

# Economic Growth and its Determinants: a Longitudinal and a Cross-regional Analysis

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## Abstract

Empirical evidence from a panel of 177 countries, over the time period of 1995 – 2009, indicates that economic growth is dependent on various factors. This paper finds that corruption control, reduced inflation and increased trade openness are the factors that boost up the economic growth of a country. Mixed empirical evidence is seen for government consumption, tropical climate and agricultural growth. No significant relationship has been observed between military expenditure and economic growth, whereas democracy influences output for African countries. The cross-regional analysis of Asian, European, African, Caribbean, and American countries also gives specific determinants for these regions. I have also analyzed Economic growth has also been analyzed in developing, developed, least developed, Muslim and petroleum exporting and emerging countries.

**Keywords:** economic growth, corruption, democracy, government consumption, health, inflation, trade openness, tropical climate, human capital, military expenditure, agricultural growth

## 1. Introduction

Economic growth, no doubt, is the backbone of an economy's development and its enhancement remains one of the major strategic and policy issues for the policymakers. Researchers, over the years, have analyzed the economic growth and its development; special emphasis has been laid upon the factors that influence the economic growth. A vast body of economic literature has, empirically and theoretically, researched the economic growth and its determinants (Kormendi and Meguire 1985; Barro, 1990, 1995, 1996, 1997; Sachs and Warner 1997). These studies have identified several factors, having empirical and theoretical backing, which impact economic growth of a country. The studies relating to economic growth have used cross-sectional, time-series and panel data models for their analyses. This study has focused on panel/longitudinal (cross-sectional time-series) data to investigate the relationship.

Through this study, I have tried to answer questions like "Do open trades boost economic trade?", "Can corruption practices hinder growth?", "Is a democratic regime more effective in economic development of the country?", "Do better health facilities help in economic growth?", "Does inflation impede growth?", "What affect government consumption, population and agricultural growth have on economic growth of a country?", "What are the determinants of growth in Asian countries, as compared to European and African countries?" and many more.

This study utilizes panel data for 177 countries over the time period of 15 years in order to determine the impact of democracy, corruption, health, government consumption, population growth, trade openness, tropical climate, inflation, human capital, military expenditure and agricultural growth on the economic growth.

The results of this study validate the dependence of economic growth on various factors. Corruption has shown a consistent negative relationship with economic growth throughout the analyses. Democracy only played its role in the growth of African countries. Low inflation rates and increased openness were seen to help in economic development. Military expenditure did not return significant coefficients for any of the analyses. Government expenditure, population growth, agricultural growth and tropical climate showed mixed coefficients for different regions of the world. Human capital also impacted economic growth for some of the regions.

The rest of the paper is structured as follows: Section 2 reviews the literature on economic growth and its determinants. Section 3 describes the data used in the study. Section 4 gives the empirical analysis and the discussion of results. Section 5 concludes the paper.

## 2. Literature Review

Literature vastly contains evidence on the relationship between economic growth and the factors influencing it. Barro (1996b) identified various factors which enhance the real per capita GDP growth rate. These factors include low government consumption, low inflation and rule of law. Various other factors which influence growth are greater life expectancy level (indicator for health), higher schooling levels (indicator for human capital) and better trade terms. Drury, Kriekhaus and Lusztig (2006) found insignificant relationship between economic growth and population growth; and between economic growth and life expectancy. Barro (1996a) found significant effects of rule of law, openness, less government consumption and increased human capital; in growth determination.

Kormendi and Meguire (1985) found a negative relation between inflation and growth rate but the explanatory power becomes insignificant when investment rate is also included, indicating inflation directly affects investment and may be less relevant in the capital growth. Cozier and Selody (1992) also estimated that the effect of inflation on income is negative for OECD. Barro (1995, 1996) has also obtained similar results for inflation, a negative long-run effect of inflation on growth.

Lipset (1959, 1960) argues that an industrialized society, where middle-class industrialized producers are in abundance, promotes democracy. Helliwell (1994) found no direct relationship between growth and democracy. This does not conclude that democracy discourages economic growth but instead it may force governments to increase its spending on education and health. This, in turn, enhances economic growth.

Corruption can affect the investment in a country. People having capabilities and means of obtaining resources derive most of public resources and may not leave significant resources for the ones who are more deserving, having better understanding and ability. Mauro (1995) found a negative relation between corruption and the growth rate. Azariadis and Lahiri (1997) described some of the reasons for corruption practices; including inefficient organizational structure of the State, inadequate democratic control of the civilian society over government and unlimited bureaucratic powers. Different measures of corruption are used by researchers. Drury, Kriekhaus and Lusztig (2006) relied on International Country Risk Guide's (ICRG) corruption index, along with the other available measures to complement their results, for the analysis of corruption of the analyzed countries. Kaufmann, Kraay and Mastruzzi (2003) used control of corruption as their measure of corruption. They used a strategy different from the one used by the Transparency International's corruption perceptions index, but found a high correlation of 0.97 between the two measures. Also the correlation, between the above two measures and the corruption index scores of the International Country Risk Guide, was found to be 0.75.

Evidence regarding the impact of government expenditure and economic growth is inconsistent. Some researchers have found a negative relation between the two; some indicated a positive relation, whereas some have shown no significant relationship between government expenditure and economic growth. Barro (1990) modeled government expenditure, in an endogenous growth theory, for the first time. According to him, the rate of growth in the long run depends on the structure of government expenditure, along with many other factors. Barro (1997) also mentions that the government consumption may also retard the growth by taking resources from the private sector (considered high on efficiency) to the public sector (considered low on efficiency). Hsieh and Lai (1994) mention inconsistent evidence regarding the relationship between government spending and per capita output growth. Aschauer (1990) reports positive and significant relation between government spending and the level of output. Kormendi and Meguire (1985) found no significant relationship between government spending and growth rate of real GDP.

Brumm (1997) found a positive relationship between GDP per capita growth rate and share of military expenditure in GDP. Some researchers have also argued that an increased military expenditure might lead into a decreased spending on various other sectors like health and education etc. This may retard economic growth, in turn. Lim (1983) found a negative relationship between military expenditure and economic

growth. Klein (2004) has also found a similar negative impact of military expenditure on economic growth, due to a crowding-out effect. Chowdhury (1991) studied 55 developing countries and found no support for military expenditure affecting economic growth. Kim (1996) has also concluded that military expenditure has no effect on growth.

Sachs and Warner (1995) argued the existence of a relationship between economic growth and natural resource abundance and found a strong negative relationship between the two variables. Matsuyama (1992), in their theoretical analysis, countered the argument that agricultural production enhances economic growth.

Yanikkaya (2003) has analyzed the trade openness literature and notes that different measures of measuring trade openness can be found in literature. Many researchers have used the simple measure of trade openness (exports plus imports divided by GDP), whereas others have used different other available measures. Using the simple measure, Harrison (1996) mentions, researchers have found robust positive relationship between trades share in GDP and economic growth.

Sachs and Warner (1997) argued that agricultural production and health are lower in tropical regions. Following their measure for tropical regions (proportion of country that lies between tropic of Cancer and tropic of Capricorn); Drury, Kriekhaus and Lusztig (2006) also used a similar methodology by including a dummy variable.

Education may play a role in the economic growth of a country. There has also been some evidence regarding weak or non-effectiveness of education in the enhancement of economic growth. Devarajan, Swaroop and Zou (1996) have found a negative relationship between economic growth and the share of education expenditure in the budget. Similarly, Benhabib and Spiegel (1994) found a weak relation between economic growth and education levels of the workforce.

### **3. Data**

Time series cross-sectional (panel) data of 177 countries has been used in the analysis. The annual time period ranges from 1995 to 2009.

Real GDP growth, representing economic growth, is the dependent variable. Data for the variable was obtained from the World Bank World Development Indicators (WDI) database.

Corruption, the first independent variable, is measured by Transparency International's Corruption Perceptions Index (CPI). The index (a score between 0 and 10) reflects the degree of perceived corruption among politicians and public officials. Data is available for most of the countries for the time period under consideration. Democracy, the second independent variable, is measured using Polity IV data. The index measures a given country's democracy and autocracy levels and then subtracts the autocracy level from democracy level.

Government consumption, population growth, health (represented by log of average life expectancy) inflation, human capital (represented by primary and secondary school enrollment), military expenditure and agricultural growth are the other variables considered for the study. Data, for all these variables, was obtained from World Bank World Development Indicators (WDI). Trade openness data was obtained using the simple measure (exports plus imports divided by GDP). For exports, imports and GDP, I obtained data from World Bank WDI. Initial real GDP for a particular year was also used as an independent variable to account for convergence.

A dummy variable was included to identify between a tropical and non-tropical region. Table 1 shows the summary of descriptive statistics for all the variables used in the analysis.

### **4. Analysis**

I use panel data for 177 countries over the period of 1995 – 2009 yielding a panel with  $N = 177$  and  $T = 15$ . Clearly, our pool is cross-sectional dominant ( $N > T$ ). Because of the chances of the existence of non-spherical errors, I use panel-corrected standard errors (PCSE) to correct for the errors. Because our dependent variable GDP Growth was autoregressive, I correct this temporal dependence by using a panel-specific AR(1) model (Achen, 2000), for the analysis of all the regions. Separate regressions were run for the complete sample and then for sub-samples consisting of developing, developed, least developed, petrol-exporting, emerging, Caribbean, Asian, European, American region, African and Muslim countries; in order to get an insight into the relevant determinants of economic growth for these sub-samples.

### *3.1 Economic Growth in the Complete Panel*

Table II (Column a) gives the results of the regression for the complete panel of 177 countries. The  $R^2$  statistic, 0.17 (17%), is not very strong. Low  $R^2$  values have also been reported by Drury, Krieckhaus and Luszti (2006) for the same kind of analysis. Corruption (significant), democracy (insignificant), tropical (insignificant), inflation (significant) and agricultural growth (significant) return negative coefficients; which indicates that all these variables have negative impact on economic growth. The significance of the corruption, government expenditure, openness, inflation and agricultural growth variables leads to certain results.

With an increase in the level of corruption in a country, economic growth tends to be affected; complementing the results of Mauro (1995). Therefore, in order to boost up a country's economic growth, corruption practices should be minimized. Government expenditure is also seen to impact the economic growth; but the sign of the coefficient is not, as intended. Barro (1990) mentioned the dependence of long run growth on the structure of government expenditure. Up to this extent, our analysis provided similar results. But as Barro (1997) mentioned, government consumption retards growth; our analysis indicated that government consumption, in fact, boosted growth; as indicated by Aschauer (1990).

Openness is found to have a positive impact on a country's economic growth. Harrison (1996) has also observed a similar positive relation between openness and growth. So, open international markets boost up a country's economic growth and open economies tend to grow more rapidly as compared to those whose trade has barriers.

Inflation casts a negative effect on the economic growth; complementing the results of Kormendi and Meguire (1985), Cozier and Selody (1992) and Barro (1995, 1996). Agricultural growth also impacts economic growth but the negative sign indicates that higher agricultural growth degrades economic growth; accepting the view of Matsuyama (1992). So, increased intent towards agricultural growth might take resources away from other potential investment sectors and impede economic growth, in general. Sachs and Warner (1995) have indicated a negative relation between natural resource abundance and economic growth.

Generalizing the results; I conclude that decreased corruption, increased openness, reduced inflation and a moderate agricultural growth will enhance the economic growth of a country.

### *3.2 Economic Growth in Developing Countries*

Similar method, to the one presented for the complete panel, is used to analyze the economic growth in the developing countries in Table II (Column b). The  $R^2$  statistics for the regression is 0.2 (20%). Government expenditure and openness return significant positive coefficients for developing countries whereas inflation and agricultural growth give negative coefficients, as is the case in the complete panel. The only difference in the results for the complete panel and developing countries is that corruption, although having a negative coefficient, is not found to be significant.

Generalizing the results for developing countries; I conclude that increased openness to trade, inflation reduction and a reasonable agricultural growth contribute, significantly, towards the economic growth in a developing country.

### *3.3 Economic Growth in Developed Countries*

The analysis of developed countries in Table II (Column c) shows that only corruption and population growth relate to the economic growth. The  $R^2$  statistics for the regression is 0.15 (15%).

Corruption yields a negative coefficient, as expected; whereas population growth returns a positive coefficient. Drury, Kriekhaus and Lusztig (2006) found an insignificant relationship between population growth and economic growth; however for our study of developed countries, the relationship is significant. This indicates that higher population leads to higher economic growth. This can be justified in this way that the country has more manpower to yield inclined output, keeping in view that most of the population in a developed country is provided all necessities of life and they are mostly literate; as compared to a developing or a least developed country.

So in general, for a developed country, low corruption and higher population growth enhance the country's economic growth.

### *3.4 Economic Growth in Least Developed Countries*

The analysis for least developed countries is presented in Table II (Column d). Health (log of average life expectancy), population growth, openness, tropical-ness and human capital (primary school enrolment) return significant coefficients. The  $R^2$  statistics for the regression is 0.24 (24%).

For most of the least developed countries, health conditions are not up-to-mark. These countries are mostly dependent on the manpower for output. Due to below-average health facilities, their manpower is not able to work up to their potential. So, the positive relationship between health and economic growth, as indicated by Barro (1996), shows that better health conditions can lead to higher economic growth.

Population growth, as opposed to developed countries where facilities are abundant, returns a negative coefficient. This indicates the fact that the least developed countries are low on resources; and with increased population growth these resources become even scarcer. So, in order to have an effective and efficient population which can add sufficiently to the country's economic growth, these countries need to control their population growth. Trade openness also returns a positive coefficient indicating the fact that market and trade openness lead to higher economic growth.

Tropical variable also gives a positive coefficient. The positive sign was unexpected keeping in view the results of Sachs (2001) and Drury, Kriekhaus and Lusztig (2006) who indicated that the countries falling in tropical climates have lower economic growth. This shows that in least developed countries, the tropical growth deficit has decreased. This, however, opposes the views of researches like Sachs (2001) who argue that countries lying in the tropical climates have generally lower economic growth as compared to the temperate-zone regions. Some of the Asian tropical economies like Singapore, Thailand and Malaysia have shown sustainable growth over the last few decades. Same can be said about other tropical countries like Mexico, Brazil and Colombia. However, tropical Africa remains one of the poorest regions of the world. So, we have a mixed evidence of economic growth for tropical economies.

Human capital (proxied by primary school enrolment) also gives a positive coefficient in the regression analysis. This means that higher (and functional) human capital is expected to return higher economic growth.

In general, for least developed countries; better health conditions, lower population growth, tropical climate and higher human capital lead to a sound economic growth.

### *3.5 Economic Growth in Petroleum Exporting Countries*

For petroleum exporting countries (Table II Column e), the regression analysis with PCSEs returns three significant variables. Corruption (negative coefficient), tropical climate (negative coefficient) and human capital (positive coefficient) all yield, significantly, to economic growth. The negative coefficient of

corruption is as per theory, complementing the results of Mauro (1995). The negative coefficient for the tropical variable is in accordance with the findings of Sachs (2001) and Drury, Kriekhaus and Lusztig (2006), indicating that a petroleum exporting country lying the tropical region will have lower economic growth as compared to the one lying in temperate zone region. The positive coefficient for human capital (proxied by secondary school enrolment) indicates that higher human capital leads to a higher economic growth in petroleum exporting countries. The  $R^2$  statistics for the regression is 0.26 (26%).

Generalizing the results for petroleum exporting countries; corruption control, non-tropical climate and high human capital lead to high economic growth.

### *3.6 Economic Growth in Emerging Markets / Countries*

For emerging countries (Table II Column f); the analysis shows a negative coefficient for corruption and a positive coefficient for government consumption. The negative coefficient for corruption is consistent with our findings for other regions. The positive coefficient for government consumption is inconsistent with the findings of Barro (1996, 1997) and consistent with those of Aschauer (1990). Government may allocate resources to the effective and required sectors in order to boost up economic growth. The  $R^2$  statistics for the regression is 0.15 (15%).

So, in the case of emerging markets/countries; low corruption and higher government spending lead to better economic growth.

### *3.7 Economic Growth in Caribbean Countries*

For Caribbean countries (Table II Column g), inflation and agricultural growth return significant coefficients. The negative coefficient of inflation is in accordance with the economic theory, consistent with the findings of Barro (1995, 1996), Kormendi and Meguire (1985), Selody (1992). Positive coefficient for agricultural growth indicates that higher agricultural growth leads to a sound economic growth in Caribbean countries, consistent with the analysis of Matsuyama (1992). The  $R^2$  statistics for the regression is 0.79 (79%).

Generalizing the results for Caribbean countries, low inflation and higher agricultural growth enhance economic growth.

### *3.8 Economic Growth in Asian Countries*

For Asian countries (Table II Column h); corruption (negative coefficient), government expenditure (positive coefficient), openness (positive coefficient), tropical (negative coefficient) and agricultural growth (negative coefficient) give significant coefficients in the regression analysis. The  $R^2$  statistics for the regression is 0.17 (17%).

The negative coefficient of corruption, positive coefficient for openness and negative coefficient for tropical variable are consistent with the theory on these coefficients; as mentioned in the above analyses. Government expenditure's positive relationship with economic growth affirms the findings of Aschauer (1990). The negative coefficient of agricultural growth for Asian countries indicates that major investments in agriculture lead to a reduced expenditure in other productive sectors, thereby reducing the potential for a higher economic growth.

So, corruption control, higher government expenditure, increased trade openness, non-tropical climate and a reasonable agricultural growth contribute to a high economic growth in Asian countries.

### *3.9 Economic Growth in European Countries*

Analysis for European countries (Table II Column i) shows that corruption, openness and inflation significantly impact economic growth. The negative coefficient for corruption, positive coefficient for

openness and a negative coefficient for inflation are all aligned with the literature on economic growth. The  $R^2$  statistics for the regression is 0.09 (9%).

Generalizing the results for European countries; reduced corruption, increased openness and lower inflation contribute to a sound economic growth.

### *3.10 Economic Growth in American Region Countries (North, South and Central American Countries)*

The analysis for the American region countries (Table II Column j) returns negative and significant coefficients for inflation and agricultural growth. The  $R^2$  statistics for the regression is 0.21 (21%). Hence, for American region countries, low inflation and a focus on moderate agricultural growth will route towards a successful economic growth.

### *3.11 Economic Growth in African Countries (East, West and Central African Countries)*

Analyzing the regression statistics for African countries (Table II Column k); I find significant relationship of democracy (positive), population growth (negative) and agricultural growth (negative) with economic growth. The  $R^2$  statistics for the regression is 0.12 (12%).

The positive coefficient of democracy contradicts with the findings of Helliwell (1994), who found no direct relationship between democracy and economic growth. This indicates that a democratic regime in the African region would take necessary and effective steps to promote economic growth in the country. Because of the lower health and basic facilities in most of the African countries, higher population growth would lead to consumption of most of the available resources; thereby reducing the potential for a higher economic growth. The negative coefficient for agricultural growth also focuses on the issue that major resources of the country should not be consumed on agricultural development.

In general; a democratic setup, controlled population and agricultural growth will contribute to a higher economic growth in African countries.

### *3.12 Economic Growth in Muslim Countries*

Regression analysis for Muslim countries (Table II Column l) returns significant coefficients for corruption (negative coefficient), tropical (negative coefficient) and human capital (positive coefficient). The  $R^2$  statistics for the regression is 0.10 (10%).

Negative coefficient for corruption indicates the need for a corruption-free environment to prevail in the Muslim countries in order to attain a higher economic growth. Negative coefficient for tropical variable shows that a Muslim tropical country will exhibit less economic growth as compared to the one having a non-tropical climate. Positive relationship of human capital (proxied by secondary school enrolment) with economic growth shows that more human capital will yield higher levels of economic growth.

In general, for Muslim countries; lower corruption, non-tropical climate and higher human capital will bring higher economic growth.

## **5. Conclusion**

For a broad panel of 177 countries, this paper investigated the relationship between economic growth and various variables which have strong theoretical support of affecting economic growth of a country. Thirteen separate regression analyses were conducted to check the impact of the variables on economic growth in different regions, cultures and classifications of the world.

Corruption, throughout our analysis, returned negative coefficients; indicating that corruption negatively affects the economic growth of a country, irrespective of the location and status of the country. Democracy only showed its significant coefficient for African countries, indicating the fact that a democratic setup will have better prospects of bringing higher economic growth in a country. Health was also seen to positively

impact the economic growth for least developed countries, showing the need of better health facilities in the country to boost up the economic output. Government consumption, population growth, tropical climate and agricultural growth variables led to a mixed relationship with economic growth, positive for some of the regions whereas negative for other regions. Military expenditure did not return any significant coefficient throughout our analyses, indicating that it may not have a strong impact on the economic growth of a country. Trade openness positively impacted economic growth for most of the regions, indicating that a country with open access to its trade is expected to have higher economic growth. Inflation, on the other hand, returned negative coefficients for most of our analyses. This means that lower inflation rates will enhance economic growth. Human capital also had some impact on the economic growth of some of the regions, with a mixed positive and negative coefficient structure.

This study makes several contributions to the existing knowledge on economic growth. First, a very wide panel of 177 countries is used for the analysis. Second, I have run separate regression analysis for developing countries, developed countries, least developed countries, petroleum exporting countries, emerging markets/countries, Caribbean countries, Asian countries, European countries, American region countries, African countries and Muslim countries. This gives an understanding of the relationship of economic growth and the variables under consideration for different regions and classifications of the world. Third, I have employed a variety of variables which had strong theoretical backing based on existing literature. Fourth, our results may help policy makers to focus on the specified areas that support the economic growth in a country or a region.

The results of the study present important implications for policy makers. Economists and relevant policymakers can use the analysis to have an insight into the economic growth factors prevailing in the whole world (referring to the complete sample) and the ones having vital influence for the sub-samples' analysis (referring to the regional analysis). The empirical results of the study can be essential for the direction of policies towards relevant factors that play significant roles in the enhancement and the development of the economy.

Future research should consider other relevant explanatory variables like labor force and investment (gross capital formation) and income inequality. Also, a causality analysis may be conducted for understanding the relationship between economic growth and its significant determinants.

## Appendix

### *Complete Panel of 177 Countries:*

(D, D\* and LD represent countries used in the analysis as developed countries, developing countries and least developed countries)

Afghanistan(LD), Albania(D\*), Algeria(D\*), Angola(LD), Argentina(D\*), Armenia(D\*), Australia(D), Austria(D), Azerbaijan(D\*), Bahrain, Bangladesh(LD), Barbados(D\*), Belarus(D\*), Belgium(D), Belize(D\*), Benin(LD), Bhutan(LD), Bolivia(D\*), Bosnia and Herzegovina(D\*), Botswana(D\*), Brazil(D\*), Brunei, Bulgaria(D\*), Burkina Faso(LD), Burundi(LD), Cambodia(LD), Cameroon(D\*), Canada(D), Cape Verde(LD), Central African Republic(LD), Chad(LD), Chile(D\*), China(D\*), Colombia(D\*), Comoros(LD), Costa Rica(D\*), Cote d'Ivoire(D\*), Croatia(D\*), Cuba(D\*), Cyprus(D), Czech Republic(D), Democratic Republic of Congo, Denmark(D), Djibouti(LD), Dominica(D\*), Dominican Republic(D\*), Ecuador(D\*), Egypt(D\*), El Salvador(D\*), Equatorial Guinea(LD), Eritrea(LD), Estonia(D), Ethiopia(LD), Finland(D), France(D), Gabon(D\*), Gambia(LD), Georgia(D\*), Germany(D), Ghana(D\*), Greece(D), Grenada(D\*), Guatemala(D\*), Guinea(LD), Guinea-Bissau(LD), Guyana(D\*), Haiti(LD), Honduras(D\*), Hong Kong(D), Hungary(D\*), Iceland(D), India(D\*), Indonesia(D\*), Iran(D\*), Iraq(D\*), Ireland(D), Israel(D), Italy(D), Jamaica(D\*), Japan(D), Jordan(D\*), Kazakhstan(D\*), Kenya(D\*), Kiribati(LD), Kosovo(D\*), Kuwait, Kyrgyzstan(D\*), Latvia(D\*), Lebanon(D\*), Lesotho(LD), Liberia(LD), Libya(D\*), Lithuania(D\*), Luxembourg(D), Macau, Macedonia(D\*), Madagascar(LD), Malawi(LD), Malaysia(D\*), Maldives(LD), Mali(LD), Malta(D), Mauritania(LD), Mauritius(D\*),

Mexico(D\*), Moldova(D\*), Mongolia(D\*), Montenegro(D\*), Morocco(D\*), Mozambique(LD), Namibia(D\*), Nepal(LD), Netherlands(D), New Zealand(D), Nicaragua(D\*), Niger(LD), Nigeria(D\*), Norway(D), Oman(D\*), Pakistan(D\*), Panama(D\*), Papua New Guinea(D\*), Paraguay(D\*), Peru(D\*), Philippines(D\*), Poland(D\*), Portugal(D), Puerto Rico, Qatar, Romania, Russia, Rwanda(LD), Saint Lucia(D\*), Saint Vincent and Grenadines(D\*), Samoa(LD), Sao Tome and Principe(LD), Saudi Arabia, Senegal(LD), Serbia(D\*), Seychelles(D\*), Sierra Leone(LD), Singapore(D), Slovakia(D), Slovenia(D), Solomon Islands(LD), South Africa(D\*), South Korea(D), Spain(D), Sri Lanka(D\*), Sudan(LD), Swaziland(D\*), Sweden(D), Switzerland(D), Syria(D\*), Tajikistan(D\*), Tanzania(LD), Thailand(D\*), Timor-Leste(LD), Togo(LD), Tonga(D\*), Trinidad and Tobago(D\*), Tunisia(D\*), Turkey(D\*), Turkmenistan(D\*), Uganda(LD), Ukraine(D\*), United Arab Emirates, United Kingdom(D), United States(D), Uruguay(D\*), Uzbekistan(D\*), Vanuatu(LD), Venezuela(D\*), Vietnam(D\*), Yemen(LD), Zambia(LD), Zimbabwe(D\*).

*List of Petroleum Exporting Countries:*

Algeria, Angola, Australia, Bahrain, Brunei, Canada, China, Colombia, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Malaysia, Mexico, Nigeria, Oman, Qatar, Russia, Saudi Arabia, Syria, Trinidad and Tobago, United Arab Emirates, Venezuela, Yemen.

*List of Emerging Market / Countries:*

Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey.

*List of Caribbean Countries:*

Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago.

*List of Asian Countries:*

Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei, Cambodia, China, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Malaysia, Maldives, Mongolia, Nepal, Oman, Pakistan, Philippines, Qatar, Russia, Saudi Arabia, Singapore, South Korea, Sri Lanka, Syria, Tajikistan, Thailand, Timor-Leste, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Vietnam, Yemen.

*List of European Countries:*

Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.

*List of American Region Countries:*

Argentina, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, United States, Uruguay, Venezuela.

*List of African Countries:*

Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

*List of Muslim Countries:*

Afghanistan, Albania, Algeria, Bahrain, Bangladesh, Cameroon, Central African Republic, Chad, Cote d'Ivoire, Egypt, Ethiopia, Gambia, Guinea, Guinea-Bissau, Indonesia, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Malaysia, Maldives, Mali, Mauritania, Morocco, Niger, Nigeria, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Sierra Leone, Sudan, Syria, Tanzania, Togo, Tunisia, Turkey, United Arab Emirates, Yemen.

*List of Tropical Countries:*

The countries in brackets have less than half of their land in the tropics, while the rest have at least half.

Angola, Barbados, Belize, Benin, Bolivia, Botswana, Brazil, Brunei, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Colombia, Costa Rica, Cote d'Ivoire, Cuba, Djibouti, Dominica, Dominican Republic, Ecuador, El Salvador, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, India, Indonesia, Jamaica, Kenya, Kiribati, Liberia, Macau, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Oman, Panama, Papua New Guinea, Peru, Philippines, Puerto Rico, Rwanda, Saint Vincent and Grenadines, Samoa, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Sri Lanka, Sudan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Uganda, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe. (Algeria, Australia, Bangladesh, Chile, China, Egypt, Libya, Paraguay, Saudi Arabia, United Arab Emirates)

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**Table I. Summary Statistics**

<b>Variables</b>	<b>Mean</b>	<b>Std Dev</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Growth</b>	.02515	.1157	-2.8564	2.9673
<b>Corruption</b>	4.4817	2.3080	.4	10
<b>Democracy</b>	.4261	16.2422	-88	10
<b>Health</b>	1.8216	.0738	1.4639	1.9187
<b>Government Consumption</b>	9.4432	1.0226	7.2115	12.3856
<b>Population Growth</b>	1.4492	1.3761	-10.9552	12.8273
<b>Openness</b>	.8728	.5339	0	4.40272
<b>Tropical Climate</b>	.5170	.4854	0	1
<b>Inflation</b>	24.2451	518.5782	-100	24411.03
<b>Human Capital (Primary)</b>	100.4391	17.6234	21.8954	173.3705
<b>Human Capital (Secondary)</b>	73.2800	31.8602	5.1687	161.7809
<b>Military Expenditure</b>	2.6613	3.4260	.0466	47.2574
<b>Agricultural Growth</b>	-.4022	2.0336	-18.0172	12.1525

**Table II. Estimation Results for Economic Growth and its Determinants**

	(a)	(b)	(c)	(d)	(e)	(f)
<b>Corruption</b>	<b>-0.06(.003)**</b>	-0.06(.01)	<b>-0.04(.002)**</b>	-0.16(.01)	<b>-0.19(.004)***</b>	<b>-0.23(.01)***</b>
<b>Democracy</b>	.0001(.0002)	.0001(.00)	-0.001(.006)	-0.001(.001)	-0.002(.001)	-0.002(.0003)
<b>Health</b>	-0.029(.063)	.003(.101)	.127(.556)	<b>.296(.156)*</b>	.548(.491)	.043(.133)
<b>Government Expenditure</b>	<b>.009(.006)*</b>	<b>.014(.01)**</b>	-0.004(.006)	.018(.016)	.003(.011)	<b>.03(.01)***</b>
<b>Population Growth</b>	.001(.004)	.000(.006)	<b>.015(.007)**</b>	<b>-.05(.01)***</b>	-.014(.013)	-.010(.010)
<b>Openness</b>	<b>.023(.011)**</b>	<b>.028(.015)*</b>	.020(.017)	<b>.08(.03)***</b>	.015(.015)	.021(.014)
<b>Tropical</b>	-0.009(.009)	-0.011(.011)	.030(.046)	<b>.15(.03)***</b>	<b>-.036(.012)***</b>	-.024(.018)
<b>Inflation</b>	<b>-.001(.00)***</b>	<b>-.001(.00)***</b>	-0.001(.002)	-0.002(.001)	.0001(.001)	-0.001(.001)
<b>Human Capital (Primary)</b>	.00001(.00)	-0.0001(.0004)	-0.0001(.0004)	<b>.001(.00)**</b>	-0.001(.001)	-0.0001(.001)
<b>Human Capital (Secondary)</b>	.0001(.00)	.0001(.0003)	-0.0002(.0003)	-0.0001(.00)	<b>.001(.00)***</b>	.0002(.0003)
<b>Military Expenditure</b>	.001(.001)	-0.001(.002)	.001(.004)	.003(.004)	.002(.002)	-0.001(.005)
<b>Agricultural Growth</b>	<b>-.01(.002)***</b>	<b>-.01(.002)***</b>	-0.004(.008)	-0.003(.002)	-0.008(.005)	-0.0002(.003)
<b>Constant</b>	-0.002(.138)	-1.00(.198)	-1.26(1.051)	-.716(.295)	-.882(.844)	-.244(.253)
<i>Obs</i>	925	498	314	92	113	204
<i>R</i> <sup>2</sup>	.17	.20	.15	.24	.26	.15

**Table II (continued). Estimation Results for Economic Growth and its Determinants**

	(g)	(h)	(i)	(j)	(k)	(l)
<b>Corruption</b>	.076(.083)	<b>-.023(.01)***</b>	<b>-.006(.003)**</b>	-0.10(.006)	-.013(.011)	<b>-.02(.01)***</b>
<b>Democracy</b>	-.311(.386)	-0.002(.001)	.0004(.0003)	-0.0003(.00)	<b>.002(.001)*</b>	.001(.001)
<b>Health</b>	.319(16.69)	-.038(.255)	-.293(.335)	.666(.620)	.048(.250)	-.115(.125)
<b>Government Expenditure</b>	-.107(.270)	<b>.028(.01)***</b>	.013(.009)	.012(.014)	.001(.024)	.006(.010)
<b>Population Growth</b>	-.027(.114)	.003(.008)	.007(.007)	.006(.011)	<b>-.025(.015)*</b>	.001(.007)
<b>Openness</b>	.330(.314)	<b>.037(.01)***</b>	<b>.036(.021)*</b>	.045(.033)	-.079(.051)	.017(.015)
<b>Tropical</b>	3.11(31.54)	<b>-.04(.01)***</b>		.019(.039)	.052(.369)	<b>-.015(.009)*</b>
<b>Inflation</b>	<b>-.01(.003)**</b>	-0.001(.001)	<b>-.001(.00)***</b>	<b>-.002(.00)**</b>	.0003(.001)	-0.001(.001)
<b>Human Capital (Primary)</b>	-0.006(.006)	.0003(.0003)	-0.0001(.001)	-0.001(.001)	.0002(.0003)	-0.0001(.00)
<b>Human Capital (Secondary)</b>	.003(.007)	.0004(.0003)	-0.0003(.0004)	.0002(.001)	.0002(.001)	<b>.001(.00)*</b>
<b>Military Expenditure</b>	-.114(.212)	.004(.003)	.003(.004)	-0.003(.005)	-0.002(.008)	.002(.002)
<b>Agricultural Growth</b>	<b>.128(.04)***</b>	<b>-.009(.004)**</b>	-0.002(.004)	<b>-.02(.01)***</b>	<b>-.006(.002)**</b>	-0.001(.002)
<b>Constant</b>		-.181(.497)	.486(.655)	-1.21(1.07)		.219(.151)
<i>Obs</i>	16	182	398	157	113	143
<i>R</i> <sup>2</sup>	.79	.17	.09	.21	.12	.10

*Notes:* Economic Growth (log of initial GDP) is the dependent variable. \*\*\*, \*\*, \* denote significance at 1%, 5% and 10% levels; respectively. Panel-corrected standard errors are in parentheses. Column (a) represents the analysis for the complete panel; Columns (b), (c), (d), (e), (f), (g), (h), (i), (j), (k) and (l) show analyses results for developing countries, developed countries, least developed countries, petroleum exporting countries, emerging markets/countries, Caribbean countries, Asian countries, European countries, American region countries, African countries and Muslim countries respectively. List of countries is available in the appendix.