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Human Capital and Economic Growth Nexus: Does Corruption Matter?

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Abstract

This paper investigates the human capital and economic growth nexus in the presence of corruption for a disaggregated sample of developed and developing economies, and East, West, and South Asia. For the purpose, Dynamic Panel Data (DPD) and the Generalized Method of Moments (GMM) are employed. The findings provide inferences that human capital positively affects economic growth even though for some groups of economies, corruption boost up economic growth while for some others, it retards the economic growth. The results also suggest that an augmented Solow production function is best fitted to the data. The population growth rate negatively affects economic growth for all economies, but democracy has mixed effects for the groups of the economies.

Keywords: corruption, human capital, democracy, population growth, economic growth

1. Introduction

Human capital is a crucial productive factor in neoclassical models of exogenous growth (Mankiw et al., 1992). Other endogenous growth models consider that human capital accumulation facilitates the adoption, creation, and diffusion of technology, which enhances the economic growth (Benhabib & Spiegel, 1994). There is a large body of literature that has revealed that one of the most important factors of economic growth is human capital (Mankiw et al., 1992). Ahmed and Khan (2018) evidenced that human capital positively influences the economic growth of all the income groups and regions globally. However Cadil et al. (2014) found no clear positive effect of human capital on economic growth. Similarly, Vijesandiran and Vinayagathasan (2015) analyzed the dynamic linkage between human capital and economic growth in Sri Lanka and concluded that human capital had no significant relationship with economic growth in Sri Lanka. The negative effect of human capital on economic growth in cross sectional studies (Benhabib & Spiegel, 1994; Pritchett, 2001) and panel studies (Kumar, 2006) created the interest in exploring the possible explanations. They were identified as measurement errors (Krueger and Lindhal, 2001), and data quality (Cohen & Soto, 2007; de La Fuente & Donenech, 2000). Further, for such type of explanation, the researchers also worked with alternative estimation methodologies (Freire-Seren, 2002). Some of the studies emphasized on economic reasons for the phenomenon. Rogers (2008) explained that country specific characteristics such as corruption, black market premium and brain drain make human capital unproductive while Schündeln and Playforth (2014) emphasized the need to consider the social returns to human capital.

The debate on the effect of corruption on economic growth is of considerable importance. Economists hold heterogenic views regarding the role of corruption in economic growth and they empirically produced a mixed effect of corruption on economic growth. There are mainly two opposing schools of thoughts. The sanders "sand the wheel" consider that corruption negatively influences the economic growth by deterring the investment, human capital and institutional inefficiencies. The greasers "grease the wheel" are of the view that in some cases corruption can enhance the efficiency and foster the economic growth.

A variety of literature exists on corruption and growth. Mauro (2004) found that corruption adversely affects investment, which retards economic growth. Meon and Sekkat (2005) found a negative effect of corruption on growth and investment. Anoruo and Braha (2005) revealed that corruption retards economic growth directly by lowering productivity and indirectly by restricting investment in Africa. Swaleheen (2011) found that corruption had a negative and nonlinear effect on the growth rate of real per capita income. Dridi (2013) concluded that negative effect of corruption on economic growth is transmitted by its impact on human capital and political instability.

The studies led by Leff (1964) and Huntington (1968) claimed that bribery and corruption could have positive effects. The efficiency-enhancing strand views corruption as increasing efficiency because corruption "greases the wheels." Meon and Weill (2010) found a positive effect of corruption on growth in the countries having weak political institutions and bad governance. However, the negative effect of corruption on growth exists in countries with strong political institutions and good governance. Virta (2010) added that the effect of corruption on economic growth, either negative or positive mainly depends on the country and regional context. Ahmad et al. (2012) revealed that a decrease in corruption raises growth and corruption has been found less detrimental to efficiency where institutions are less effective in the economies. Huang (2016) showed that there was a significant positive causality running from corruption to economic growth in South Korea.

To explore the interference of corruption in the relationship between human capital and economic growth can explain the role of corruption in determining the economic growth of the countries. The objective of this paper is to see the human capital and economic growth nexus in the presence of corruption. It is worth mentioning that while debating on grease versus sand the wheel hypothesis, we ignore the moralistic view that condemns the corruption. Moral judgment may be biased, while in economic or realistic view, we can evaluate the consequence of corruption. To access the robustness of the results, the heterogeneity check is employed by considering the level of economic development and dividing the sample into developed and developing economies and then segregating the data into West, East and South Asia.

2. Methodology

The neo-classical growth theory considers gross fix capital formation and human capital as the main determinants of economic growth, while population growth adversely affects economic growth (Mankiw et al., 1992). Barro (1999) explained that democracy also matters in the growth process. This study is going to follow the extension of Solow (1956) growth model's production function formulated by Mauro (1995). The extended variable in production function is corruption that affects the growth path. The measurement of corruption is hard with a single proxy variable because each society has diverse sources of corruption and dynamics (Kaufmann et al., 2000). The International Country Risk Guide (ICRG) corruption index is considered a comprehensive index to quantify corruption. Under the extended Solow growth model, the functional equation of the model is given as:

$$GROWTH = f\,(HCAP, CORRP, GFCF, POP, DEMOC) \quad \ldots\ldots\ldots\ldots \quad (1)$$

Where, GROWTH = Growth rate of GDP per capita, HCAP = Human capital, CORRP = Incidence of corruption, GFCF = Gross fixed capital formation, POP = Population growth and DEMOC = Democracy.

The operational measurement of the variables and source of data are shown in table 1.

Table1: Measurement of Variables and Source of Data

Variable	Measurement	Source
GROWTH (Economic Growth)	Annual percentage growth rate of GDP per capita based on constant 2010 U.S. dollars.	World Development Indicators (World Bank 2018)
GFCF (Gross Fixed Capital Formation)	Gross fixed capital formation investment as percentage of GDP	World Development Indicators (World Bank 2018)
HCAP (Human Capital)	Human capital index constructed by multiplying mean years of schooling and rate of return on education	Penn World (2018)
POP (Population Growth Rate)	Annual population growth rate	World Development Indicators (World Bank 2018)
DEMOC (Democracy)	Average of political right and civil liberty	Freedom House (2018)
CORRP (Corruption)	Corruption index	International Country Risk Guide (2018)

The idea of corruption's effect on economic growth is intuitively appealing; however, many econometric challenges may arise such as heterogeneity, endogeneity and autocorrelation. First, the time invariant heterogeneity among countries regarding culture and religion has a prominent role in clarifying the cross-country variation in corruption (Treisman, 2000). Second, endogeneity is likely to be a serious problem between corruption and growth relationship. In traditional growth regression analysis, it may occur due to omitted variables measurement error (Acemoglu et al., 2009). Auto correlated error, simultaneity, or reverse causality can also cause endogeneity. Third, after including the lag dependent variable, serial correlation may worsen the problem of endogeneity. Fourth, there is a possibility that corruption measure may be biased.

In the presence of all these limitations, in the literature, the dynamic panel data with GMM is used as GMM is very well tailored to deal with such kind of issues. GMM estimation technique developed by Hansen and Singleton (1988) is free from unwanted assumption such as to specify a particular distribution for the errors term. To alleviate endogeneity, it seeks no "external" instruments, and for the model, it follows the linear moment.

$$GROWTH_{it} = \beta_0 + \beta_1\ LagGROWTH_{it} + \beta_2\ HCAP_{it} + \beta_3\ CORRP_{it} + \beta_4\ GFCF_{it} + \beta_5\ POP_{it} + \beta_6\ DEMOC_{it} + \mu_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ (2)$$

The regression equation (2) is dynamic after the inclusion of the lagged value of GDP per-capita growth rate as an independent variable. It is included in the model as per the need of dynamic panel model and to observe the convergence effect as mentioned in the neo-classical growth model.

As pre-estimation test to capture the endogeneity, Durbin-Wu-Hausman specification test is applied. Since lagged values are used as instruments, specification tests for the dynamic panel data model are required, so we perform in the absence of second-order serial correlation in the error term (Arellano & Bond, 1991). We also perform the Sargan test (validity test of instrumental variables) and Hansen test (over identifying test of instruments). Wald test for the significance of the variables as post estimation test is also applied.

3. Results and Discussion

The results of GMM estimation are presented in table 2.

Table 2: Results of GMM Estimation for Economic Growth

Dependent Variable = GROWTH (GDP per-capital growth rate)					
Explanatory Variables	**GMM Results**				
	Developing Economies	**Developed Economies**	**West Asia**	**East Asia**	**South Asia**
LAGGROWTH (Lag of Economic Growth)	0.405472 [9.003439] (0.0000)***	0.445078 [9.387609] (0.0000)***	0.439370 [6.074516] (0.0000)***	0.084551 [0.869986] (0.3861)	0.225589 [2.520689] (0.0131)***
CORRP (Corruption)	-1.342671 [-1.628312] (0.1028)	-0.081301 [-1.943750] (0.0591)**	-1.145262 [-2.285311] (0.0236)**	1.125262 [2.085360] (0.0246)**	0.740434 [1.640982] (0.1039)
HCAP (Human Capital)	0.255308 [1.775069] (0.0767)*	0.073571 [2.248276] (0.0238)**	1.243277 [1.986011] (0.0510) **	0.050875 [2.143457] (0.0336)**	2.531863 [1.96210] (0.0516)**
GFCF (Gross Fixed Capital Formation)	0.109583 [6.269639] (0.0000)***	0.168079 [5.57993] (0.0000)***	0.056425 [0.961176] (0.3379)	0.246012 [6.201010] (0.0000)***	0.072935 [1.961476] (0.0521)**
POP (Population Growth)	-2.426453 [-1.921329] (0.0553)**	0.282797 [1.23738] (0.22167)	-1.016633 [-2.358040] (0.0188)***	-0.083808 [-1.127040] (0.02688)**	-0.433089 [-2.55975] (0.0108)***
DEMOC (Democracy)	-0.197570 [-1.505083] (0.1330)	0.062935 [1.951476] (0.0531)**	-0.0007587 [-2.000603] (0.0461)**	-4.261123 [-1.530542] (0.1285)	0.043591 [1.986600] (0.0477)**
Constant	2.406453 [1.91229] (0.0553)**	-3.279039 [-3.389698] (0.0008)***	5.604891 [2.517173] (0.02313)**	-3.27123 [-1.730562] (0.1086)	-1.269294 [-0.524147] (0.6011)
R^2	0.109887	0.097817	0.103964	0.271748	0.061409
Adjusted R^2	0.103777	0.090965	0.087574	0.253840	0.038329
No. of Observation	420	380	160	120	120
No. of Countries	21	19	8	6	6
Hausmen Value[a]	0.0000	0.0000	0.0000	0.0000	0.0000
Sargan Test[b] (p-value)	0.315	0.993	0.405	0.240	0.130
Hansen test[c] (p-value)	0.302	0.452	0.068	0.978	0.261
AR1[d]	0.005	0.001	0.053	0.144	0.038
AR2	0.019	0.645	0.365	0.058	0.266
Wald Test[e] (p-value)	0.2228	0.0091	0.0236	0.0236	0.1039

Note: t-values are in parenthesis.
a. For endogeneity: H_0 = endogeneity does not exist; H_1 = endogeneity exists.
b. Sargan test for instruments validity: H_0 = instruments are valid; H_1 = instruments are not valid.
c. Hansen test for over identifying restrictions: H_0 = instruments are over identified; H_1 = instruments are not over identified.
d. AR (1) & AR (2) test for second-order serial correlation: H_0 = no autocorrelation; H_1 = autocorrelation.
e. For significance of variable: H_0 = significance exists; H_1 = significance does not exist. Second-order autocorrelation AR (2) fail to reject the null hypothesis of no autocorrelation.
***, ** and * denote significance levels at 1, 5 and 10 percent respectively.

The GMM estimation shows that coefficient of lagged growth positively and significantly affects the economic growth of all group of countries except East Asia. The coefficient of lagged growth shows no convergence effect, which reveals a large degree of persistence in economic growth rate.

The results show a negative effect of corruption on economic growth in developed countries and West Asian countries. It supports sanders hypothesis. It explains that due to corruption resources start diverting towards unproductive activities; especially human talent diverts towards other activities such as rent-seeking. Corruption is also considered as the feckless imposition of tax on agents hence it increases the cost of doing business as well as increase the transaction cost. Hence, economic growth is hampered by corruption.

In developing countries, the empirical result depicts that although the coefficient of corruption is negative but statically insignificant. For South Asia, corruption has shown no significant impact on economic growth. It is supported by Brunetti et al. (1998) and Triesman (2007) who failed to find any significant impact of corruption on growth. Similarly, Huang (2016) found no significant impact of corruption on growth for ASIAN-Pacific counties.

However, corruption has shown a positive impact on economic growth in East Asian countries. East Asia region has been characterized by growth-oriented policies accompanied by strong state holds. The exceptional phenomena of East Asian paradox persists in this region. Rock and Bonnett (2004) persuasively argue that corruption elevated rapid growth in East Asia region due to newly industrializing countries (NICs) and horizon of centralized government monopoly to control corruption. Some researchers go beyond the East Asian paradox and argued that by creating a parallel economic flow of speedy money and by acting as “greasing the wheels” corruption can have a positive effect.

The human capital positively affects the economic growth for all the groups of economies. It explains that knowledge accumulation brings new ideas and improve both productivity and the quality of products. The higher human capital encourages entrepreneurship and innovation, which leads to a higher growth rate (Dakhli & Clercq, 2004). The results validate not only the endogenous growth model but also the traditional growth theories which argue that the accumulation of human capital is responsible for sustained growth (Mankiw et al., 1992).

The gross fixed capital formation has shown a significant and positive effect on economic growth in all the economies except West Asia, where the sign is positive but insignificant. Growth models by Mankiw et al. (1992) explained that capital accumulation results in a permanent increase in growth rate. Harrod Domar model described the economic mechanism by which more investment leads to more growth. For a country to develop and grow, it must divert part of its resources from current consumption (or save) to invest in capital formation. Bakare (2011) asserted that capital formation influences the economic welfare of a country. It helps in meeting all the requirements of an increasing population in developing economies. Rodrik (2005) emphasized the fundamental role of strong capital accumulation in generating income. He believed the "best single predictor of the growth of an economy remains its investment rate."

The population growth rate has shown a negative effect on GDP per-capita growth in all groups of the economies except developed economies. It explains the neo-classical growth theory (Mankiw et al., 1992). Mason (1988) demonstrated theoretically and empirically that population growth may reduce saving propensity and lower the potential investments. This would lead to a decrease in per capita physical capital per worker, and thus in per capita steady state output.

The developed economies are aging economies having a low ratio of working-age population. They have exhausted the demographic dividends (Ahmed & Khan, 2018). Kuznets highlighted the possible positive effects of population growth on economic cycles considering three possible activities undertaken by people: production, consumption and saving (Kuznets et al., 1960). Barro (1999) indicated that labor is the most fundamental and dynamic element of all economic activities, natural development and social well-being. In the long run, if growing population economy acquires advanced knowledge, which, in turn, increases productivity and output at a higher rate than that of population growth; it will not result into decreased economic growth rate.

As concerns the democracy, the results show that in developing economies and East Asian countries, democracy has no significant effect on economic growth. However, in developed economies and South Asian countries, democracy positively affects economic growth. For West Asian countries, democracy has a negative effect on economic growth which contradicts the views of Barro (1999), i.e., democracy has a positive impact on growth.

4. Conclusion

The study has estimated the effect of human capital on economic growth in the presence of corruption. The analysis has been done for forty economies disaggregated into developed and developing economies as well as West Asia, East Asia, and South Asia. It is concluded that human capital contributes positively to the economic growth of all groups of the economies in the presence of corruption. For some of the economies, the corruption sands the wheels of growth but for some others, it greases the wheels. It may be inferred that either corruption is supportive or obstructive to the economic growth the human capital is the factor which propagates the economic growth. Fixed capital formation enhances economic growth, while democracy has a mixed effect. The population growth rate slows down economic growth in developing economies.

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APPENDIX A

List of Countries in Different Regions According to WESP* Classification

	Developed	**Developing**	**West Asia**	**East Asia**	**South Asia**
1	Australia	Bahrain	Bahrain	China	Bangladesh
2	Austria	Bangladesh	Israel	Indonesia	India
3	Belgium	China	Jordan	Malaysia	Bhutan
4	Canada	India	Lebanon	Philippines	Pakistan
5	Denmark	Indonesia	Oman	Singapore	Sri Lanka
6	Finland	Iran	Saudi Arabia	Thailand	Nepal
7	France	Israel	Turkey	-	-
8	Germany	Jordan	U.A.E.	-	-
9	Greece	Lebanon	-	-	-
10	Ireland	Malaysia	-	-	-
11	Italy	Oman	-	-	-
12	Japan	Pakistan	-	-	-
13	Luxembourg	Philippines	-	-	-
14	Netherlands	Saudi Arabia	-	-	-
15	New Zealand	Singapore	-	-	-
16	Spain	Sri Lanka	-	-	-
17	Sweden	Thailand	-	-	-
18	United States	Turkey	-	-	-
19	U.K	U.A.E	-	-	-
20	-	Egypt	-	-	-
21	-	Nigeria	-	-	-