000)

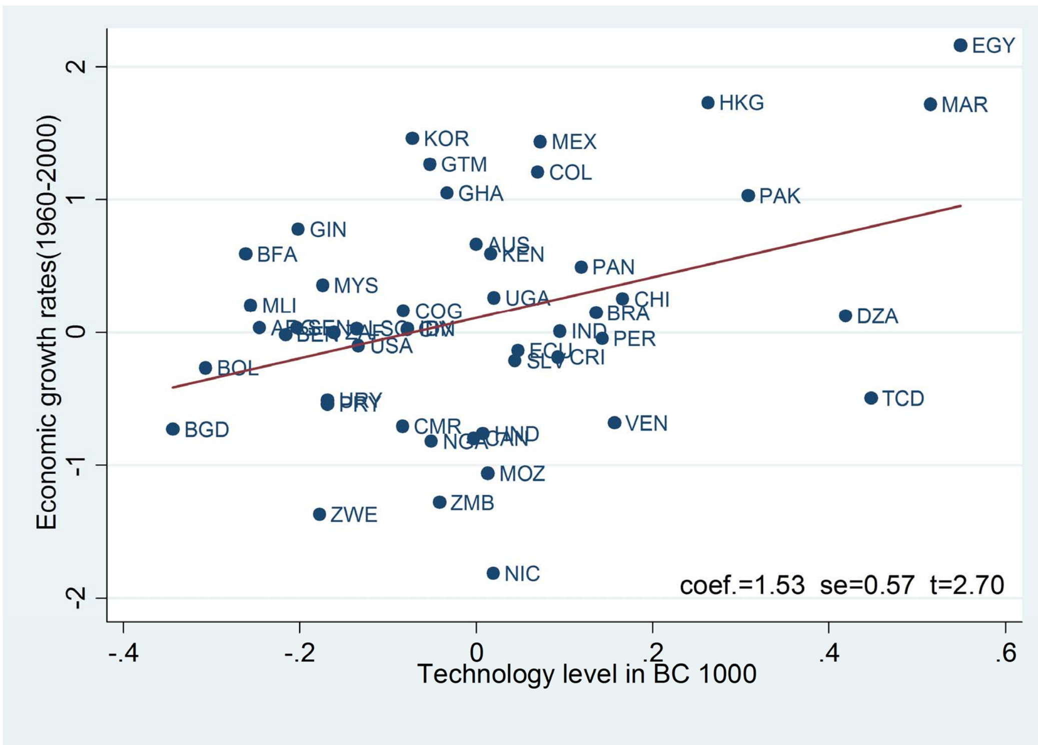

Figure 5: THE PARTIAL EFFECT OF TECHNOLOGY LEVEL 1000 BC ON THE ECONOMIC GROWTH RATE (1960-2000)