The Effectiveness of Institutions in Economic Growth in Developing Countries: A Panel Data Analysis

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Abstract

This study investigated the effect of institutions on economic growth for the panel of 17 developing countries which covers the period 2000-2014, using pooled ordinary least square model, fixed effect model, random effect model, and dynamic random effect model and generalized method of moments technique. It examined the direct impact of Institutions i.e., financial institutions, economic institutions, social institutions, and political institutions in economic growth in developing countries. This study shows that institutions significantly affect economic growth. This suggests that in emerging countries, institutions are the most important factor for an economy's growth. In this study we have estimated panel ordinary least square model, fixed effect model, random effect model and dynamic random effect model". F-test is used between pooled ordinary least square model and fixed effect model. According to the f-test results; it shows us that pooled ordinary least square model is suitable model between fixed effect model and random effect model. Whereas fixed effect model shows significant impact of independent variables on dependent variable and random effect model also shows significant effect of independent variables on dependent variable. Between fixed effect model and random effect model. According to f-test statistic and Hausman test statistic, fixed effect model is a valid model. Fixed model is also valid model because it shows that GDP and independent variables have significant results. Our other explanatory variables i.e., capital stock, trade openness and four institutions also show significant impact on response variable. Adjusted R-square is also in favor of this model. Thus, the estimates are reliable, and we can use these estimates for policy making.

Keywords: Institutions, economic Growth, Developing Countries, Panel Data, GMM.

JEL classification: C23, F6, **11, 12,** 05

Introduction

Economic Growth

Economic growth is particularly the most important instrument for an economy specifically in developing economies to reducing poverty, increasing national output, and improving quality of life (Tran et al., 2021). Many studies examined the relationship between energy consumption and economic growth (EG). Some studies have investigated single countries while others have chosen many countries simultaneously in a panel data analysis framework (Barro, 1991).

The social and investment model of economic growth is one of the most topical contradictions and manifestations of the differences between developed and developing countries. The socioeconomic systems of developed countries have by now achieved such a high level of progress and the gap between them and other participants of global economic relations has become so large that they could ignore the rate of economic growth (temporarily) to raise the quality of life (Ellahi et al., 2021; Kapetanovic et al., 2022). This is what takes place in the social and investment model of economic growth, which ensures its moderate rate but a serious contribution to human development and realization of intellectual and innovative potential (Brown et al., 2022; Salamzadeh et al., 2022).

The origins of cross-country disparities in economic development and growth are arguably the most important problems in social science. What causes certain countries to be significantly poorer than others? Why do certain countries thrive economically while others remain stagnant? And, to the degree that we can create some answers to these issues, as well as the following ones: what can be done to stimulate economic growth and raise societal living standards?

A society's output per person is correlated with the quantity of human capital, physical capital, and technology available to its workers and enterprises, according to economists who have known this for a long time (Awais et al., 2022; Muhammad et al., 2023). The capacity of a civilization to grow its physical capital, human capital, and technological capital is also related to economic growth. In this context, technology is interpreted broadly; technological distinctions include both the organizational structures of production and the tools available to businesses, allowing certain nations to utilize their resources more effectively.

Differences in these three sectors raise the question of why certain nations have lower levels of physical capital, human capital, and technology and make poor use of their resources and opportunities. On the other hand, these differences are only proximate reasons. To produce more sufficient answers to questions like why some countries are considerably richer than others and why some countries grow much faster than others, we need to investigate potential fundamental causes that may be behind these proximal variations among countries. We can only establish a framework for making policy recommendations that go beyond platitudes (such as "upgrade your technology") and limit the possibility of unanticipated negative repercussions if we understand these underlying reasons (Hsiao & Mei-Chu, 2003).

The objectives of the study are: There is a broad agreement in academia that institutions play a fundamental role in economic development. Nevertheless, the question about which specific types of institutions relate to specific economic outcomes is not adequately addressed. Our

primary research interest is to identify the channels through which development outcomes are affected by economic and political institutions directly.

Research Questions

Against this background, our key research questions can be summarized as a series of related themes as follows: (a) Exactly what development outcomes are directly affected by institutional quality? (b) Are these development outcomes affected by economic or political institutions, or macroeconomic policies or other economic fundamentals? (c) Given that institutional changes do occur, do economic and political institutions cause changes in macroeconomic policies? Similarly, do macroeconomic policies cause institutional changes? (d) Other than domestic institutions, do external institutions have any role to play in the development process?

Significance of Study

Cross-country empirical analyses, in combination with micro-level studies, provide strong support for the overwhelming importance of institutions in predicting the level of development in countries around the world (Hall & Jones, 1999; Acemoglu, Johnson & Robinson, 2001). Protection of property rights, effective law enforcement, and efficient bureaucracies, together with a broad range of norms and civic mores, are found to be strongly correlated to better economic performance over time.

The performance of institutions is determined by a country's economic structure. Many less developed countries have some form of "inclusive" institutions-the primary problem is that these are only written in law and hardly or only selectively enforced. This article argues that this is the outcome of decreasing returns production structures. Enforcing institutions are not costless and diminishing returns economic activities simply do not produce sufficient value added to cover the costs of enforcement. The reverse is true in rich countries with increasing returns economic structures.

Literature Review

Institutions are the rules of the game in a community or, more technically, are the humanly constructed limits that govern human interaction (Northt, 1990). This definition highlights three fundamental characteristics of institutions 1) They are "humanly manufactured," as opposed to other potential fundamental causes, such geographic conditions, which are out of human control 2) they are "game rules," placing "constraints" on human behavior 3) and they will primarily affect behavior through incentives (North, 1981).

The human-made limitations that govern political, economic, financial, and social interaction are referred to as institutions. They are made up of both legal (laws, property rights, and constitutions) and informal (sanctions, norms, traditions, and codes of conduct) restrictions. In this definition, institutions are the kinds of structures which make up the stuff of social life. According to Williamson (2009) institutions are widely believed to be important for the economic development of a country. Every institution has a purpose, and they are permanent, which means they do not end when one person is gone.

The manner that economic and political life is organized varies greatly from country to country. Wide cross-country disparities in economic institutions, as well as a substantial association between these institutions and economic success are documented in a large body of work. For

example, Knack and Keefer (1995) looked at property rights enforcement measures produced by international business groups, Mauro (1995) looked at corruption measures, and Djankov et al. (2002) looked at entry barriers among countries. Numerous more studies examine how changes in educational institutions affect human capital.

For one hundred twenty-seven nations, Hall, and Jones (1999) used ICRG dataset for the indicator institutions. Human capital, education, and productivity were all factors that influence organizational change, according to the researchers. As per their findings, differences were related to differences in institutional factors among cross-country.

Antweiler et al. (2001) analyzed how pollution levels were affected by access to international goods markets. They created a theoretical model that divided trade's impact on pollution into scale, technique, composition effects, and then tested it with data on sulphur dioxide concentrations. When international commerce modified the composition of national output, they found that pollutant concentrations move only slightly. Estimates of trade-induced techniques and scale effects suggested that pollution from these sources will be reduced net. When they added together these estimates for all three effects, they arrived at an unexpected conclusion: more open trade looks to be good for the environment.

From 1982 to 1997 data, Drury et al. (2006) studied the connection between corruption, democracies & non-democracies and used panel data from over a hundred nations (taking data from ICRG). They discovered that in democracies corruption had a minor impact on economic growth while it had a substantial impact in non-democracies, and this substantial impact had a negative economic impact.

The causal connection between total energy use and Pakistan's economy's contribution to financial development was also examined by Kakar et al. (2011) using a separate set of data from 1980 to 2009, co-integration and the Vector Error Correction model were applied. The empirical results of the Granger Causality test showed that the bond between the two variables were unidirectional running from EC to EG. Their study confirmed that any energy shock through financial development in Pakistan will help the economy to grow in the long run.

In a theoretical framework, Siddique et al. (2016) investigated how institutional indicators influence economic growth. Principal component analysis was used to extract variables from thirty-one indicators encompassing 84 nations during a five-year period (2000-2006). These institutional elements were then incorporated into a formal growth model using panel OLS and GMM-based estimation techniques. According to the findings, favorable institutions had a positive impact on economic growth.

For a panel of 91 nations between 1999 and 2014, Siddique et al. (2016) used random effect models and System GMM techniques to analyses the relationship between institutional governance and economic growth. For a small panel of nations, the findings show that institutional governance had a direct and considerable impact on economic growth. This study wants to investigate institutional governance to enhance economic growth both directly and indirectly.

While most studies present a linear linkage between institutions and growth, there is also an empirical growth literature that deals with the non-linearities in the canonical cross-country growth regression. For instance, using data on 100 countries over the years 1995-2018, Li and

Kumbhakar (2022) propose a quantile regression model in which countries are grouped according to their growth rates, finding a positive effect of economic freedom on per capita GDP growth.

In the long term, under the effect of the dialectical law of transition from quantity to quality, large-scale social investments will be accumulated in the volume that would ensure acceleration of economic growth rate based on the capabilities of the fourth technological mode (Industry 4.0), the transition to which has only started (Nja et al., 2022). Developing countries cannot allow for a reduction in economic growth rate, but they are also interested very much (as compared with developed countries) in social investments (Batchaev et al., 2021). Therefore, there emerges a problem in the search for a new, special approach to implementing the social and investment model of economic growth in developing countries, which would allow increasing social investments and preserving a high rate of economic growth, avoiding its reduction (Slisane et al., 2022).

Review of literature shows that most of the studies found positive role of institution in economic growth, but some studies also found the negative impact also. Hence, this study will help us to determine the impact of institutions on economic growth and to compare the fixed effect model (FEM) with random effect Model (REF) and dynamic effect Model (DEM) in 17 developing economies.

Model Specification

Using the statistical model proposed by Hall and Jones (1999); Romer and Weil (1992) we may assess the impact of institutions in economic growth. Four institutions, including financial institutions, Social Institutions and Political Institutions, capital stock, trade openness. Economic Institutions can all is used as control variables in this model. As a result, this model expressed by McManus (2015) as follows:

$$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (1)$$

Where,

Y_{it} represent real GDPPC which is dependent variable

β_0 is the intercept of the model and independent variables are as follows:

k_{it} Represent Capital Stock, T_{it} represent Trade Openness, F_{it} represent Financial Institutions, E_{it} represent Economic Institutions, S_{it} represent Social Institutions, P_{it} represent Political Institutions and μ_{it} represent residual term of the model.

Panel Data Regression Models

There are three main types of data with respect to time periods and cross-section units. These types are as follows: Data with respect to time is known as time series data i.e., observations varying with respect to time-period represent time series data. The time-period may be a second, a minute, an hour, day, week or years etc. Data of particular variable collected from different units at the one specific point of time is known as cross-sectional data e.g. data of institutional indicator of 17 developing countries for the specific year 2015. Data of particular variable collected from different units for multiple time periods is called pooled data i.e., observations

vary with respect to a time period as well as with respect to cross-sectional units e.g. data of institutional indicator of 27 developing countries for 1990-2014. Panel data is a particular type of pool data where the same units are surveyed over different time points. Simply put, panel data has two dimensions of space as well as time. Additional names of panel data are cohort analysis, event history analysis, and longitudinal data. As linked to cross-sectional and time series data, panel data can measure better effects.

The general form of panel data regression model by Shah et al. (2019) may be written as follow:

$$Y_{it} = F(x_{it}) + \mu_{it} \qquad (2)$$

In the model 2 indicates the general form of the panel data model. Where Y_{it} is the dependent variable and $F(x_{it})$ is the deterministic part of the model and μ_{it} is the error term.

Estimation of the above model depends based on assumptions. Based on these assumptions, there are different models for panel data formed such as "Pooled Ordinary Least Square Regression Model", "Fixed Effect Model", "Random Effect Model" and "Dynamic Random Effect Model". If we assume that the model's parameters represent a common effect with respect to time or cross-sectional units with assumptions of Classical Linear Regression Model (CLRM) followed by error term, it is called a Pooled OLS regression model. Greenland and Robins (1985) use "estimation of a POLS parameter from sparse follow-up data". We can write POLS model 1.

The above model is estimated using the least square method. If endogeneity is an issue, we can use any Instrumental Variable (IV) method i.e., 2SLS or GMM to solve the problem. A fixed effect model is one in which at least one of the model's parameters fluctuates with respect to time periods or cross-sectional units. For heterogeneity, the Fixed Effect Model (FEM) assigns intercept values to all potential entities.

Consider the following model by McManus, 2015:

$$y_{it} = \beta_{0i} + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (3)$$

Because each country has its own characteristics, the subscript i in the preceding equation suggests that it may allow intercept to vary among countries. Capital Stock, Trade Openness, and four institutions are examples of these qualities. Since each developing nation has a unique intercept that is time invariant and does not change with respect to time, a FEM is the name given to the overhead model. For all time periods, we can include time dummies in the model if the variable fluctuates over time. So here is a query raised up that how can it allow FEM intercepts to vary by country? Using the dummy variable method, it can easily manage the situation. McManus, 2015 write this model as follows:

$$y_{it} = \beta_0 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 \ldots\ldots + \beta_{16} D_{16} + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (4)$$

Where, D2=1 for country 2, Otherwise 0, D3=2 for country 3, Otherwise zero and so on.

We currently have 17 nations and 16 dummies to launch. "This approach for analysis of combining ability for seed oil content in cotton" is used by Kaushik et al. (1984).

If numerous cross-sectional units are surveyed, using an LSDV or fixed effects model could be expensive in terms of degree of freedom. To convey information if dummy variables are unable to do so, proponents of the Error Component Model (ECM) or Random Effect Model (REM) suggested adding an error term to the model.

Simply, we can define REM, if random variation in the model parameters with respect to time or units is anticipated. So, in resultant, random variations of the parameters can be measured by adding a random error term. Random Effect Model is the name given to such a panel data model.

Estimation Method for Panel Data Models

Heterogeneity in Panel Data

The panel data model where the coefficients in the model differ for each cross-section in the panel dataset which means that there is variability in data. Observed heterogeneity usually consists of covariates and unobserved heterogeneity consists of any unobserved difference like ability or effort.

Endogeneity Problem

Endogeneity refers to the relationship between the observed and unobserved variables, namely that they are dependent on one another. In econometrics, the word "endogeneity" is used to characterize situations in which an explanatory variable is linked to the error term (Wooldridge, 2009).

The hypothesis is as follows:

H_0: All variables are exogenous and against H_1 : All variables are endogenous.

Data and Methodology

This section includes the variables, data sources and techniques of analysis. Broadly the chapter is divided into two parts. One part consists of sources of data, description of variables and background of the model specification. The second part includes estimation of the model.

Data Description

In order to investigate the relationship between institutions and economic growth by using panel data from the years 2000-2014 for 17 developing countries. Population growth has slowed everywhere except sub-Saharan Africa but still accounted for almost half of world economic growth over the period 1990-2015 (United Nations 2016). This study took data for the institutions from International Country Risk Guide (ICRG) dataset and the data for GDPPC, capital stock and trade openness are collected from the World Development Indicators (WDI).

We used data from 2000 to 2014 in this research investigation. The institutions use the International Country Risk Guide (ICRG) as a source of variables. In the cross-country literature, a large variety of variables, both with and without time variation, have been presented as growth determinants. However, data for many of the latter is not accessible for the whole sample period studied in this article. We limit our selection of time-varying variables to those for which data is

available across the whole period 2000-2014 because our major purpose is to work with a panel data set.

In order to investigate the relationship between institutions and economic growth by using panel data from the years 2000-2014 (15 years) for the instance of 17 developing countries and the World Development Indicators (WDI) was used to compile data for the 17 developing countries. The data for GDPPC and capital stock creation is collected from a variety of sources (WDI). Data from various types of organizations is collected using the International Country Risk Guide (ICRG) data source. The International Crisis Response Group (ICRG) was ready to foresee political, economic, social, and financial dangers. The ICRG make statistics available on annual basis for 17 developing countries (Asian and others). The advantage of using ICRG dataset is that it allows you to understand the political, economic, and financial risks that might affect investment, company, and, ultimately, the country's economic growth.

List of the countries included in the study

1	Bangladesh	5	Gambia	9	India	13	Côte d'Ivoire	16	Haiti
2	Burkina Faso	6	Ghana	10	Kenya	14	Ethiopia	17	Honduras
3	Burundi	7	Guinea	11	Liberia	15	Pakistan		
4	Congo	8	Guinea –Bissau	12	Madagascar				

Description of variables

Real per capita GDP growth: Annual percentage growth rate of real per capita GDP which is measured by constant 2010 US$.

Trade openness: It is calculated as the sum of merchandise exports and imports divided by the value of GDP which is measured by constant 2010 $US.

***Capital stock*:** Using 2010 as the base year, real gross capital creation in dollars.

***Economic Institution*:** Budget balance, real GDP growth, yearly inflation rate, and GDP per person, current account

***Financial Institution*:** Foreign debt, percentage of exports of goods and services, Current account of goods and services, Net international liquidity of import, exchange rate stability

***Political Institutions*:** Govt. stability, investment profile, internal conflict, external conflict, corruption, military in politics, law and order, democratic accountability, bureaucracy quality.

***Social Institutions*:** Ethnic tension, religious tension

Results and Discussion

The descriptive statistics with and without logarithm form of the data and then check the normality for all countries and then individually for each country by using normality test i.e. Shapiro-Wilk Test. we estimates Pooled OLS model. The estimate of Fixed Effect model.

The VIF values for all the institutions and other independent variables. It is clear that all variables are not correlated to each other, and they are quite satisfactory. Overall, there is no

evidence of a significant multicollinearity problem because the values are all lower than 2 and its mean is also 1.09.

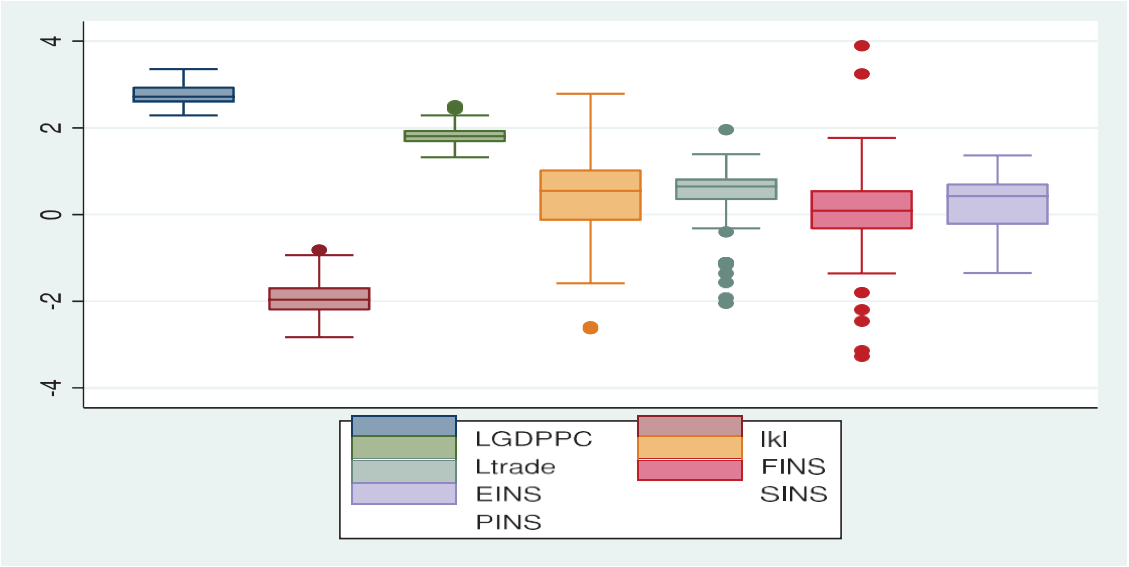
Table 4.1

Test of Normality for each variable (Shapiro-Wilk W Test)

Variables	n	W	Prob>z
GDPPC (log)	255	0.968	0.000
Kl (log)	255	0.993	0.287
Trade Openness (log)	255	0.975	0.000
FINS	255	0.983	0.004
EINS	255	0.835	0.000
SINS	255	0.937	0.000
PINS	255	0.922	0.000

Table 4.1 shows that the statistical test of Shapiro-Wilk for is significant for the variable GDPPC (in log) it means that this dependent variable is not normal. The variable Kl (in log) is normally distributed as its P>0.05. The statistical test of Shapiro-Wilk is significant for the independent variable Trade Openness (in log) which means that this variable is not normally distributed. Furthermore, next four variables FINS, EINS, SINS and PINS are not normal according to Shapiro-Wilk test as P value is less than 0.05.

Figure 1: Boxes Plot



Estimation of Pooled Ordinary Least Square Model

Parameters of the model represent Pooled Ordinary Least Square Model w.r.t time or units and all assumptions of Classical Linear Regression Model (CLRM) followed by error term; it is called Pooled Ordinary Least Square Regression Model.

Table 4.2

Results of Panel Ordinary Least Square Model

Coefficients	Estimate	Std. Error	P
Intercept	3.529	0.115	0.000
Capital stock	0.504	0.027	0.000
Trade Openness	0.167	0.052	0.002
FINS	0.080	0.012	0.000
EINS	-0.014	0.021	0.505
SINS	-0.024	0.012	0.054
PINS	-0.036	0.016	0.029

Table 4.2 shows that financial institution plays a positive significant role while other three indicates a negative impact on the dependent variable.

Table 4.3

Goodness of Fit and Diagnostic Test

R square	0.6539
Adjusted R square	0.6444
Prob.	0.0000
F test	90.80
Endogenity	0.1241

In Table 4.3, R-square shows that 65% influence of independent variables on the GDP. F value is 90.80 and its p value is less than 0.05 so it shows that model provides a better fit and the endogeneity (P-value) is 0.1241 which is greater than 0.05 so we accept null hypothesis that the variables are exogenous.

Estimation of Fixed Effect Model

At least single parameter of the model varies with respect to time or units then such a model is known as a Fixed Effect Model. FEM allows heterogeneity by allocating intercept to all its entities. For the estimation of FEM generalized method of moment can be used.

Table 4.4

Estimation Results of Fixed Effect Model

Coefficients	Estimate	Std. Error	P
Intercept	3.908	0.065	0.000
Capital stock	0.607	0.020	0.000
Trade Openness	0.022	0.033	0.050

FINS	0.020	0.012	0.400
EINS	0.162	0.019	0.020
SINS	-0.029	0.012	0.015
PINS	-0.037	0.008	0.000

Table 4.4 shows that change of one unit in Capital Stock cause 0.6068 units increases in GDP with P<0.05 along standard error 0.0203 which concludes significant impact on dependent variable. Similarly, a change in Trade Openness of one unit causes 0.0216 units increases in GDP with P>0.05 along standard error 0.0329 which indicates minor effect on dependent variable.

Table 4.5

Goodness of Fit and Diagnostic Test

R square	0.611
Adjusted R square	0.631
Prob.	0.000
F test	19.40

In Table 4.5, R-square shows that 61% influence of independent variables on the GDP.

F value is 19.40 and its p value < 0.05 so it shows that model provides a better fit.

Estimation of Random Effect Model

If the model's parameters are anticipated to vary arbitrarily with respect to either time or units, the term "random error term" may be used to describe these variations. Consequently, it is known as the Random Effect Model (REM). There are two elements to the REM composite error term, “the cross sectional or individual specific error component and the combined time series and cross-sectional error component”.

Table 4.6

Estimation Results of Random Effect Model

Coefficients	Estimate	Std. Error	P
Intercept	3.49	0.12	0.00
Capital stock	0.51	0.28	0.00
Trade Openness	0.13	0.53	0.01
FINS	0.66	0.12	0.60
EINS	0.01	0.22	0.09
SINS	-0.02	0.14	0.00
PINS	-0.06	0.17	0.00

Table 4.6 shows that a change in Capital Stock of one unit cause 0.5059 units increases in GDP with P<0.05 along standard error 0.2820 which concludes significant impact on dependent variable. Furthermore, a change in PINS of one unit causes -0.0616 units decreases in GDP with P<0.05 along standard error 0.1709 which shows negative impact on dependent variable.

Table 4.7

Goodness of Fit and Diagnostic Test

R square	0.6539
Adjusted R square	0.6785
Wald chi square	411.84
P-value	0.000

In Table 4.7, R-square shows that 65% influence of independent variables on the GDP.

Estimation of Hausman Test

The Hausman test is a statistical hypothesis which evaluates the consistency of an estimator when compared to another. It is used to select which model is best between FEM and REM. In the Hausman test, if P<0.05 it means that FEM is suitable model and if P>0.05 then REM is the suitable model.

b = consistent under H_0 and H_1 or B = inconsistent under H_1, efficient under H_0

Test: Ho: difference in coefficients not systematic

X^2 (7) = (b-B)'$[(Varb - VarB)]^{-1}$ (b-B) = 184.22, Prob = 0.0000

The hypotheses is as follows: H_0: REM is selected , H_1: FEM is selected

Table 4.8

Estimation Results of Hausman Test

	Coefficients		
	(b) Fixed Effect	**(B) Random Effect**	**(b-B) Difference**
Capital Stock	0.607	0.506	0.101
Trade Openness	0.216	0.131	-0.109
FINS	0.195	0.066	-0.047
EINS	-0.016	-0.011	-0.005
SINS	-0.029	-0.029	-0.006
PINS	-0.037	-0.016	0.024

Table 4.8 shows the P<0.05 with statistic 184.22. If P<0.05, we reject the null hypothesis and accept alternative one. As our result shows that P<0.05 so in this case we conclude that Fixed Effect Model is an appropriate model.

Estimation of Dynamic Random Effect Model

When we include lag term of the response variable as an explanatory variable then the random effect model is called dynamic.

Now we must face a specific problem in the above model. This problem is due to the violation of the assumption of CLRM. The assumption of CLRM is that the regresses are exogenous to error term.

Table 4.9

Estimation Results of Dynamic Random Effect Model

Coefficients	Estimate	Std. Error	P
L1	0.593	0.315	0.040
Intercept	4.012	0.147	0.000
Capital Stock	0.600	0.226	0.000
Trade Openness	0.528	0.046	0.256
FINS	0.031	0.144	0.071
EINS	0.039	0.021	0.000
SINS	-0.051	0.014	0.000
PINS	-0.546	0.147	0.000

Table 4.9 shows that a change in Capital Stock of one unit cause 0.5997 unit increases in GDP with P<0.05 along standard error 0.2256 which concludes major effect on dependent variable.

Table 4.10

Goodness of Fit and Diagnostic Test

R Square	0.687
Adjusted R square	0.680
Wald chi square	911.8
P-values	0.00

In Table 10, R-square shows that 68% influence of independent variables on the GDP.

Firstly, describe the summary of statistics and then plot their histogram as well but two variables are highly skewed i.e. GDPPC and trade openness. So, in this case we apply log transformation and then find out again descriptive statistics. To test the normality of data of all countries we use Shapiro-Wilk test for this purpose, and it indicates significant results. Finally, the Hausman test is used for selecting best model between FEM and REM. As P-value= 0.0000 so reject our null hypothesis and accept alternative one that is FEM is best model.

Summary and Conclusion

In this study we have estimated Panel Ordinary Least Square Model, Fixed Effect Model, Random Effect Model and Dynamic Random Effect Model". F-test is used between Pooled Ordinary Least Square Model and Fixed Effect Model. According to the F-test results; it shows us that Pooled Ordinary Least Square Model is suitable model between Fixed Effect Model and Random Effect Model. But still Pooled Ordinary Least Square (POLS) is not a valid model among all the models. Random Effect Model and Dynamic Random Effect Model are also not selected because their standard error shows high values between GDP and the independent variables. Whereas Fixed Effect Model shows significant impact of independent variables on dependent variable and Random Effect Model also shows significant effect of independent variables on dependent variable.

Fixed model is the valid model because it shows that GDP and independent variables have significant results. Our other explanatory variables i.e., Capital Stock, Trade Openness and four institutions also have a significant impact on our response variable. Adjusted R-square is also in favor of this model. So, their estimates are reliable, and we can use these estimates for policy making in the case of selected developing countries.
Finally, we can conclude that Fixed Effect Model is an appropriate model among all the other models. Unlike other models, it has a low standard error.

Future Recommendation

In the light of our empirical results and limitations, we propose the following dimensions for further investigation and for polishing our work:

Firstly, we could consider a micro level analysis investigating how firm or sector level development relates to institutional change. Such kind of micro level investigation has been started in recent years. However, most of these works relate to qualitative analysis on one hand and mostly land reform on the other (Nunn, 2009). Empirical work in respect to the manufacturing and services sectors remain limited. As institutional measures are largely macro in nature, case studies for specific data needs at sectoral level may have to be built up. Alternatively, we could also investigate how macro institutional arrangement could be differently felt by sectors and industries.

Secondly, a theoretical model to incorporate the bilateral causal relationship between democracy and economic reforms may need to be considered. How and why economic reforms are more likely to be implemented in democracy have been previously studied in the literature. However, a model to explain the reverse causality is perhaps more interesting, especially with reference to the experiences of emerging markets like China, where economic reforms have taken place but democratization progress has been slow.

The third is how to formalize institutional quality - regulatory environment in particular - as a source of comparative advantage which ultimately determines the pattern of capital flow. Models relating institutional quality and trade have been built.

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Introduction

Economic Growth

Economic growth is particularly the most important instrument for an economy specifically in developing economies to reducing poverty, increasing national output, and improving quality of life (Tran et al., 2021). Many studies examined the relationship between energy consumption and economic growth (EG). Some studies have investigated single countries while others have chosen many countries simultaneously in a panel data analysis framework (Barro, 1991).

The social and investment model of economic growth is one of the most topical contradictions and manifestations of the differences between developed and developing countries. The socioeconomic systems of developed countries have by now achieved such a high level of progress and the gap between them and other participants of global economic relations has become so large that they could ignore the rate of economic growth (temporarily) to raise the quality of life (Ellahi et al., 2021; Kapetanovic et al., 2022). This is what takes place in the social and investment model of economic growth, which ensures its moderate rate but a serious contribution to human development and realization of intellectual and innovative potential (Brown et al., 2022; Salamzadeh et al., 2022).

The origins of cross-country disparities in economic development and growth are arguably the most important problems in social science. What causes certain countries to be significantly poorer than others? Why do certain countries thrive economically while others remain stagnant? And, to the degree that we can create some answers to these issues, as well as the following ones: what can be done to stimulate economic growth and raise societal living standards?

A society's output per person is correlated with the quantity of human capital, physical capital, and technology available to its workers and enterprises, according to economists who have known this for a long time (Awais et al., 2022; Muhammad et al., 2023). The capacity of a civilization to grow its physical capital, human capital, and technological capital is also related to economic growth. In this context, technology is interpreted broadly; technological distinctions include both the organizational structures of production and the tools available to businesses, allowing certain nations to utilize their resources more effectively.

Differences in these three sectors raise the question of why certain nations have lower levels of physical capital, human capital, and technology and make poor use of their resources and opportunities. On the other hand, these differences are only proximate reasons. To produce more sufficient answers to questions like why some countries are considerably richer than others and why some countries grow much faster than others, we need to investigate potential fundamental causes that may be behind these proximal variations among countries. We can only establish a framework for making policy recommendations that go beyond platitudes (such as "upgrade your technology") and limit the possibility of unanticipated negative repercussions if we understand these underlying reasons (Hsiao & Mei-Chu, 2003).

The objectives of the study are: There is a broad agreement in academia that institutions play a fundamental role in economic development. Nevertheless, the question about which specific types of institutions relate to specific economic outcomes is not adequately addressed. Our

primary research interest is to identify the channels through which development outcomes are affected by economic and political institutions directly.

Research Questions

Against this background, our key research questions can be summarized as a series of related themes as follows: (a) Exactly what development outcomes are directly affected by institutional quality? (b) Are these development outcomes affected by economic or political institutions, or macroeconomic policies or other economic fundamentals? (c) Given that institutional changes do occur, do economic and political institutions cause changes in macroeconomic policies? Similarly, do macroeconomic policies cause institutional changes? (d) Other than domestic institutions, do external institutions have any role to play in the development process?

Significance of Study

Cross-country empirical analyses, in combination with micro-level studies, provide strong support for the overwhelming importance of institutions in predicting the level of development in countries around the world (Hall & Jones, 1999; Acemoglu, Johnson & Robinson, 2001). Protection of property rights, effective law enforcement, and efficient bureaucracies, together with a broad range of norms and civic mores, are found to be strongly correlated to better economic performance over time.

The performance of institutions is determined by a country's economic structure. Many less developed countries have some form of "inclusive" institutions-the primary problem is that these are only written in law and hardly or only selectively enforced. This article argues that this is the outcome of decreasing returns production structures. Enforcing institutions are not costless and diminishing returns economic activities simply do not produce sufficient value added to cover the costs of enforcement. The reverse is true in rich countries with increasing returns economic structures.

Literature Review

Institutions are the rules of the game in a community or, more technically, are the humanly constructed limits that govern human interaction (Northt, 1990). This definition highlights three fundamental characteristics of institutions 1) They are "humanly manufactured," as opposed to other potential fundamental causes, such geographic conditions, which are out of human control 2) they are "game rules," placing "constraints" on human behavior 3) and they will primarily affect behavior through incentives (North, 1981).

The human-made limitations that govern political, economic, financial, and social interaction are referred to as institutions. They are made up of both legal (laws, property rights, and constitutions) and informal (sanctions, norms, traditions, and codes of conduct) restrictions. In this definition, institutions are the kinds of structures which make up the stuff of social life. According to Williamson (2009) institutions are widely believed to be important for the economic development of a country. Every institution has a purpose, and they are permanent, which means they do not end when one person is gone.

The manner that economic and political life is organized varies greatly from country to country. Wide cross-country disparities in economic institutions, as well as a substantial association between these institutions and economic success are documented in a large body of work. For

example, Knack and Keefer (1995) looked at property rights enforcement measures produced by international business groups, Mauro (1995) looked at corruption measures, and Djankov et al. (2002) looked at entry barriers among countries. Numerous more studies examine how changes in educational institutions affect human capital.

For one hundred twenty-seven nations, Hall, and Jones (1999) used ICRG dataset for the indicator institutions. Human capital, education, and productivity were all factors that influence organizational change, according to the researchers. As per their findings, differences were related to differences in institutional factors among cross-country.

Antweiler et al. (2001) analyzed how pollution levels were affected by access to international goods markets. They created a theoretical model that divided trade's impact on pollution into scale, technique, composition effects, and then tested it with data on sulphur dioxide concentrations. When international commerce modified the composition of national output, they found that pollutant concentrations move only slightly. Estimates of trade-induced techniques and scale effects suggested that pollution from these sources will be reduced net. When they added together these estimates for all three effects, they arrived at an unexpected conclusion: more open trade looks to be good for the environment.

From 1982 to 1997 data, Drury et al. (2006) studied the connection between corruption, democracies & non-democracies and used panel data from over a hundred nations (taking data from ICRG). They discovered that in democracies corruption had a minor impact on economic growth while it had a substantial impact in non-democracies, and this substantial impact had a negative economic impact.

The causal connection between total energy use and Pakistan's economy's contribution to financial development was also examined by Kakar et al. (2011) using a separate set of data from 1980 to 2009, co-integration and the Vector Error Correction model were applied. The empirical results of the Granger Causality test showed that the bond between the two variables were unidirectional running from EC to EG. Their study confirmed that any energy shock through financial development in Pakistan will help the economy to grow in the long run.

In a theoretical framework, Siddique et al. (2016) investigated how institutional indicators influence economic growth. Principal component analysis was used to extract variables from thirty-one indicators encompassing 84 nations during a five-year period (2000-2006). These institutional elements were then incorporated into a formal growth model using panel OLS and GMM-based estimation techniques. According to the findings, favorable institutions had a positive impact on economic growth.

For a panel of 91 nations between 1999 and 2014, Siddique et al. (2016) used random effect models and System GMM techniques to analyses the relationship between institutional governance and economic growth. For a small panel of nations, the findings show that institutional governance had a direct and considerable impact on economic growth. This study wants to investigate institutional governance to enhance economic growth both directly and indirectly.

While most studies present a linear linkage between institutions and growth, there is also an empirical growth literature that deals with the non-linearities in the canonical cross-country growth regression. For instance, using data on 100 countries over the years 1995-2018, Li and

Kumbhakar (2022) propose a quantile regression model in which countries are grouped according to their growth rates, finding a positive effect of economic freedom on per capita GDP growth.

In the long term, under the effect of the dialectical law of transition from quantity to quality, large-scale social investments will be accumulated in the volume that would ensure acceleration of economic growth rate based on the capabilities of the fourth technological mode (Industry 4.0), the transition to which has only started (Nja et al., 2022). Developing countries cannot allow for a reduction in economic growth rate, but they are also interested very much (as compared with developed countries) in social investments (Batchaev et al., 2021). Therefore, there emerges a problem in the search for a new, special approach to implementing the social and investment model of economic growth in developing countries, which would allow increasing social investments and preserving a high rate of economic growth, avoiding its reduction (Slisane et al., 2022).

Review of literature shows that most of the studies found positive role of institution in economic growth, but some studies also found the negative impact also. Hence, this study will help us to determine the impact of institutions on economic growth and to compare the fixed effect model (FEM) with random effect Model (REF) and dynamic effect Model (DEM) in 17 developing economies.

Model Specification

Using the statistical model proposed by Hall and Jones (1999); Romer and Weil (1992) we may assess the impact of institutions in economic growth. Four institutions, including financial institutions, Social Institutions and Political Institutions, capital stock, trade openness. Economic Institutions can all is used as control variables in this model. As a result, this model expressed by McManus (2015) as follows:

$$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (1)$$

Where,

Y_{it} represent real GDPPC which is dependent variable

β_0 is the intercept of the model and independent variables are as follows:

k_{it} Represent Capital Stock, T_{it} represent Trade Openness, F_{it} represent Financial Institutions, E_{it} represent Economic Institutions, S_{it} represent Social Institutions, P_{it} represent Political Institutions and μ_{it} represent residual term of the model.

Panel Data Regression Models

There are three main types of data with respect to time periods and cross-section units. These types are as follows: Data with respect to time is known as time series data i.e., observations varying with respect to time-period represent time series data. The time-period may be a second, a minute, an hour, day, week or years etc. Data of particular variable collected from different units at the one specific point of time is known as cross-sectional data e.g. data of institutional indicator of 17 developing countries for the specific year 2015. Data of particular variable collected from different units for multiple time periods is called pooled data i.e., observations

vary with respect to a time period as well as with respect to cross-sectional units e.g. data of institutional indicator of 27 developing countries for 1990-2014. Panel data is a particular type of pool data where the same units are surveyed over different time points. Simply put, panel data has two dimensions of space as well as time. Additional names of panel data are cohort analysis, event history analysis, and longitudinal data. As linked to cross-sectional and time series data, panel data can measure better effects.

The general form of panel data regression model by Shah et al. (2019) may be written as follow:

$$Y_{it} = F(x_{it}) + \mu_{it} \qquad (2)$$

In the model 2 indicates the general form of the panel data model. Where Y_{it} is the dependent variable and $F(x_{it})$ is the deterministic part of the model and μ_{it} is the error term.

Estimation of the above model depends based on assumptions. Based on these assumptions, there are different models for panel data formed such as "Pooled Ordinary Least Square Regression Model", "Fixed Effect Model", "Random Effect Model" and "Dynamic Random Effect Model". If we assume that the model's parameters represent a common effect with respect to time or cross-sectional units with assumptions of Classical Linear Regression Model (CLRM) followed by error term, it is called a Pooled OLS regression model. Greenland and Robins (1985) use "estimation of a POLS parameter from sparse follow-up data". We can write POLS model 1.

The above model is estimated using the least square method. If endogeneity is an issue, we can use any Instrumental Variable (IV) method i.e., 2SLS or GMM to solve the problem. A fixed effect model is one in which at least one of the model's parameters fluctuates with respect to time periods or cross-sectional units. For heterogeneity, the Fixed Effect Model (FEM) assigns intercept values to all potential entities.

Consider the following model by McManus, 2015:

$$y_{it} = \beta_{0i} + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (3)$$

Because each country has its own characteristics, the subscript i in the preceding equation suggests that it may allow intercept to vary among countries. Capital Stock, Trade Openness, and four institutions are examples of these qualities. Since each developing nation has a unique intercept that is time invariant and does not change with respect to time, a FEM is the name given to the overhead model. For all time periods, we can include time dummies in the model if the variable fluctuates over time. So here is a query raised up that how can it allow FEM intercepts to vary by country? Using the dummy variable method, it can easily manage the situation. McManus, 2015 write this model as follows:

$$y_{it} = \beta_0 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 \dots \dots . + \beta_{16} D_{16} + \beta_1 k_{it} + \beta_2 T_{it} + \beta_3 F_{it} + \beta_4 E_{it} + \beta_5 S_{it} + \beta_6 P_{it} + \mu_{it} \qquad (4)$$

Where, D2=1 for country 2, Otherwise 0, D3=2 for country 3, Otherwise zero and so on.

We currently have 17 nations and 16 dummies to launch. "This approach for analysis of combining ability for seed oil content in cotton" is used by Kaushik et al. (1984).

If numerous cross-sectional units are surveyed, using an LSDV or fixed effects model could be expensive in terms of degree of freedom. To convey information if dummy variables are unable to do so, proponents of the Error Component Model (ECM) or Random Effect Model (REM) suggested adding an error term to the model.

Simply, we can define REM, if random variation in the model parameters with respect to time or units is anticipated. So, in resultant, random variations of the parameters can be measured by adding a random error term. Random Effect Model is the name given to such a panel data model.

Estimation Method for Panel Data Models

Heterogeneity in Panel Data

The panel data model where the coefficients in the model differ for each cross-section in the panel dataset which means that there is variability in data. Observed heterogeneity usually consists of covariates and unobserved heterogeneity consists of any unobserved difference like ability or effort.

Endogeneity Problem

Endogeneity refers to the relationship between the observed and unobserved variables, namely that they are dependent on one another. In econometrics, the word "endogeneity" is used to characterize situations in which an explanatory variable is linked to the error term (Wooldridge, 2009).

The hypothesis is as follows:

H_0: All variables are exogenous and against H_1 : All variables are endogenous.

Data and Methodology

This section includes the variables, data sources and techniques of analysis. Broadly the chapter is divided into two parts. One part consists of sources of data, description of variables and background of the model specification. The second part includes estimation of the model.

Data Description

In order to investigate the relationship between institutions and economic growth by using panel data from the years 2000-2014 for 17 developing countries. Population growth has slowed everywhere except sub-Saharan Africa but still accounted for almost half of world economic growth over the period 1990-2015 (United Nations 2016). This study took data for the institutions from International Country Risk Guide (ICRG) dataset and the data for GDPPC, capital stock and trade openness are collected from the World Development Indicators (WDI).

We used data from 2000 to 2014 in this research investigation. The institutions use the International Country Risk Guide (ICRG) as a source of variables. In the cross-country literature, a large variety of variables, both with and without time variation, have been presented as growth determinants. However, data for many of the latter is not accessible for the whole sample period studied in this article. We limit our selection of time-varying variables to those for which data is

available across the whole period 2000-2014 because our major purpose is to work with a panel data set.

In order to investigate the relationship between institutions and economic growth by using panel data from the years 2000-2014 (15 years) for the instance of 17 developing countries and the World Development Indicators (WDI) was used to compile data for the 17 developing countries. The data for GDPPC and capital stock creation is collected from a variety of sources (WDI). Data from various types of organizations is collected using the International Country Risk Guide (ICRG) data source. The International Crisis Response Group (ICRG) was ready to foresee political, economic, social, and financial dangers. The ICRG make statistics available on annual basis for 17 developing countries (Asian and others). The advantage of using ICRG dataset is that it allows you to understand the political, economic, and financial risks that might affect investment, company, and, ultimately, the country's economic growth.

List of the countries included in the study

1	Bangladesh	5	Gambia	9	India	13	Côte d'Ivoire	16	Haiti
2	Burkina Faso	6	Ghana	10	Kenya	14	Ethiopia	17	Honduras
3	Burundi	7	Guinea	11	Liberia	15	Pakistan		
4	Congo	8	Guinea –Bissau	12	Madagascar				

Description of variables

Real per capita GDP growth: Annual percentage growth rate of real per capita GDP which is measured by constant 2010 US$.

Trade openness: It is calculated as the sum of merchandise exports and imports divided by the value of GDP which is measured by constant 2010 $US.

***Capital stock*:** Using 2010 as the base year, real gross capital creation in dollars.

***Economic Institution*:** Budget balance, real GDP growth, yearly inflation rate, and GDP per person, current account

***Financial Institution*:** Foreign debt, percentage of exports of goods and services, Current account of goods and services, Net international liquidity of import, exchange rate stability

***Political Institutions*:** Govt. stability, investment profile, internal conflict, external conflict, corruption, military in politics, law and order, democratic accountability, bureaucracy quality.

***Social Institutions*:** Ethnic tension, religious tension

Results and Discussion

The descriptive statistics with and without logarithm form of the data and then check the normality for all countries and then individually for each country by using normality test i.e. Shapiro-Wilk Test. we estimates Pooled OLS model. The estimate of Fixed Effect model.

The VIF values for all the institutions and other independent variables. It is clear that all variables are not correlated to each other, and they are quite satisfactory. Overall, there is no

evidence of a significant multicollinearity problem because the values are all lower than 2 and its mean is also 1.09.

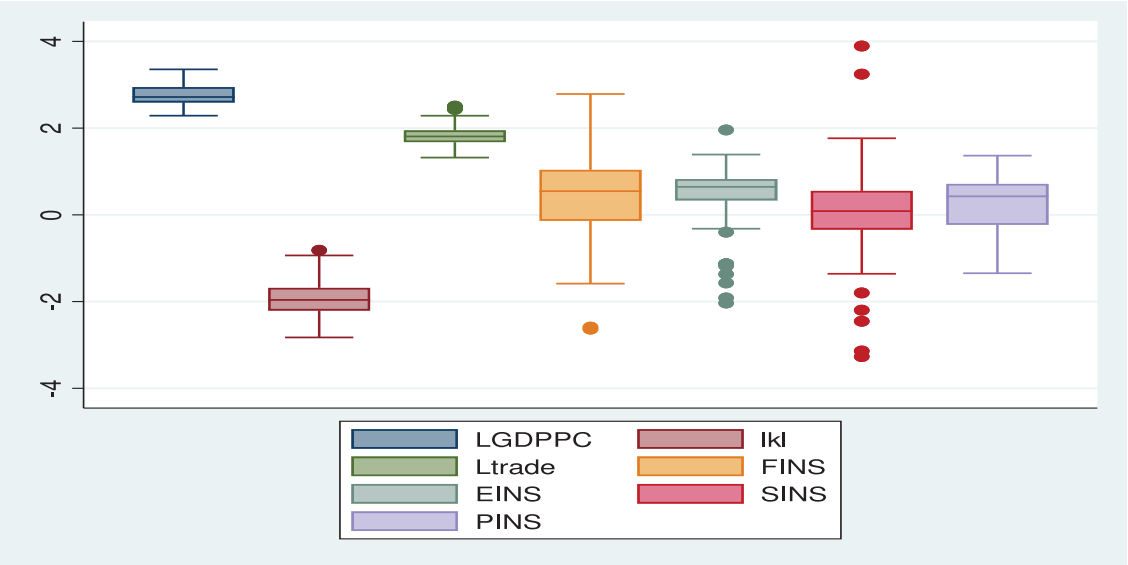
Table 4.1

Test of Normality for each variable (Shapiro-Wilk W Test)

Variables	n	W	Prob>z
GDPPC (log)	255	0.968	0.000
Kl (log)	255	0.993	0.287
Trade Openness (log)	255	0.975	0.000
FINS	255	0.983	0.004
EINS	255	0.835	0.000
SINS	255	0.937	0.000
PINS	255	0.922	0.000

Table 4.1 shows that the statistical test of Shapiro-Wilk for is significant for the variable GDPPC (in log) it means that this dependent variable is not normal. The variable Kl (in log) is normally distributed as its P>0.05. The statistical test of Shapiro-Wilk is significant for the independent variable Trade Openness (in log) which means that this variable is not normally distributed. Furthermore, next four variables FINS, EINS, SINS and PINS are not normal according to Shapiro-Wilk test as P value is less than 0.05.

Figure 1: Boxes Plot



Estimation of Pooled Ordinary Least Square Model

Parameters of the model represent Pooled Ordinary Least Square Model w.r.t time or units and all assumptions of Classical Linear Regression Model (CLRM) followed by error term; it is called Pooled Ordinary Least Square Regression Model.

Table 4.2

Results of Panel Ordinary Least Square Model

Coefficients	Estimate	Std. Error	P
Intercept	3.529	0.115	0.000
Capital stock	0.504	0.027	0.000
Trade Openness	0.167	0.052	0.002
FINS	0.080	0.012	0.000
EINS	-0.014	0.021	0.505
SINS	-0.024	0.012	0.054
PINS	-0.036	0.016	0.029

Table 4.2 shows that financial institution plays a positive significant role while other three indicates a negative impact on the dependent variable.

Table 4.3

Goodness of Fit and Diagnostic Test

R square	0.6539
Adjusted R square	0.6444
Prob.	0.0000
F test	90.80
Endogenity	0.1241

In Table 4.3, R-square shows that 65% influence of independent variables on the GDP. F value is 90.80 and its p value is less than 0.05 so it shows that model provides a better fit and the endogeneity (P-value) is 0.1241 which is greater than 0.05 so we accept null hypothesis that the variables are exogenous.

Estimation of Fixed Effect Model

At least single parameter of the model varies with respect to time or units then such a model is known as a Fixed Effect Model. FEM allows heterogeneity by allocating intercept to all its entities. For the estimation of FEM generalized method of moment can be used.

Table 4.4

Estimation Results of Fixed Effect Model

Coefficients	Estimate	Std. Error	P
Intercept	3.908	0.065	0.000
Capital stock	0.607	0.020	0.000
Trade Openness	0.022	0.033	0.050

FINS	0.020	0.012	0.400
EINS	0.162	0.019	0.020
SINS	-0.029	0.012	0.015
PINS	-0.037	0.008	0.000

Table 4.4 shows that change of one unit in Capital Stock cause 0.6068 units increases in GDP with P<0.05 along standard error 0.0203 which concludes significant impact on dependent variable. Similarly, a change in Trade Openness of one unit causes 0.0216 units increases in GDP with P>0.05 along standard error 0.0329 which indicates minor effect on dependent variable.

Table 4.5

Goodness of Fit and Diagnostic Test

R square	0.611
Adjusted R square	0.631
Prob.	0.000
F test	19.40

In Table 4.5, R-square shows that 61% influence of independent variables on the GDP.

F value is 19.40 and its p value < 0.05 so it shows that model provides a better fit.

Estimation of Random Effect Model

If the model's parameters are anticipated to vary arbitrarily with respect to either time or units, the term "random error term" may be used to describe these variations. Consequently, it is known as the Random Effect Model (REM). There are two elements to the REM composite error term, “the cross sectional or individual specific error component and the combined time series and cross-sectional error component”.

Table 4.6

Estimation Results of Random Effect Model

Coefficients	Estimate	Std. Error	P
Intercept	3.49	0.12	0.00
Capital stock	0.51	0.28	0.00
Trade Openness	0.13	0.53	0.01
FINS	0.66	0.12	0.60
EINS	0.01	0.22	0.09
SINS	-0.02	0.14	0.00
PINS	-0.06	0.17	0.00

Table 4.6 shows that a change in Capital Stock of one unit cause 0.5059 units increases in GDP with P<0.05 along standard error 0.2820 which concludes significant impact on dependent variable. Furthermore, a change in PINS of one unit causes -0.0616 units decreases in GDP with P<0.05 along standard error 0.1709 which shows negative impact on dependent variable.

Table 4.7

Goodness of Fit and Diagnostic Test

R square	0.6539
Adjusted R square	0.6785
Wald chi square	411.84
P-value	0.000

In Table 4.7, R-square shows that 65% influence of independent variables on the GDP.

Estimation of Hausman Test

The Hausman test is a statistical hypothesis which evaluates the consistency of an estimator when compared to another. It is used to select which model is best between FEM and REM. In the Hausman test, if P<0.05 it means that FEM is suitable model and if P>0.05 then REM is the suitable model.

b = consistent under H_0 and H_1 or B = inconsistent under H_1, efficient under H_0

Test: Ho: difference in coefficients not systematic

X^2 (7) = (b-B)'[$(Varb - VarB)]^{-1}$ (b-B) = 184.22, Prob = 0.0000

The hypotheses is as follows: H_0: REM is selected , H_1: FEM is selected

Table 4.8

Estimation Results of Hausman Test

	Coefficients		**(b-B) Difference**
	(b) Fixed Effect	**(B) Random Effect**	
Capital Stock	0.607	0.506	0.101
Trade Openness	0.216	0.131	-0.109
FINS	0.195	0.066	-0.047
EINS	-0.016	-0.011	-0.005
SINS	-0.029	-0.029	-0.006
PINS	-0.037	-0.016	0.024

Table 4.8 shows the P<0.05 with statistic 184.22. If P<0.05, we reject the null hypothesis and accept alternative one. As our result shows that P<0.05 so in this case we conclude that Fixed Effect Model is an appropriate model.

Estimation of Dynamic Random Effect Model

When we include lag term of the response variable as an explanatory variable then the random effect model is called dynamic.

Now we must face a specific problem in the above model. This problem is due to the violation of the assumption of CLRM. The assumption of CLRM is that the regresses are exogenous to error term.

Table 4.9

Estimation Results of Dynamic Random Effect Model

Coefficients	Estimate	Std. Error	P
L1	0.593	0.315	0.040
Intercept	4.012	0.147	0.000
Capital Stock	0.600	0.226	0.000
Trade Openness	0.528	0.046	0.256
FINS	0.031	0.144	0.071
EINS	0.039	0.021	0.000
SINS	-0.051	0.014	0.000
PINS	-0.546	0.147	0.000

Table 4.9 shows that a change in Capital Stock of one unit cause 0.5997 unit increases in GDP with P<0.05 along standard error 0.2256 which concludes major effect on dependent variable.

Table 4.10

Goodness of Fit and Diagnostic Test

R Square	0.687
Adjusted R square	0.680
Wald chi square	911.8
P-values	0.00

In Table 10, R-square shows that 68% influence of independent variables on the GDP.

Firstly, describe the summary of statistics and then plot their histogram as well but two variables are highly skewed i.e. GDPPC and trade openness. So, in this case we apply log transformation and then find out again descriptive statistics. To test the normality of data of all countries we use Shapiro-Wilk test for this purpose, and it indicates significant results. Finally, the Hausman test is used for selecting best model between FEM and REM. As P-value= 0.0000 so reject our null hypothesis and accept alternative one that is FEM is best model.

Summary and Conclusion

In this study we have estimated Panel Ordinary Least Square Model, Fixed Effect Model, Random Effect Model and Dynamic Random Effect Model". F-test is used between Pooled Ordinary Least Square Model and Fixed Effect Model. According to the F-test results; it shows us that Pooled Ordinary Least Square Model is suitable model between Fixed Effect Model and Random Effect Model. But still Pooled Ordinary Least Square (POLS) is not a valid model among all the models. Random Effect Model and Dynamic Random Effect Model are also not selected because their standard error shows high values between GDP and the independent variables. Whereas Fixed Effect Model shows significant impact of independent variables on dependent variable and Random Effect Model also shows significant effect of independent variables on dependent variable.

Fixed model is the valid model because it shows that GDP and independent variables have significant results. Our other explanatory variables i.e., Capital Stock, Trade Openness and four institutions also have a significant impact on our response variable. Adjusted R-square is also in favor of this model. So, their estimates are reliable, and we can use these estimates for policy making in the case of selected developing countries.
Finally, we can conclude that Fixed Effect Model is an appropriate model among all the other models. Unlike other models, it has a low standard error.

Future Recommendation

In the light of our empirical results and limitations, we propose the following dimensions for further investigation and for polishing our work:

Firstly, we could consider a micro level analysis investigating how firm or sector level development relates to institutional change. Such kind of micro level investigation has been started in recent years. However, most of these works relate to qualitative analysis on one hand and mostly land reform on the other (Nunn, 2009). Empirical work in respect to the manufacturing and services sectors remain limited. As institutional measures are largely macro in nature, case studies for specific data needs at sectoral level may have to be built up. Alternatively, we could also investigate how macro institutional arrangement could be differently felt by sectors and industries.

Secondly, a theoretical model to incorporate the bilateral causal relationship between democracy and economic reforms may need to be considered. How and why economic reforms are more likely to be implemented in democracy have been previously studied in the literature. However, a model to explain the reverse causality is perhaps more interesting, especially with reference to the experiences of emerging markets like China, where economic reforms have taken place but democratization progress has been slow.

The third is how to formalize institutional quality - regulatory environment in particular - as a source of comparative advantage which ultimately determines the pattern of capital flow. Models relating institutional quality and trade have been built.

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