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The Impact of Institutional Quality on Economic Growth: Panel Evidence

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The aim of the present study is twofold. First, we develop a theoretical model which incorporates the role of institutions in promoting economic growth. The theoretical model predicts that rent seeking activities decrease as institutional quality improves, and hence income increases and vice versa. Second, we conduct an empirical analysis to quantify the impact of institutions on economic growth in selected Asian economies over the period 1996-2012 by employing both static and dynamic panel system Generalised Method of Moments (GMM) technique with fixed effects. The empirical results reveal that institutions indeed are important in determining the long run economic growth in Asian economies. However, the impact of institutions on economic growth differs across Asian economies and depends on the level of economic development. The results reveal that institutions are more effective in developed Asia than developing Asia. This evidence implies that different countries require different set of institutions to promote long term economic growth.

Keywords: Institutions, Economic Growth, Panel Evidence, Asia

1. INTRODUCTION

The path breaking studies by North (1981), Jones (1987) and Olson (1982) inspired the researchers as well as policy-makers to investigate the impact of institutions on economic growth. Earlier empirical studies, inter alia by Knack and Keefer (1995), Mauro (1995) and Barro (1997) reveal that institutions are important for investment and long term sustainable growth. Hall and Jones (1999) demonstrate that differences in the institutions across the globe cause huge variations in capital accumulation, education attainment, and productivity growth, hence account for income disparities. More recently, Rodrik, Subramanian, and Trebbi (2004) find that rule of law has a positive impact on economic growth. Similarly, Acemoglu, Cutler, Finkelstein, and Linn (2006) concluded that private property right institutions are the main drivers of long run economic growth, investment and financial development. These studies suggest that institutions are the fundamental determinants of the long run economic growth across countries.

The existing literature primarily indicates a positive association between institutions and economic growth. However, institutions do not exert similar impact on economic growth across different set of countries. The positive contribution of

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institutions is shaped by various factors like the perception of the individual about the institutions and the social norms and community rules of a particular group of individuals. Sometimes institutions with similar characteristics produced extremely different outcomes across different groups, regions and societies. For example, in Latin American countries similar laws and solutions were adopted to achieve different levels of economic growth and development [Yifu Lin and Nugent (1995)]. In this context, Alonso and Garcimartín (2013) signify the role of stages of economic development in determining the growth effects of institutions and found that level of development determines the quality of institutions which, in turn, enhances higher economic growth.

Few studies have empirically investigated the growth effects of institutions at various stages of development [Nawaz (2014); Valeriani and Peluso (2011)]. These studies have shown that the impact of institutions on economic growth is different across countries. These studies conclude that institutions perform better in developed countries as compared to developing ones. A study on transitional economies shows that control over corruption is growth enhancing if complemented by strong democratic institutions not necessarily otherwise. Institutional measures promote economic growth in strongly democratic economies and fail to boost growth in weakly democratic countries [Iqbal and Daly (2014)]. However, these studies lack a theoretical foundation to capture the linkages between institutions and economic growth, and also suffered from possible endogeneity problem. It can be argued that theoretical foundation is essential to understand the mechanism though which institutions are linked with economic growth. Furthermore, controlling endogeneity is important for reliable and robust empirical findings. Nawaz (2014) has investigated the impact of different institutions on economic growth assuming different stages of development using the SYS-GMM estimation technique. However, this study fails to control the possibility of heterogeneity by combining different countries into one group. The present study fills that gap in literature after taking care of above mentioned shortcomings.

The main objective of this study is to develop theoretical model that incorporates the role of institutions with respect to economic growth. Furthermore, the present study empirically estimates the impact of various institutions on economic growth at the cross-country level. Particularly, we examine the impact of institutions on economic growth by classifying developed and developing Asian economies over the period 1996-2012. This study contributes to the existing literature in various ways. First, this study develops a theoretical model by incorporating the role of institutions on economic growth following Gradstein (2007) and Chong and Gradstein (2007). Second, this study addresses the issues of heterogeneity and endogeneity using the SYS-GMM estimation technique. Third, this study develops institutional quality index to capture different dimensions of the institutions. Fourth, this study quantifies the impact of institutions at different stages of development.

The rest of the paper is structured as follows: Section 2 provides theoretical framework based on extended version of the endogenous growth theory to incorporate the impact of institutions on economic growth. Section 3 explains the data sources, and outlines estimation methodology. The empirical results and discussion are presented in section, while conclusion and policy implications are given in Section 5.

2. THEORETICAL FRAMEWORK

Traditional economic growth theories postulate that level of output per capita is determined by the amount of physical and human capital and level of technology in a country. In the production process, economic growth is linked with the ability of the nation to enhance its physical and human capital along with the technological developments. Acemoglu and Robinson (2010) however, state that:

> *"[The] differences in human capital, physical capital, and technology are only* ***proximate causes*** *in the sense that they pose the next question of why some countries have less human capital, physical capital, and technology and make worse use of their factors and opportunities. To develop more satisfactory answer to question of why some countries are much richer than others and why some countries grow much faster than others, we need to look for potential* ***fundamental causes****, which may be underlying these proximate differences across countries"[p.2]*

Acemoglu and Robinson (2010) argue that institutions are the fundamental determinant of economic growth and cause development differences across countries. North (1981) defines institutions as the rule of the game in a society or, more formally the humanly devised constraints that shape human interaction. This means that institutions shape the incentive structure in the society that may increase or hamper the economic activities. Poor quality institutions may slow down the economic activities by providing room to economic agents to remain busy in redistributive politics with lower economic returns rather than growth promoting economic activities [Murphy, Shleifer, and Vishny (1993)]. On the other hand, good quality institutions may promote incentive structure that leads to higher economic growth through reducing uncertainty and promoting efficiency [North (1990)]. Hall and Jones (1999) argued that overall productivity of factors of production in a country is driven by the quality of its institutions. Efficient, well developed and uncorrupt institutions guarantee that labour can only be used for productive purposes and not wasted in rent seeking activities, which leads to higher economic growth [North (1990)]. Good quality institutions enhance the ability of a country to adopt new technologies invented elsewhere which may play an important role in upgrading the development process of a country [Bernard and Jones (1996)].

Iqbal and Daly (2014) argue that weak institutions divert resources from productive sector to unproductive sector hence promote rent seeking activities. While, strong institutions reduce the chances of rent seeking activities and accelerate economic growth process and productivity of the reproducible factors. This study argues that weak institutional framework creates an opportunity for rent seeking behaviour that may divert resources to unproductive sectors.[1] The consequences of these activities for growth can be negative: resources may not be efficiently allocated, externalities may be ignored, transaction costs may be increased. North (1990) argues that institutional weaknesses

[1]Rent seeking activity is defined as an activity through which public power is exercised for private gain; this may involve misuse of public resources or, more generally, any attempted capture and commodification of state, social or commercial authority by politicians, public officials, elites and private interests [Iqbal and Daly (2014)].

lead to rent seeking activities hence low development. The incomplete rule of law, non-enforcement of property rights, inadequate policies and the lack of reliable infrastructure constitute a weak institutional framework that may promote rent seeking activities [Iqbal and Daly (2014)].

To put the above discussion in a framework, we use the endogenous growth model. Following the Gradstein (2007) and Chong and Gradstein (2007), we specify Cobb Douglas type production function of the following form:

$$y_{it} = Ak_{it}^{\alpha} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where y is output per worker, k is the stock of physical capital per worker which includes both private and public capitals, $A>0$ represents total factor productivity. Countries are indexed by i and t represents time period, α is the elasticity of output per worker with respect to physical capital per worker and $0 < \alpha < 1$. To incorporate the role of institutions in promoting economic growth, we modify the basic endogenous growth model. The above discussion reveals that weak (strong) institutions divert resources to unproductive (productive) sectors hence cause low (high) development. Gradstein (2007) and Chong and Gradstein (2007) also argued that weak institutions divert resources from productive sectors to unproductive sectors and promote rent seeking activities. However, strong institutions reduce the chances of rent seeking activities and accelerate economic growth and productivity of the reproducible factors. To capture this notion, we redefine production function specified in Equation (1) by including rent-seeking activities that act as a distortion in the production process. Now the production function takes the following form:

$$y_{it} = (1 - r_{it})Ak_{it}^{\alpha} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where $r_{it} \in [0, \hat{r}]$, $\hat{r} \ll 1$ indicate rent seeking activities. $\hat{r}$ is a ppoint at which institutional quality is degraded to such an extent that the modeling framework ceases to apply. Assume that appropriate share of rent-seeking by each firm depends on the amount of rent seeking and quality of institutions. With *strong institutions*, the value of rent seeking r_{it} is close to 0, whereas with *weak institutions* the value of r_{it} is close to 1 and the marginal utility of rent-seeking is maximal. Higher marginal utility of r_{it} implies weak institutions and hence low productivity of factors of production and vice versa. This augmentation provides meaningful explanation about the cross country differences in long run growth rates.[2] Thus r_{it} reduces the marginal product of reproducible factors due to economic distortions resulting from low quality institutions. To determine the long run growth patterns across countries, we need to examine the consumption and investment decisions made by the individuals. Consider one representative agent facing an infinite planning horizon and maximising intertemporal utility subject to dynamic budget constraint. The representative agent's preferences have the following form:

$$U_{it} = \int_0^{\infty} \frac{c_{it}^{1-\sigma-1}}{1-\sigma} e^{-\rho t} dt \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

[2]Steger (2000) introduces the similar index (distortion index in the production function to capture the role of detrimental government policies on economic growth. Iqbal (2013) incorporates instability index in the model using similar formulation to capture the impact on macroeconomic instability due to weak institutions and macroeconomic policies on output.

where c_{it} represents private consumption in per capita form and $\sigma > 0$ and $\sigma \neq 1$ which shows that the elasticity of marginal utility equals the constant $-\sigma$. The other multiplier, $e^{-\rho t}$, involves the rate of time preference, $\rho > 0$. Positive time preferences rate ρ means so that utils are valued less the later they are received. The dynamic budget constraint in per capita terms is given by the following equation:

$$\dot{k_{it}} = \frac{dk}{dt} = (1 - r_{it})Ak_{it}^{\alpha} - c_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

It is assumed that the initial capital stock at time 0 is 1 i.e. $k_{(0)} = 1$. The terminal condition is defined as $\lim_{t\to\infty} k\lambda e^{-\rho t} = 0$ which indicates that the capital stock left over the end of the planning horizon, when discounted at the time discount rate is zero. This restriction rules out the type of chain-letter finance. Equation (4) suggests that increase in the capital stock equals the total saving, which in turn, equals to the difference between output and consumption. The individual chooses optimal consumption $\{c_{it}: t \geq 0\}$ and investment path to determine the level of capital stock $\{k_{it}: t \geq 0\}$. To find this optimal allocation of resources by the individual, we can write the Hamiltonian as:

$$H = \frac{c_{it}^{1-\sigma-1}}{1-\sigma} e^{-\rho t} + \lambda[(1 - r_{it})Ak_{it}^{\alpha} - c_{it}] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

The expression within bracket is equal to $\dot{k}$ and λ is Lagrange multiplier representing the present value of shadow price of income. Differentiation of Lagrange function with respect to c_{it} and k_{it} and the first order conditions give us Equations (6) and (7).

$$\frac{\partial H}{\partial c_{it}} = 0 \Rightarrow c_{it}^{1-\sigma} e^{-\rho t} - \lambda = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

$$\frac{\partial H}{\partial k_{it}} + \dot{\lambda} = 0 \Rightarrow \lambda(1 - r_{it})A\alpha k_{it}^{\alpha-1} = -\dot{\lambda} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Using first-order conditions; fixing the initial capital stock $k_{(0)} = 1$; applying transversality condition $\lim_{t\to\infty} k_t \lambda e^{-\rho t} = 0$; the budget constraint is given in Equation (4), we find the growth rate of per capita consumption which is the same as the capital and the output growth rate. The growth rate of the economy is given as follows:

$$\frac{\dot{y}_{it}}{y_{it}} = \frac{\dot{c}_{it}}{c_{it}} = \frac{1}{\sigma}[(1 - r_{ir})A\alpha k_{it}^{\alpha-1} - \rho] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

$$\frac{\dot{y}_{it}}{y_{it}} = \frac{\dot{c}_{it}}{c_{it}} = \frac{(1-r_{ir})}{\sigma}(A\alpha k_{it}^{\alpha-1}) - \frac{\rho}{\sigma} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

Equation (8) shows that as institutional quality improves, the rent seeking activities decrease and hence consumption (or income) increases. Now differentiating with respect to $r_{it} = \frac{\partial\left(\dot{y}_{it}/y_{it}\right)}{\partial r_{it}} = -\frac{A\alpha k_{it}^{\alpha-1}}{\sigma^2} > 0$. This shows that as the value of r_{it} increases, the output decreases as $\sigma > 0$.

Propositions: *The larger the r_{it}, the lower will be the growth rate of the economy and vice versa. As institutional quality improves, the rent seeking activities decrease and hence consumption/income increases and vice versa.*

We consider two cases for example for validation, these include:

(i) *When* $r_{it} = 0$ *(strong institutions): Under strong institutions regime, economic growth is with* $\frac{1}{\sigma}[A\alpha k_{it}^{\alpha-1} - \rho]$

(ii) *When* $0 < r_{it} < \hat{r}$ *(weak institutions): Under weak institutions regime, economic growth is with* $\frac{1}{\sigma}[(1 - r_{ir})A\alpha k_{it}^{\alpha-1} - \rho]$

In essence, the theoretical model highlights that long run growth rate of per capita output is a function of physical capital and rent seeking—a proxy for institutions. After logarithmic transformation, Equation (9) can be rewritten as:

$$\dot{y}_{it} = \alpha_0 + \varphi \mathrm{I}_{it} + \theta \mathrm{k}_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

where $\dot{y}_{it}$ represents GDP growth rate across cross-section i at time period t. I_{it} represents institutional quality index and k_{it} indicates physical capital. We use Equation (10) to examine the impact of institutions on economic growth.

3. DATA AND METHODOLOGY

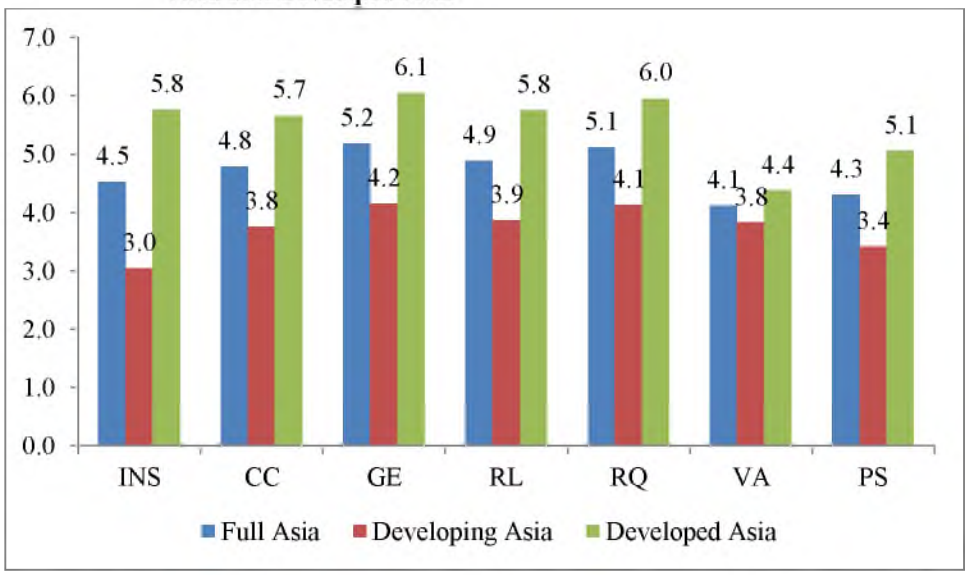
To determine the impact of institutions on growth, we employ a panel data set of 35 Asian countries over the period 1996-2012.[3] The selected countries are divided into developed Asia and developing Asia on the basis of income levels following the World Bank classification.[4] The data on the institutional variables are collected from the Worldwide Governance Indicators (WGI) published by the World Bank. The database provides six different measures capturing different dimensions of the institutional framework. These indicators include: (i) control of corruption, (ii) government effectiveness, (iii) political stability and absence of violence/terrorism, (iv) regulatory quality, (v) rule of law, and (vi) voice and accountability. The indicator ranges from –2.5 to +2.5. The low value indicates bad quality institutions and vice versa.

It is expected that these indicators are likely to be correlated, therefore, we construct institutional quality index using the Principle Component Method (PCM) methodology. The PCM indicates how much variance of a variable is explained by a specific principal component. The principal component is derived by computing the eigenvalues of the sample covariance matrix. These eigenvalues are the variances of the variables (institutional indicators in this case). Therefore, the number of principal components is equal to the number of variables. Typically most of the variance is explained by the first principal component and therefore its value is used for computation of the index. The main advantage of PCM is that the weights to be assigned to the variables are determined by the data itself. The Figure 1 depicts the average quality of institutions across full sample, developing Asia and developed Asia. The average value of institutional quality index across the full sample is 4.5, while this value is 5.8, 3.0 for developed Asia and developing Asian countries respectively during the period 1996-2012. The individual indicators also show similar behaviour.

[3]The choice of 35 countries is mainly based on the availability of data on all variables.

[4]The World Bank classifies the countries on the basis of income per capita. The sub-groups are: (i) Low income countries/Developing countries and (ii) High income countries/Developed countries. In developing countries sub-group, we have selected 16 countries, while in developed countries sub-group we have selected 19 countries.

Fig. 1. Average Quality of Institutions across Full Sample, Developing Asia and Developed Asia



Source: Authors' own calculation. We normalised the values between the ranges of 1 to 10. 1 implies low quality of institutions and 10 means high quality of institutions.

The data on all economic variables are taken from the World Development Indicators (WDI) published by the World Bank. These variables include GDP per capita growth, investment, trade openness, inflation and the government size. Investment is measured as the Gross Fixed Capital Formation as a percent of GDP. Openness is the sum of exports and imports divided by the GDP. Inflation is measured by the log difference of consumer price index (CPI). We use general government final consumption expenditure relative to GDP as a proxy for the government size. The descriptive statistics (Table 1A appendix) show that the annual average GDP per capita growth rate is 3.7 over the period 1996-2012. The annual average investment as percent of GDP is 24 over the same period. The annual average inflation across the full sample is 7.15, while annual average inflation is relatively high in developed countries (5.35) as compared to developing countries (9.29) over the period 1996-2012. The average government size as percent of GDP is 13 over the same period.

The model described in previous section emphasises the role of institutions as determinants of output per capita. Based on the theoretical framework an empirical model can be written as:

$$\dot{y}_{it} = \alpha_0 + \varphi \mathrm{I}_{it} + \theta \mathrm{k}_{it} + \beta \mathrm{X} + \varepsilon_{\mathrm{it}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

where $\dot{y}_{it}$ represent GDP growth rate of country i at time period t. I_{it} represents institutional quality index (INS Index) and k_{it} indicates physical capital, and X is the set of control variables, while $\varepsilon_{\mathrm{it}}$ is the disturbance term which is assumed to be serially uncorrelated and orthogonal to the explanatory variables. The vector of control variables X includes: investment (INV), government size (EXP), inflation (INF) and trade openness (OPEN). These variables have been frequently used in growth literature and have been

identified by Mankiw, Romer, and Weil (1992), Levine and Renelt (1992) and Barro and Lee (1996).

The choice of appropriate estimation technique is important for obtaining robust estimates. To measure the impact of institutions on economic growth we, employ panel data estimation technique. The panel data estimation technique is considered as an efficient analytical method, since it allows combining different cross sections and time periods, and provides more reliable and robust inference. We use the Fixed Effects Model (FEM) based on the Hausman test. Before proceeding further, it is important to highlight the possibility of endogeneity between institutions and economic growth. Acemoglu, Johnson, Robinson, and Yared (2009) conclude that traditional empirical literature generally carries problems like endogeneity, measurement errors and omitted variables bias.

A popular method to tackle the endogeneity is the Generalised Method of Moments (GMM). The GMM estimator is as an extension of Instrumental Variable (IV) methodology. The main advantage of GMM estimation is that the model need not be homoscedastic and serially independent. Another advantage of the GMM estimation is that it finds the parameters estimates by maximising an objective function which includes the moment restriction that the correlation between error term and lagged regressor is zero. In essence, the GMM takes into account the time series dimension of the data, non-observable country specific effects, inclusion of lagged dependent variables among the explanatory variables and the possibility that all explanatory variables are endogenous [Bond, Bowsher, and Windmeijer (2001); Caselli, Esquivel, and Lefort (1996)]. In particular, the system GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998) and applied by Bond, *et al.* (2001) to the growth equation, was found to reduce a small sample bias that characterises the first differenced GMM used by Caselli, *et al.* (1996).

Anderson and Hsiao (1982) propose a strategy to choose instruments to solve the endogeneity. This study suggests transforming to first differences to eliminate the time-invariant fixed effects and applying IV with lagged difference or level as instruments. Anderson and Hsiao (1982) estimator is an example of simple IV estimation, in which there is one instrument for each endogenous variable. A simple generalisation of this estimator is the GMM in which the number of instruments is permitted to exceed the number of endogenous variables. Arellano and Bond (1991) suggest using all valid lags of all the regressors as instruments. The efficiency of GMM estimation generally increases in the number of valid and effective moment conditions. Therefore, Arellano and Bond (1991) estimator should be superior to Anderson and Hsiao (1982) estimator. However, this superiority might be minimal if the panel has a shorter time span. Given that our data span over 30 years, there is limited opportunity for applying the Arellano and Bond (1991) instrumentation method. To solve this problem, Arellano and Bover (1995) and Blundell and Bond (1998), assuming stationarity justify additional zero-moment restrictions that can be applied to a model in levels, instrumented with lagged differences. These additional moment restrictions can be combined with those in Arellano and Bond (1991) to provide a "system-GMM" estimator in which GMM is applied to a system of two equations: an equation in difference form instrumented by lagged levels, and an equation in levels instrumented by lagged difference.

For lagged endogenous variables and weakly exogenous variables to be valid as instruments, it is necessary that the transient disturbances are free of autocorrelation in the basic model [Blundell and Bond (1998)]. This implies that disturbances in the differenced model have significant first-order correlation and insignificant second-order autocorrelation. For this purpose, the Arellano-Bond tests for first-order and second-order serial correlation in the first-differenced residuals are used [Arellano and Bond (1991)]. As the first difference of independently and identically distributed idiosyncratic error will be serially correlated, rejecting the null hypothesis of no serial correlation in the first-differenced error at order one does not imply that model is misspecified. Rejecting the null hypothesis at higher orders, however, implies that the moment conditions are not valid. Therefore, to establish the robustness of the estimates, we employ SYS-GMM.

4. EMPIRICAL RESULTS AND DISCUSSION

We have estimated equation (10) to examine the impact of institutions on economic growth for a panel of 35 Asian countries over the period 1996-2012 using the Fixed Effects Model. The estimation results are presented in Table 2. The estimation has been carried out separately for the whole panel of countries as well as for the developed and developing Asian economies. We have used various diagnostics to ensure the adequacy of the estimated models. The results of diagnostics are reported below in Table 2. These results confirm that the estimated models are well specified.

As shown in Table 2 that institutions have a positive impact on economic growth in Asian countries which implies that institutions are growth enhancing. The value of estimated coefficient of institutions is 0.7 and significant at the 5 percent level of significance. This implies that an increase in institutional quality by 1 percentage points increases the long term economic growth rate by 0.7 percentage points. This result is consistent with the hypothesis that institutions play a critical role in the growth process. For example, North (1990) argues that institutions increase the productivity of factor inputs by improving the incentive structure. Similarly, Acemoglu, Johnson, Robinson, and Yared (2008) showed that good quality institutions enhance a country's ability to utilise modern technologies which, in turn causes economic growth. Many other empirical studies provide evidence that institutions promote economic growth [Acemoglu, *et al.* (2006); Acemoglu, Johnson, and Robinson (2001); Barro (1997); Hall and Jones (1999); Iqbal and Daly (2014); Knack and Keefer (1995)].

To examine the role of institutions on economic growth at various stages of economic development, we have disaggregated our sample into developed Asia and developing Asia. We find that the impact of institutions on economic growth is positive for both developed as well as developing Asia. However, the contribution of institutions to economic growth is relatively high in developed Asian countries than in developing Asian countries. The value of estimated coefficient of institution index is 0.4 for developing Asian countries, while it is 1.17 for developed Asian economies. This shows that a one percentage point improvement in the quality of institution leads to 0.4 percentage point increase in GDP per capita in the developing Asian economies and 1.17 percentage point increase in GDP per capita in the developed Asian countries. The low contribution of institutions to economic growth in developing Asian nations could be attributed to several reasons. One reason could be that the political system in these

countries is weak. The politicians and public officials have fewer checks on their power, making it easier for them to engage in rent seeking. This inefficiency may act as binding constraint in making institutions growth enhancing. Various studies have shown that under weak democracy, institutions may not work effectively [Aidt, Dutta, and Sena (2008); Drury, Krieckhaus, and Lusztig (2006); Iqbal and Daly (2014); Méndez and Sepúlveda (2006)]. Iqbal and Daly (2014) find that corruption has an insignificant impact on economic growth under weak democracy. Other reason could be that the institutional framework in developing countries is still underdeveloped and in the transition stage. This transition process undermines the effectiveness of institutions. For example, frequent changes in the design of institutional framework are not effective to promote economic growth. Another reason could be that the quality of institutions could be below the certain minimum threshold level. Zhuang, De Dios, and Lagman-Martin (2010) argue that institutions are only effective when they are above the world average values. Economies with strong institutions show higher growth than those with institutions below threshold level. Finally, causality between institutional quality and economic growth also explains different impacts on institutions in developed and developing countries [Fukuyama and McFaul (2008)].

Table 2

Impact of Institutions on Economic Growth (Institutional Quality Index)

Variables	Asia	Developing Asia	Developed Asia
INS Index	0.702	0.406	1.172
	(0.30)**	(0.21)*	(0.48)**
EXP	–0.369	–0.441	–0.300
	(0.08)***	(0.14)***	(0.11)***
INV	0.087	0.191	0.031
	(0.03)***	(0.05)***	(0.05)
OPN	0.034	–0.001	0.041
	(0.01)***	(0.02)	(0.01)***
INF	–0.037	–0.025	–0.028
	(0.02)**	(0.02)	(0.03)
Constant	0.259	3.707	-4.591
	(1.91)	(2.02)*	(3.50)
Observations	595	272	323
R-squared	0.083	0.106	0.102
F-values	10.10	5.97	6.78
Hausman test	29.83 (0.00)	25.37 (0.00)	33.62 (0.00)
Number of Countries	35	16	19

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Numerous control variables have been used in the empirical analysis. For example, our results show that the impact of government size measured by government consumption is negative on economic growth for the whole Asian countries, developing Asia and developed Asia. Our results are consistent with earlier studies that government

size has a negative impact on economic growth [Agell, Lindh, and Ohlsson (1997); Barro (1991); Bergh and Karlsson (2010); Cameron (1982); Grier and Tullock (1989); Landau (1983); Marlow (1986); Romero-Avila and Strauch (2008); Saunders (1986)]. The results show that the impact of investment on economic growth is positive. This finding is in line with existing literature [Barro (1991); Rebelo (1991)]. Inflation has a negative association with growth in GDP per capita, implying that inflation hurts the growth process. Many empirical studies have found similar results [Fischer (1993); Sirimaneetham and Temple (2009)]. Higher inflation produces detrimental impact on the economic growth. This result could be justified in many ways. It causes reduction in investment and productivity by generating uncertainty in the economy [Fischer (1993)] and produces adverse effects on the productivity of inputs through distorting the price mechanism [Smyth (1995)]. High inflation also increases the risk premium and hinders the smooth functioning of financial markets through the reduction of saving and investment. Trade openness has a positive and significant impact on the economic growth, implying that trade is beneficial for economic growth. The positive association of trade openness and economic growth is due to the benefits emerging from specialisation, competition and economies of scale. This result is consistent with the earlier studies [Balassa (1978); Din, Ghani, and Siddique (2003); Edwards (1998); Sachs, Warner, Åslund, and Fischer (1995); Tyler (1981)].

4.1. Institutions and Growth: A Disaggregated Analysis

In the previous analysis we used a composite index of institutional quality to quantify the impact of institutions on economic growth. We concluded that institutions perform better in developed Asian economies as compared to developing economies. However, this provides a limited picture in explaining the influence of institutions on growth assuming different stages of development. The findings based on composite institutional quality index do not identify the effect of individual components of institutional quality. Zhuang, *et al.* (2010) have pointed out that various components of institutional quality have differential effects on growth, depending on a country's history, stages of development, and the length of time horizon being investigated. Following Zhuang, *et al.* (2010) we have investigated the impact of various components of institutional quality on economic growth. Table 3 reports the results.[5]

The disaggregated analysis has shown that control over corruption (CC), government effectiveness (GE) and rule of law (RL) are more important as compared to political stability (PS), regulatory quality (RQ) and voice and accountability (VA) in the full sample of Asian countries. Further, we have found that different institutions perform differently for developed and developing Asia. For Asian developing economies, the government effectiveness and rule of law play significant role in promoting economic growth. On the other hand, all most all measures of institutional quality contribute significantly to economic growth. These findings support the Zhuang, *et al.* (2010) view that different institutions perform differently at different stages of development.

[5]We have also used other control variables in the estimation, but for presentation purposes we have omitted these variables from the Table. The detailed estimation Tables are available upon the request from authors.

Table 3

Impact of Institutions on Economic Growth (Components of Institutional Quality)

Variable	CC	GE	PS	RL	RQ	VA
Full Sample	0.762	1.497	0.245	0.832	0.779	0.411
	(0.41)*	(0.49)***	(0.25)	(0.48)*	(0.43)*	(0.44)
Developing	0.620	1.194	0.292	0.682	-0.699	0.920
	(0.56)	(0.68)*	(0.31)	(0.41)*	(0.57)	(0.57)
Developed	1.095	2.099	0.140	1.428	3.041	0.173
	(0.63)*	(0.78)***	(0.42)	(0.74)*	(0.72)***	(0.66)

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

4.2. Sensitivity Analysis

To examine the issue of reverse causality between institutions quality and economic growth, we re-estimate the model after controlling the possibility of reverse causality and endogeneity using dynamic system GMM (SYS-GMM). The SYS-GMM uses lag of dependent variables to introduce dynamics in the model. The inclusion of lagged dependent variable allows for path dependency in the model and works as a partial adjustment mechanism. Lagged level of per capita GDP is taken to test the neo-classical hypothesis of convergence to a long run steady state. The results are presented in the Table 4. A battery of diagnostic tests have been applied to check the accuracy of the specification and to ensure that the models are adequately specified. Chi-square statistic confirms the adequacy of the estimated models. Diagnostic statistics based on AR1 and AR2 are consistent with the validity of instruments used in SYS-GMM.

The results show that institutions have a positive impact on economic growth in a sample of 35 Asian countries as well as for developed and developing Asian countries. We found that institutions perform relatively better in developed Asian countries as compared to developing Asian countries as indicated by the size of the coefficient. The estimated impact of institutions is high in developed Asian countries than developing Asia. The impact of control variables remains the same as we found in case of fixed effects estimation.

As shown in Table 4 the negative coefficient of the lagged level of GDP per capita (GDPPC(-1)) together with positive coefficient of the lagged growth rates (GDPPCG(-1)), support the neoclassical hypothesis of convergence to a long run steady state in the case of full sample. The impact of individual indicators of institutions on economic growth is also estimated using the SYS-GMM method (Table 5). The results suggest that different institutions perform differently at different stages of development. The results are similar to those found in case of fixed effects estimation. The results suggest that control of corruption, government effectiveness and regulatory quality have relatively greater effect on economic growth in developed Asia as compared to developing Asia. On the other hand, rule of law and voice and accountability perform better in developing Asia than in developed Asian nations.

Table 4

SYS-GMM (Results of Institutional and Economic Growth)

Variables	Asia	Developing Asia	Developed Asia
INS Index	1.304	1.568	1.992
	(0.36)***	(0.51)***	(0.36)***
EXP	–0.259	–0.210	–0.225
	(0.10)**	(0.14)	(0.11)**
INV	0.024	0.244	–0.096
	(0.04)	(0.06)***	(0.06)*
INF	–0.109	–0.065	–0.207
	(0.03)***	(0.03)**	(0.05)***
GDPPC(–1)	–2.870	–2.748	–5.050
	(0.58)***	(1.00)***	(0.89)***
GDPPCG(–1)	0.096	**-0.104**	0.226
	(0.03)***	**(0.05)****	(0.04)***
Constant	24.047	15.183	49.023
	(4.07)***	(5.48)***	(8.10)***
Observations	560	256	304
Number of Countries	35	16	19
Wald Chi2 Value	60.72	36.16	83.60
AR1 Test	0.0018	0.0396	0.0042
AR2 Test	0.1729	0.1140	0.1645

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table 5

SYS-GMM (Components of Institutional Quality)

Variable	CC	GE	PS	RL	RQ	VA
Full Sample	1.570	2.728	0.142	2.465	2.308	1.239
	(0.46)***	(0.55)***	(0.38)	(0.57)***	(0.55)***	(0.51)**
Developing	2.287	2.336	0.446	3.645	0.144	2.310
	(0.68)***	(0.79)***	(0.42)	(0.88)***	(0.67)	(0.74)***
Developed	2.932	2.370	–0.134	2.406	2.832	0.875
	(0.52)***	(0.62)***	(0.43)	(0.59)***	(0.66)***	(0.51)*

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

5. CONCLUDING REMARKS

This study develops a theoretical model and assesses the role of institutions on economic growth for a panel of 35 Asian countries over the period 1996-2012. We have used the fixed effects and SYS-GMM estimation techniques to examine the impact of different institutions including: control over corruption, government effectiveness, political stability, rule of law, regulatory quality and voice and accountability on economic growth. We have constructed institutional quality index using six component

institutions by employing principle component method. The theoretical model reveals that as institutional quality improves, the rent seeking activities decrease and hence income increases and vice versa. The empirical results support the hypothesis that institutions exert positive impact on economic growth. Our findings suggest that control of corruption and maintenance of rule of law are the key determinants of long term economic growth for sampled Asian countries. Furthermore, results reveal that the impact of institutions on economic growth varies across Asian countries depending on the stages of economic development. The estimated impact of institutions on economic growth is relatively higher in the developed Asia than in the developing Asian countries. This result highlights the role of institutions and level of economic development in determining the long run economic growth. Therefore, different countries require different set of institutions and policies to promote long run economic growth.

Appendix Table 1A

Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min.	Max.
		Full Sample			
GDP Per Capita Growth Rate	595	3.70	4.84	–14.39	38.06
Investment (INV)	595	24.14	8.33	8.01	64.43
Government size (EXP)	595	13.59	5.62	3.46	30.50
Inflation (INF)	595	7.15	11.33	–8.53	128.42
Openness (OPN)	595	101.95	75.89	18.76	448.31
Institutions (INS Index)	595	–0.14	0.70	–1.45	1.44
Control of Corruption (CC)	595	–0.10	0.86	–1.49	2.42
Government Effectiveness (GE)	595	0.09	0.80	–1.28	2.43
Political Stability (PS)	595	–0.35	0.92	–2.50	1.40
Rule of Law (RL)	595	–0.05	0.79	–1.52	1.77
Regulatory Quality (RQ)	595	0.06	0.82	–1.73	2.25
Voice and Accountability (VA)	595	–0.44	0.72	–1.86	1.14
		Low Income/Developing Countries			
GDP Per Capita Growth Rate	272	4.38	4.26	–14.39	38.06
Investment (INV)	272	24.59	9.18	8.01	64.43
Government Size (EXP)	272	11.21	4.68	3.46	25.88
Inflation (INF)	272	9.29	11.43	–1.71	128.42
Openness (OPN)	272	76.66	31.42	21.55	162.91
Institutions (INS Index)	272	–0.57	0.38	–1.45	0.29
Control of Corruption (CC)	272	–0.62	0.47	–1.49	0.82
Government Effectiveness (GE)	272	–0.42	0.40	–1.28	0.78
Political Stability (PS)	272	–0.79	0.87	–2.50	1.31
Rule of Law (RL)	272	–0.57	0.48	–1.52	0.37
Regulatory Quality (RQ)	272	–0.44	0.40	–1.50	0.68
Voice and Accountability (VA)	272	–0.59	0.56	–1.82	0.50
		High Income/Developed Countries			
GDP Per Capita Growth Rate	323	3.12	5.21	–11.53	33.03
Investment (INV)	323	23.76	7.54	9.66	57.71
Government Size (EXP)	323	15.59	5.57	6.77	30.50
Inflation (INF)	323	5.35	10.93	–8.53	85.73
Openness (OPN)	323	123.25	93.80	18.76	448.31
Institutions (INS Index)	323	0.22	0.71	–1.24	1.44
Control of Corruption (CC)	323	0.33	0.88	–1.25	2.42
Government Effectiveness (GE)	323	0.53	0.80	–1.07	2.43
Political Stability (PS)	323	0.03	0.78	–1.62	1.40
Rule of Law (RL)	323	0.38	0.73	–1.19	1.77
Regulatory Quality (RQ)	323	0.48	0.85	–1.73	2.25
Voice and Accountability (VA)	323	–0.31	0.82	-1.86	1.14

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