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A NEXUS AMONG INSTITUTIONS, EDUCATION AND ECONOMIC GROWTH: AN ANALYSIS OF DEVELOPING COUNTRIES

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ABSTRACT

This study investigates linkages among institutions, education and economic growth empirically and theoretically and is based on panel data between 1996 and 2017. For the panel data, two-stage least squares (2SLS) regression analysis was used to estimate the results in developing countries. Rule of law, control of corruption, absence of violence and political stability were used as proxies for institution. We found that economic growth exerted positive and significant effects on education, control of corruption, absence of violence and political stability. Rule of law, absence of violence, political stability and control of corruption have positive and significant effects on education, and education has a negative and significant effect on absence of violence and political stability but a positive and significant effect on rule of law and economic growth. Hence, results show that institutions positively affect economic growth through education and a difference in institutional quality is the key to differences in education among countries.

Contribution/Originality: This study contributes to existing literature by exploring theoretical channels among institutions, education and economic growth in developing countries. It also provides a systematic analysis of the relationship among variables by examining endogeneity. It shows that institutions indirectly affect economic growth through education.

1. INTRODUCTION

There is a debate in social science about the reasons for differences in economic growth and economic development among countries. Why are some countries rich while others are poor? Why are some countries stagnant while others achieve faster economic growth? Economists have accepted that per capita income in a country is closely linked to the amount of physical capital, human capital and technology in a country.

Education raises productivity and efficiency, and is transferred in the form of knowledge, ideas, habits and skills from one generation to next with the help of training, teaching and research. According to an endogenous growth model, long-term growth is determined inside the model (Romer, 1990). He assumed that the formation of new ideas is a direct function of human capital and usually proxied by education variables. The theory also placed emphasis on positive externalities of a knowledge-based economy, which leads to economic development.

However, differences in physical capital, human capital and technology are only proximate reasons in the way that they raise the question regarding why some nations have less physical capital, human capital (education,

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training and skills) and technology. Why do some countries not fully utilize their opportunities and factors? These reasons explain proximate differences among countries; however, we need to find potential reasons for the differences in physical capital, human capital and technology among countries. In this manner, we build an argument that institutional quality is the main reason for economic growth and development differences nationwide.

North (1991) explained that institutions comprise both formal rules and informal limitations. Formal rules include property rights, constitutions and laws, and informal limitations are taboos, customs, traditions, sanctions and codes of conduct. Neoclassical economic theory is criticized for ignoring the role of institutions during the late 1960**s** and the early 1970s by North. Many problems of economic development in Third World countries can be better understood by considering the role of institutions, incorporating institutions into economic models and by knowing the political processes. Institutional economics has now strongly placed the role of institutions on economic performance on the economic policy plan in many developing nations. Hence, institutional economics offers alternative explanations for the differences in the economic performance of developing and developed countries. Many studies provide confirmation that institutional quality is a key factor for a well-functioning market economy and is vital for sustained growth and development.

The study analyzes the linkages among institutions, education and economic growth empirically, and theoretically, in developing countries.

The rest of the study is organized as follows: Section 2 reviews the literature, research design and methodology are contained in Section 3, Section 4 provides the results and discussion, the concluding remarks are in Section 5 and suggestions are provided in Section 6.

2. LITERATURE REVIEW

One view is that there is a significant and positive relationship between education and economic growth. Mincer (1984); Galor and Tsiddon (1997); Asteriou and Agiomirgianakis (2001); Baldacci, Clements, Gupta, and Cui (2008); Isola and Alani (2012); Oancea, Pospíšil, and Drăgoescu (2017) argued that stock of human capital (education) is a key determinant of economic development. Krueger and Lindahl (2001) found a positive connection between education (average years of schooling) and economic growth after adjusting for measurement error. Lee and Kim (2009) recommended that tertiary education, technology and institutions are the determinants of long run economic growth only for high- and upper middle-income countries. They found that secondary education and institutions are significant factors for growth in lower income countries.

In spite of strong evidence of a positive relationship between education and economic growth, controversy still exists among researchers and debate is ongoing. Appiah and McMahon (2002) and Costantini and Monni (2008) found a negative association between education and economic growth. Pritchett (2001) showed that the link between human capital (education) and economic growth is negative and statistically significant due to poor institutional and educational quality.

To the contrary, some studies have found an insignificant relationship between education and economic growth. After their analysis, Benhabib and Spiegel (1994) reported that human capital has an insignificant effect on per capita income growth rates but total factor productivity growth rate depends on a country's stock of human capital. Rogers (2008) argued that human capital has no effect on income levels due to incapability of using schooling efficiently and productively. Wang and Liu (2016) found a positive and significant impact of higher education on economic growth but primary and secondary education do not have an important effect on economic growth.

Over the previous few years, a link has been established between institutional quality and economic growth. Keefer and Knack (1997) showed that poor countries are falling behind rather than catching up due to the poor quality of institutions (i.e., corruption, rule of law, contract rejection and the risk of expropriation). Acemoglu,

Johnson, and Robinson (2001) claimed that differences in colonial experience could be a reason for differences in institutions. Al-Marhubi (2004) investigated countries with British mutual law roots and a past of Western European influence and found that they have improved governance. Eicher, García-Peñalosa, and Van Ypersele (2009) found that institution-led development is only likely in highly educated countries and occurs when inequality is high. Development is education-led when the distribution of wealth is more equal. Law, Lim, and Ismail (2013) indicated that there is a bi-directional causality between institutions and economic development and it varies at different levels of income. In higher income countries, better institutional quality promotes economic development, while economic development is likely to improve the quality of institutions in lower income nations. Flachaire, García-Peñalosa, and Konte (2014) explored political institutions and set the platform in which economic institutions operate.

Some studies explained relationships between education and institutions. Osipian (2009) found a positive relationship between partial privatization of higher education and more opportunities for corruption because of unacceptably low pay and exploiting the privileged. Rontos, Syrmali, and Vavouras (2015) found that a highly educated population is expected to contribute more to public decision making and claimed enhanced quality of institutions.

Bouzahzah, Asongu, and Jellal (2016) demonstrated that both human capital accumulation and institutions are causes of positive economic development. They emphasized the positive direct channel through which educational quality makes individuals more productive. As a result, institutional quality has a double advantage, which was a recommended significant advantage for educational improvements. This study does not provide any empirical evidence.

Although strong evidence of the positive relationship between education and economic growth exists, there is still controversy among researchers. In some studies, a negative or insignificant relationship between education and economic growth has been found (Appiah & McMahon, 2002; Benhabib & Spiegel, 1994; Costantini & Monni, 2008; Rogers, 2008), while in other studies a positive relationship between these two variables was found (Asteriou & Agiomirgianakis, 2001; Baldacci et al., 2008; Krueger & Lindahl, 2001). Exogenous variables used in these studies differed greatly from country to country.

In the last few decades, an entirely separate line of inquiry focusing on the role of institutional quality in promoting growth and better development outcomes has developed (North, 1991). It is expected that differences in education, productivity and therefore differences in income are driven by differences in institutions and government policies. These three strands of research regarding institutions, education and economic growth have run in parallel without clear recognition of each other.

Given the intense debate about institutional consequences of educational differences, there is no systematic analysis of the relationship among institutions, education and economic growth. Previous studies have presented that economic growth rate is determined by educational levels or that the rate of economic growth depends on institutional quality. The present study will expand the current literature by exploring a systematic empirical linkage among these three variables in such a way that economic growth rate depends on education and education itself depends on the quality of institutions, which further promotes the rate of economic growth. It means that institutional quality ultimately results in differences among countries.

3. RESEARCH DESIGN AND METHODOLOGY

If institution is difficult to define, it is even more difficult to measure. There is no consensus on the important dimensions of institution, although the survey by Durlauf, Johnson, and Temple (2005) considered low corruption, protection of property rights, political stability and rule of law vital for economic development.

3.1. Model Specification

To determine the linkages among institutions, education and economic growth, the following model will be estimated:

$$\ln Institution_{it} = \beta_1 + \beta_2 \ln Tax_{it} + \beta_3 \ln Trade_{it} + \beta_4 \ln AbsenceOfPoliticalRight_{it} + \beta_5 \ln PerCapitaGDPGrowth_{it} + \beta_6 \ln Education_{it} + \eta_1 \quad (1)$$

$$\ln Education_{it} = \beta_1 + \beta_2 \ln Institution_{it} + \beta_3 \ln PerCapitaGDPGrowth_{it} + \beta_4 \ln BirthRate_{it} + \beta_5 \ln IndustryEmp_{it} + \beta_6 \ln UrbanPopGrowth_{it} + \eta_2 \quad (2)$$

$$\ln PerCapitaGDPGrowth_{it} = \beta_1 + \beta_2 \ln Instituion_{it} + \beta_3 \ln Education_{it} + \beta_4 \ln GrossCapitalFormationGrowth_{it} + \beta_5 \ln Trade_{it} + \beta_6 \ln LifeExpctancy_{it} + \eta_3 \quad (3)$$

Some of the observations of some variables in the dataset are negative; therefore, the variables that had negative values were converted using the following formula:

$$\Upsilon = \ln (x + sqrt(x^2 + 1)), \text{ which is cited in Busse and Hefeker (2007).}$$

The descriptions of the variables used in Equations 1, 2 and 3 and their data sources are given below in Table 1.

Table 1. Description of the Variables and Data Sources

Variables	Definitions	Data Sources
Institution	Three proxies are used: Rule of law, absence of violence, political stability, control of corruption.	World Bank
Education	Three proxies are used for education: Gross enrolment ratio (both sexes) primary, secondary and tertiary.	WDI
Tax	Tax revenue as a percentage of GDP.	WDI
Trade	This is the aggregate of import and export of services and goods as a percentage of GDP.	WDI
Natural resources	Total natural resource rents as a percentage of GDP.	WDI
Absence of political right	This ranges from 1 to 7. Highest value means complete absence of political rights in a country.	Freedom House
Employment in industry	Industry employment as a percentage of total employment.	WDI
Labor force participation rate	Labor force participation as a percentage of the total population.	WDI
Birth rate	Crude birth rate per 1,000 people.	WDI
Urban population	Urban population as a percentage of the total population.	WDI
Life expectancy	Life expectancy from birth.	WDI
Growth rate gross fixed capital formation	Annual growth rate of gross fixed capital formation. This is calculated using constant local currency and is used as a physical capital proxy.	WDI
Civil liberty	This is an index and ranges from 1 to 7. Highest value means no civil liberty in a country.	Freedom House

3.2. Methodology

The 2SLS technique will be used to estimate above simultaneous model on an equation-by-equation basis. 2SLS estimates are more consistent and decreases simultaneity bias.

The Sargan–Hansen test is used to check over-identifying restrictions for panel data estimation. This is a test of the null hypothesis for instrumental variables estimation that instruments are uncorrelated with the error term and correctly omitted from the estimated equation. It rejects doubt based on the validity of the instruments.

The Hausman test is possibly best interpreted not as a test for the exogeneity or endogeneity of regressors but rather as a test of the consequence (i.e., consistency) of endogeneity by using different estimation methods on the same equation. In this way, the Hausman test can be used to test endogeneity (Baum, Schaffer, & Stillman, 2003).

4. RESULTS AND DISCUSSION

Sixty-six developing economies have been chosen on the basis of IMF classification: Argentina, Armenia, Azerbaijan, Belarus, Belize, Bhutan, Bolivia, Bulgaria, Brazil, Botswana, Burundi, Cambodia, Cameroon, Chad, Colombia, Cuba, Djibouti, Dominican Republic, Eritrea, Georgia, Gabon, Gambia, Guatemala, Ghana, Guinea-Bissau, Guinea, Honduras, Haiti, Indonesia, India, Jamaica, Jordan, Kenya, Kazakhstan, Lao PDR, Lebanon, Malawi, Maldives, Malaysia, Mauritius, Mauritania, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Philippines, Peru, Rwanda, Romania, Samoa, Sri Lanka, Tajikistan, Turkey, Thailand, Zimbabwe, Zambia, Venezuela, Uganda, Ukraine and Uzbekistan.

Control of corruption, rule of law, political stability and absence of violence are used as proxies for institution. Primary, secondary and tertiary enrollment rates are used as proxy for education. The results shown in Table 2 were calculated when these proxies were used in Equation 1, which estimates the effects of education and economic growth on institutions. The results in Table 3 were calculated when these proxies were used in Equation 2, which estimates the effect of institutions and economic growth on education. The results in Table 4 were calculated when these proxies were used in Equation 3, which estimates the effect of institutions and education on economic growth.

Table 2. Effect of education and economic growth on institutions.

Variables	1.1 Control of corruption EC2sls	1.2 Control of corruption EC2sls	1.3 Control of corruption EC2sls	1.4 Rule of law EC2sls	1.5 Rule of law EC2sls	1.6 Rule of law EC2sls	1.7 Political stability & absence of violence FEIV	1.8 Political stability & absence of violence FEIV	1.9 Political stability & absence of violence FEIV
Tertiary enrollment rate	0.0262 (0.0691)			0.192** (0.0934)			0.284 (0.219)		
GDP per capita	0.0165* (0.00966)	0.0173** (0.00759)	-0.0175 (0.0451)	0.0170 (0.0109)	-0.0500 (0.0721)	0.00233 (0.0118)	0.0354* (0.0191)	0.0289* (0.0153)	0.0520 (0.116)
Tax	0.145*** (0.0459)	0.128*** (0.0451)	0.253*** (0.0594)	0.0241 (0.0506)	0.198*** (0.0471)	0.0558 (0.0615)	0.000350 (0.124)	0.151* (0.0893)	0.183* (0.111)
Absence of political right	-0.157*** (0.0309)	-0.143*** (0.0301)	-0.319*** (0.0934)	-0.166*** (0.0356)	-0.214*** (0.0503)	-0.277*** (0.0833)	-0.294*** (0.0779)	-0.278*** (0.0639)	0.0416 (0.317)
Trade	-0.116*** (0.0448)	-0.164*** (0.0429)	-0.0454 (0.108)	-0.237*** (0.0482)	-0.148*** (0.0563)	-0.203*** (0.0533)	-0.484*** (0.115)	-0.400*** (0.0785)	-0.469** (0.193)
Secondary enrollment rate		0.0755 (0.0958)			0.253** (0.108)			-0.572*** (0.210)	
Primary enrollment rate			-0.645 (0.425)			-0.467 (0.448)			1.398 (1.206)
Constant	-0.297 (0.240)	-0.240 (0.363)	2.496 (1.856)	0.361 (0.264)	-0.804 (0.581)	2.823 (2.184)	1.189*** (0.460)	3.651*** (0.866)	-5.392 (5.471)
Sargan–Hansen probability	0.0905	0.0527	.8565	0.6754	0.7952	0.5012	0.8637	0.1452	0.5966
Hausman test of probability (FEIV vs. EC2sls)	0.8332	0.7360	0.9987	1	0.3942	0.5239	0	0	0.0039
Observations	450	479	590	449	513	543	450	479	591
Countries	50	50	52	50	52	49	50	50	52

Note: Standard errors are given in parentheses, *p < 0.1, **p < 0.05, ***p < 0.01.

In Table 2, time dummies are significant in 2sls regressions (1.1, 1.4 and 1.5). In regression 1.1, the Hausman test of probability for FE-RE and EC2sls-RE are 0.9918 and 0.00, respectively. In 2sls regression 1.2, the Hausman test of probability for FE-RE and EC2sls-RE are .7851 and 0.00, respectively. In 2sls regression 1.3, the Hausman test of probability for FE-RE, EC2sls-RE and FEIV-FE are 0.0061, 0 and 0.0029, respectively. Gross capital formation, birth rate and industry employment are used as instruments in 2sls regressions 1.1 and 1.2; and in 2sls regression 1.3, urban population growth, civil liberty, natural resources and industry employment are used as instruments. In 2sls regression 1.4, the Hausman test of probability for FE-RE and EC2sls-RE are 0.9448 and 0.00, respectively. In 2sls regression 1.5, the Hausman test of probability for FE-RE and EC2sls-RE are 0.8086 and 0.00, respectively. In 2sls regression 1.6, the Hausman test of probability for FE-RE and EC2sls-RE are 0.6682 and 0.00, respectively. Natural resources, civil liberty, gross capital formation and labor force participation rate are used as instruments in 2sls regression 1.4; life expectancy, industrial employment and urban population are used as instruments in 2sls regression 1.5; and birth rate, urban population and labor force are used as instruments in 2sls regression 1.6. In 2sls regressions 1.7, 1.8 and 1.9, the Hausman test of probability for FE-RE and FEIV-FE are 0.00 and 0.00, respectively. Industrial employment, civil liberty, labor force participation and gross capital formation are used as instruments in 2sls regression 1.7; birth rate, urban population and gross capital formation are used as instruments in 2sls regression 1.8; and urban population, birth rate, life expectancy, industry employment and labor force participation rate are used as instruments in 2sls regression 1.9.

A positive and significant relationship between per capita income and control of corruption was found. The demand for effective control of corruption goes up automatically when the level of economic development increases (Alonso & Garcimartín, 2013; Rontos et al., 2015). Income and education raise political participation, the nation's awareness of public servants' illegal acts and increased ability to take action against these public officials (Glaeser & Saks, 2006).

A negative and significant relationship between trade openness and control of corruption was found. Two reasons for this are as follows:

- Growth of international trade increases payment of bribes (frequently called commissions). Firms offer bribes for access to profitable agreements over their rivals to get tax incentives or to gain privileged entry to markets. When paying bribes is instigated it puts pressure on other countries to do the same and contracts are lost as a cost of not paying bribes. In many countries, particularly developing countries, the role of the government is frequently implemented through rules and regulations and, in some cases, the rules are non-transparent. Public officials may refuse or delay decisions for a longer period to extract bribes in return for much needed approval (Tanzi, 1998).

- Countries that trade more with corrupt exporters are expected to be more corrupt (Hisamatsu, 2003).

It is found that tax has a positive effect on control of corruption, rule of law, absence of violence and political stability. If a government tries to generate revenue from taxes they are considered to be more accountable for their nation (Altunbas & Thornton, 2011; Brautigam, Fjeldstad, & Moore, 2008; Moore, 2004).

This study found that absence of political right has a negative effect on control of corruption, rule of law, absence of violence and political stability. Freedom of press, and open and systematic electoral competitions can increase the chances of revealing corrupt deeds (Badinger & Nindl, 2014).

A positive and significant relationship between education (secondary and tertiary enrollment) and rule of law was found. If institutions (political freedom and rule of law) in an independent country are not of good quality then their leaders and citizens can help to develop them using their own abilities and education (Rindermann, 2008).

An inverse relationship was found between trade and rule of law; trade negatively affects rule of law through income inequality. Trade openness is positively correlated with income inequality (Adams, 2008; Milanovic, 2005), and income inequality is inversely related to the security of contractual and property rights (Keefer & Knack, 2002).

A negative relationship was found between secondary education, absence of violence and political stability. Those who have completed secondary education and are either underemployed or unemployed are the most inclined to be violent, and consequently, education coupled with underemployment or unemployment is linked with more radicalization (Bhatia & Ghanem, 2017). Other studies explained that young individuals who complete primary or secondary education do not have any relevant skills required in the job market and do not get better jobs (Dagume & Gyekye, 2016); therefore, unemployment increases the incidence of violence (Adekoya & Razak, 2018).

An inverse relationship was found between trade and political stability and violence; trade inversely affects the absence of violence and political stability through income inequality, and trade shares in GDP have a negative effect on the distribution of income (Adams, 2008; Milanovic, 2005). High income inequality could potentially replace democratic institution by authoritarian regime (Muller, 1988).

Table 3. Effect of economic growth and institutions on education.

Variables	2.1 Tertiary enrolment EC2sls	2.2 Secondary enrolment EC2sls	2.3 Primary enrolment EC2sls	2.4 Tertiary enrolment EC2sls	2.5 Secondary enrolment EC2sls	2.6 Primary enrolment EC2sls	2.7 Tertiary enrolment EC2sls	2.8 Secondary enrolment EC2sls	2.9 Primary enrolment EC2sls
Control of corruption	0.813*** (0.308)	-1.128 (0.741)	0.0992 (0.0841)						
GDP per capita	-0.106 (0.0908)	0.371** (0.160)	0.109** (0.0469)	-0.142 (0.119)	-0.00801 (0.00744)	0.00187 (0.0144)	-0.091*** (0.0295)	-0.0102 (0.00784)	-0.00488 (0.0181)
Industrial employment	0.276** (0.140)	0.498** (0.230)	0.0380 (0.0475)	0.467*** (0.123)	0.190*** (0.0421)	-0.0241 (0.0502)	0.541*** (0.117)	0.247*** (0.0535)	-0.0572 (0.0405)
Birth rate	-1.285*** (0.269)	0.419 (0.371)	0.144* (0.0847)	-0.701*** (0.216)	-0.397*** (0.0875)	0.230** (0.0926)	-0.495*** (0.177)	-0.348*** (0.101)	0.224*** (0.0724)
Urban population	-0.131 (0.0952)	0.0655 (0.0962)	0.0160 (0.0346)	-0.224** (0.103)	-0.0455** (0.0206)	-0.0514* (0.0310)	-0.242*** (0.0662)	-0.0408 (0.0268)	-0.0558* (0.0309)
Rule of law				0.443 (0.300)	0.156* (0.0814)	0.120* (0.0653)			
Political stability & Absence of violence							0.166	0.102*	0.0530
Constant	6.149*** (1.127)	-0.170 (1.923)	3.949*** (0.342)	3.587*** (0.892)	4.846*** (0.358)	4.129*** (0.365)	2.738*** (0.742)	4.495*** (0.412)	4.232*** (0.269)
Hausman probability (FEIV vs. EC2sls)	0.5098	0.2557	0.8753	1	1	0.2035	0.5760	0.6191	0.3829
Sargan–Hansen probability	0.0709	1	0.4638	0.1682	0.9022	0.2242	0.134	0.9399	0.2596
Observations	714	818	592	731	517	543	658	479	586
Countries	62	65	52	65	51	49	58	50	50

Note: Standard errors are given in parentheses, *p < 0.1, **p < 0.05, ***p < 0.01.

In Table 3, time dummies are significant in 2sls regressions 2.1, 2.2, 2.4 and 2.5. In 2sls regression 2.1, the Hausman test of probability for FE-RE and EC2sls-RE are 0.5861 and 0.00, respectively. In 2sls regression 2.2, the Hausman test of probability for FE-RE and EC2sls-RE are 0.3516 and 0.00, respectively. In 2sls regression 2.3, the Hausman test of probability for FE-RE, EC2sls-RE are 0.9891 and 0.0212, respectively. Political right, civil liberty and trade are used as instruments in 2sls regression 2.1; civil liberty, labor force and life expectancy are used as instruments in 2sls regression 2.2; and tax, political right and labor force are used as instruments in 2sls regression 2.3. In 2sls regression 2.4, the Hausman test of probability for FE-RE and EC2sls-RE are 0.3380 and 0.00, respectively. In 2sls regression 2.5, the Hausman test of probability for FE-RE and EC2sls-RE are .7184 and 0.00, respectively. In 2sls regression 2.6, the Hausman test of probability for FE-RE and EC2sls-RE are 0.9808 and 0.00, respectively. Natural resource, labor force participation rate, civil liberty and trade are used as instruments in 2sls regression 2.4; and trade, tax and gross capital formation are used as instruments in 2sls regressions 2.5 and 2.6. In

2sls regression 2.7, the Hausman test of probability for FE-RE and FEIV-FE are 0.0005 and 0.00, respectively. In 2sls regression 2.8, the Hausman test of probability for FE-RE and FEIV-FE are 0.00 and 0.00, respectively. In 2sls regression 2.9, the Hausman test of probability for FE-RE and FEIV-FE are 0.00 and 0.0026, respectively. Industrial employment, civil liberty, labor force participation and gross capital formation are used as instruments in 2sls regression 2.7; birth rate, urban population and gross capital formation are used as instruments in 2sls regression 2.8; and urban population, birth rate, life expectancy, industry employment and labor force participation rate are used as instruments in 2sls regression 2.9.

A positive relationship was found between control of corruption and education (tertiary enrollment rate); corruption is more likely to hinder educational progress (Huang, 2008). Corruption in higher education includes ghost instructors, misuse of university property, nepotism, favoritism, cheating, unauthorized private tutoring and research misconduct (Osipian, 2009).

A positive and significant relationship was found between industry employment and education (secondary and tertiary enrollment rates). This means that industry requires more educated workers; the same result was achieved when the three proxies of institution were used.

A positive and significant relationship was found between primary enrollment rate and birth rate, but a negative and significant relationship was found between secondary and tertiary enrollment rates and birth rate. A large number of children were enrolled in primary school, but the rate at which children drop out of school is still high in many low income countries where over half of children who enroll in primary school do not complete their education (Sabates, Hossain, & Lewin, 2013). The primary enrollment rate increases as the birth rate increases, but due to the high dropout rate, low quality of education, the need for school-age children to take care of their younger siblings and the high cost of education, secondary and tertiary enrollment rates decrease.

A significant and positive relationship was found between rule of law and education (primary and secondary enrollment rates). States with better institutions have fewer distortionary policies and more secure property rights, which leads to more investment in human and physical capital and, consequently, achieves a higher level of income (Acemoglu et al., 2001).

A negative and significant relationship was found between urban population growth rate and education (primary and tertiary enrollment rates). Reasons for this are poor quality of education, insufficient educational institutions relative to the urban population growth rate and the high cost of education.

In Table 4, time dummies are significant in 2sls regressions 3.1, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8 and 3.9. In 2sls regression 3.1, the Hausman test of probability for FE-RE and EC2sls-RE are 0.9046 and 0.0018, respectively. In 2sls regression 3.2, the Hausman test of probability for FE-RE, EC2sls-RE and FEIV-FE are 0.0123, 0.000 and 0.0002, respectively. In 2sls regression 3.3, the Hausman test of probability for FE-RE and EC2sls-RE are 0.4407 and 0.0001, respectively. Industry employment, urban population, birth rate and civil liberty are used as instruments in 2sls regression 3.1; tax, political right, urban population, industry employment and birth rate are used as instruments in 2sls regression 3.2; and political right, tax and urban populations are used as instruments in model 3.3. In 2sls regression 3.4, the Hausman test of probability for FE-RE and EC2sls-RE are 0.8716 and 0.0020, respectively. In 2sls regression 3.5, the Hausman test of probability for FE-RE, FEIV-FE and EC2sls-RE are 0.0001, 0.00 and 0.00, respectively. In 2sls regression 3.6, the Hausman test of probability for FE-RE and EC2sls-RE are 0.2496 and 0.0013, respectively. Political right, industrial employment, urban population and gross capital formation are used as instruments in 2sls regression 3.4; urban population, political right, tax and industrial employment are used as instruments in 2sls regression 3.5; and urban population, political right and tax are used as instruments in 2sls regression 3.6. In 2sls regression 3.7, the Hausman test of probability for FE-RE, EC2sls-RE are 0.5441 and 0.0162, respectively. In 2sls regression 3.8, the Hausman test of probability for FE-RE and EC2sls-RE are 0.2902 and 0.00, respectively. In 2sls regression 3.9, the Hausman test of probability for FE-RE, FEIV-FE and EC2sls-RE are 0.00, 0.00 and 0.0005, respectively. Political right, urban population, birth rate, industry

employment and labor force participation rate are used as instruments in 2sls regression 3.7; civil liberty, industry employment and tax are used as instruments in 2sls regression 3.8; and tax, political right and urban population are used as instruments in 2sls regression 3.9.

Table 4. Effect of institutions and education on economic growth.

Variables	3.1 GDP per capita EC2sls	3.2 GDP per capita EC2sls	3.3 GDP per capita EC2sls	3.4 GDP per capita EC2sls	3.5 GDP per capita EC2sls	3.6 GDP per capita EC2sls	3.7 GDP per capita EC2sls	3.8 GDP per capita EC2sls	3.9 GDP per capita EC2sls
Control of corruption	-0.0631 (0.318)	0.0513 (0.297)	0.280 (1.022)						
Tertiary enrollment	0.629*** (0.236)			0.637*** (0.241)			0.547** (0.225)		
Life expectancy	-4.032** (1.931)	-3.752** (1.662)	-3.610 (4.107)	-4.155** (1.949)	-3.833** (1.765)	-1.330 (2.362)	-3.432** (1.741)	-4.720* (2.628)	-2.522 (2.259)
Trade	0.0659 (0.158)	0.0410 (0.185)	-0.293 (0.283)	0.0600 (0.163)	0.0431 (0.192)	-0.222 (0.254)	0.0638 (0.160)	-0.0429 (0.239)	-0.173 (0.251)
Gross fixed capital	0.217*** (0.0184)	0.265*** (0.0194)	0.252*** (0.0209)	0.216*** (0.0183)	0.264*** (0.0193)	0.255*** (0.0195)	0.216*** (0.0181)	0.258*** (0.0190)	0.245*** (0.0195)
Secondary enrollment		0.874* (0.473)			0.928* (0.511)			1.355* (0.721)	
Primary enrollment			0.656 (1.454)			0.859 (1.344)			-0.211 (1.291)
Rule of law				0.000238 (0.244)	-0.107 (0.297)	-0.164 (0.548)			
Political stability & absence of violence							0.0435 (0.185)	0.0349 (0.316)	0.655* (0.386)
Constant	16.25** (7.715)	13.14** (5.584)	14.48 (19.34)	16.80** (7.767)	13.21** (5.902)	3.581 (13.01)	14.00** (6.861)	15.63* (8.826)	13.54 (12.03)
Hausman test of probability (FEIV vs. EC2sls)	0.1949	0.9632	1	0.1775	0.9797	1	0.1654	0.6191	1
Sargan–Hansen prob	0.0863	0.119	0.3146	0.0965	0.1388	0.1591	0.06	0.9399	0.2424
Observations	658	479	543	658	479	543	658	492	543
Countries	58	50	49	58	50	49	58	51	49

Note: Standard errors are given in parentheses, *p < 0.1, **p < 0.05, ***p < 0.01.

A positive and significant relationship was found between education (secondary and tertiary enrollment rate) and per capita income; education increases per capita income by improving productivity (Asteriou & Agiomirgianakis, 2001; Baldacci et al., 2008; Krueger & Lindahl, 2001).

A negative and significant relationship was found between life expectancy and per capita income growth rate. A higher life expectancy leads to an increase in health costs and, consequently, it reduces savings and economic growth (Tabata, 2005).

Kunze (2014) reported that the growth effect is unambiguously negative with operative bequests as the effects of reduction in the number of bequests individuals give to their children outweigh the positive effects of saving, indicating a slowdown of physical capital accumulation along with the direct negative effect of reduced spend on private education. A positive and significant relationship was found between gross capital formation and GDP growth per capita. This indicates that investment in physical capital leads to economic growth.

5. CONCLUSION

Institutional economics has strongly emphasized the role of institutions in the economic development of many developing nations. This study had two objectives; one was to find empirical linkages among institutions, education and economic growth in developing countries. Three proxies of institution were used: control of corruption, rule of law and political stability and violence. Primary, secondary and tertiary enrollment rates were used as education proxies. Per capita income was shown to have positive and significant effects on control of corruption, but this does not apply vice versa. Control of corruption has a positive and significant effect on education (tertiary enrollment rate) but this is not true vice versa.

Education (secondary and tertiary enrollment) has a positive and significant effect on rule of law and rule of law also has a positive and significant effect on education (primary and secondary enrollment). Education (secondary enrollment) has negative and significant effect on absence of violence and political stability, and absence of violence and political stability have a positive and significant effect on secondary enrollment rate.

Economic growth has a positive and significant effect on absence of violence and political stability and this is also true vice versa. Education (secondary and tertiary enrollment) has a positive and significant impact on economic growth in all cases. The second objective was to explore theoretical linkages among institutions, education and economic growth.

Per capita income curbs corruption in a way that voters with a higher income are more willing to observe government officials and to take action when these government officials break the law (Glaeser & Saks, 2006). Corruption hinders educational progress (Huang, 2008; Osipian, 2009). States with better institutions have more secure property rights. This leads to more investment in human capital and, as a result, achieves a higher level of income (Acemoglu et al., 2001). Leaders and citizens, using their abilities and education, can develop better institutions, which further increases economic growth (Rindermann, 2008).

6. SUGGESTIONS

- Governments should ensure transparency and accountability of public officials through appropriate planning, implementation, monitoring corruption and providing an effective justice system.
- Free education should be provided at primary and secondary level, or at least some merit-based scholarships should be offered if it is affordable.
- There should be direct counselling of students and parents on the return to education to increase attendance and enrollment in schools.
- People should be encouraged to continue with career-specific training or further education in order to acquire new skills according to changing work environments.
- Offering training workshops, increased salaries for teachers and awards for exceptional teaching will improve education standards.
- There should be freedom of press, transparency and open access to information to increase the responsiveness of government organizations and the levels of public participation in a country.

In practice, it is challenging to discover valid but strong instrumental variables. This is time-consuming and not very rewarding. If instruments are acceptable, then the precision of ordinary least squares (OLS) estimates is higher than instrumental variables (IV) estimates. Future research can be conducted to discover more valid instruments.

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