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INSTITUTIONS, HUMAN CAPITAL AND ECONOMIC OUTPUT VOLATILITY: A Case of Open Economies

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Abstract

Now a days, it is debated that why some countries are facing great macroeconomic volatility and the crises. The basic reasons of dreadful macroeconomic performance and the volatility is due to poor quality of institutions and unnecessary government spending, high inflation, and mismanaged exchange rates. This study investigates the relationship between institutional quality, human capital and volatility of economic output; and uses various indicators of institutional quality. The sample includes a panel of 140 open economies, subject to the availability of data covering annual time period from 2002 to 2014. The results propose that greater institutional quality increases economic performance and reduces the output volatility in the economy.

Key Words: Macroeconomic Volatility, Economic Performance, Quality of Instituions.
JEL Classification: B25, B27, C33, E60, F10.

I. Introduction

Over the past few years developing countries have been affected by high macroeconomic volatilities, inflation and high level of inequalities. One of the reasons of low economic growth is the weak quality of institutions. The economic and political institutions building is very important for economic well-being, to encourage better politics and the macroeconomic constancy [Sawyer (2010)]. Moreover, most developing countries do not have satisfactory conditions in case of quality of institutions when compared to developed countries [Calderon, et al. (2012)].

Many researchers agree that less developed countries are more volatile due to absence of strong institutions. In addition, they report that small effect of macroeconomic volatilities and economic crises appear when institutions are working well; yet, greater macroeconomic volatilities are due to several micro and macro economic channels of weak institutions. The economic theory shows the importance of relationship of human

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capital and the instituions. Glaeser, et al. (2004) used two stage stragey to find realtionship of human capital and the instituions. Rogers (2008) found the impact of human capital and quality of institution on economic development, and reported that human capital is necessary and has strong relationship with economic development.

The last financial crisis has exposed the significance of economic and political factors where institutions play a key role in economic development, growth, and performance of countries. The consequences of economic shocks leading to fluctuation can be reduced through good institutional quality if appropriate policy responses which are as follow. North (1990) documented that institutions are rules of the game, which are "the humanly created constraints that structure economic, political and social interactions". Moreover, Easterly (2005) explained that institutions support social arrangement like law rules, property rights, legal traditions, governments democratic accountability and the human rights. Therefore, Institutions structure inducement in human exchange and the society. In addition, weak institutional quality increases cost and uncertainty of foreign direct investment, in forms of corruption, political instabilities or weak legal enforcements.

In light of the above discussion, the purpose of this study is to estimate relationship between qualtity of institutions, human capital and output volatility for a panel of open economies. The study take into account open economies which refers to an economy where economic activities are free among domestic and outside cummunities. According to Mankiw (2007) open economy is said to be open when there are financial exercises between the domestic and foreigin groups. Individuals and even organizations can exchange merchandises and the enterprises with international individuals and organizations in the universal group, and supports can stream as ventures over the outskirt. Exchange can appear as administrative trade, innovation exchange, and a wide range of merchandises and ventures. An economy is 'open' when it exchanges with different nations in merchandises, administrations and budgetary resources.

The study examine the effect of institutional quality and human capital with other macroeconomic variables on output volatility covering the period of 2002 to 2004 for panel of open economies under consideration. The paper further determines the effect of institutional quality, human capital and other relevant macroeconomic variables on economic growth. A panel data from 2000 to 2014 consisting of 140 open economies covering yearly time series is used. The study employ the fixed effect, random effect, pooled OLS and dynamic effect techniques for the analysis. The paper is designed to be the first to consider the relationship of institutional quality, human capital on economic volatility with three comparative methodologies. The contribution of this study is manyfold. To the best knowledge of the authors it is the first study, contributed to examine the relationship between quality of instituions, human capital and output volatility. The second contribution is the use of pool equation, fixed effect, random effect and Arrellano Bond GMM for dynamic effect. The third contribution is to estimate the said relationship on a panel of 140 open economies. After the introduction in Section I, Section II provides the

literature review,which shows the quality of relationship of institutions with economic growth and the output volatility. Section III contains the theoretical framework, where as Section IV includes data sources and the variable information. Section V presents the econometric methodology, and Section VI demonstrate the empirical analysis and the results. Finally, Section VII display the conclusions and policy implications.

II. Literature Review

Many studies exist on growth and institutions nexus by using micro- and macro-level data. For example, Jones (1981), Olson (1982), Bardhan (1984), Tornell and Velasco (1992) and Acemoglu, et al. [(2001), (2002)]. However, some literature on macroeconomic volatility exist in the case of LDCs. Macroeconomic problems are discussed by Krugman (1979), Dornbusch, et al. (1995), Kaminsky and Reinhart (1999). Rodrik (2002) discussed the long-run link of macroeconomic volatility with institutions of Argentina and suggested that macroeconomic volatility is more volatile in nondemocratic administration than democratic. They also argue that rich countries have a more balance sectoral distribution of output. The growth of resource abundance enhances the level of institutional quality [Mehlum (2006)]. Daron, et al. (2002) found that LDCs suffered a great level of output volatilities from post world war period, only due to unstable and distorted macroeconomic policies and documented a strong link of institutions with output volatility.

Many researchers have investigated the impact of institutions and its determinants due to the importance and relevance of institutions on economic growth. Sokoloff and Engermann (2000) argued that one of the determinant of institutions quality is natural resource. Calderón, et al. (2012) conducted a dynamic panel data set of 115 countries and applied the GMM fixed effect estimations with instrumental variables for macroeconomic variables and the institutional quality. They found that countries with high quality of institutions were able to implement counter-cyclical monetary and social policies. Consequently, there is a negative link between quality of institutions and macroeconomic volatility in output and interest rates [Duncan (2013)]. Acemoglu, et al. (2003) claimed a strong link between initial institutions, economic volatility and the severity of economic crises.

The relationship among insituional quality and human capital have been tested by economist like Hou (2016). As per the theory of economics, instituional quality may improve by investming human capital as, it solve the inconsistency problem of time [Barro and Gordon (1983)]. Countires which have high human capital have higher quality of instituions [Kalonda and Kanyama (2014)]. African countires who have high human capital have good governance [Kodila and Tedika (2012)] claims that there is a correlation between human capital with level of economic freedom [Lynn and Vanhanen (2012)].

Rogers (2008) created complementary impacts of human capital and institutional quality on economic development and explained that, for years of schooling and en-

rolment rate are used as proxies for human capital. He further elaborate that schooling is not essentially a powerful indicator of productive skills or human capital. Educated workers do not always find their way into activities that add value in the domestic economy; instead, institutional quality is an imperative conditioning factor which determines the effectiveness and productivity of human capital. Strong institutions may facilitate the productivity of workers by providing a well-functioning and informative labour market that responds actively to changes in labour supply and demand, in both the declining and growing sectors. High quality institutions may also control the modest entry, exit barriers and guarantee that human capital and other resources are guided towards their most productive uses. Macroeconomic stability promotes an environment with lower uncertainty where human capital can be used in productive activities and can generate high returns [Aisen and Veiga (2013)].

Lipset (1960) argues that human capital accumulation contributed to outline efficient policies, less violence and more political stability. Consistent with this view, Glaeser, et al. (2004) empirically investigated that human capital definitely affects the political institutions, and therefore, promotes economic growth. Castelló-Climent (2008) also povides evidence that good quality of human capital influences democracy via both implementations and sustainability of democracies. Contrary to these ideas, Acemoglu, et al. (2005) found that there is no significant effect of human capital on political institutions.

III. Theoretical Framework

Economic shocks can be reduced by high institutional quality which leads to volatility by ensuring appropriate policy reaction which can be followed. However, over the past few decades the economy of open countries have been reduced due to financial crises, and because of this reason, both the economic and political factorsare less exposed. North (1990) suggested that the rule of games are institutions, which are humanly devised limits political and structure economic interactions. Furthermore, Easterly (2005) documented that social arrangements like rule of law, legal traditions, property rights, democratic accountability of government and human rights support institutions. Moreover, the paper investigates the effect of human capital accumulation on economic growth and volatility. Human capital accumulation contributes to create better policies, more political stability and less violence [Lipset (1960)]. Papaiannou (2008) used time varying composite index for quality of institutions in fixed effect setting and found that improving institutional quality has a positive and significant effect. Several economists documented that trade is more where institutional quality is better. There is a high level of correlation between quality of institutions and trade [Dollar and Kraay (2003)]. In light of the above discussion the study formulate the following models of economic growth and volality of output:

$$EG_{it} = \alpha_0 + \alpha_1 HC_{it} + \alpha_2 IQ_{it} + \alpha_3 C_{it} + e_{it} \quad (1)$$

$$VEG = \beta_0 + \beta_1 HC_{it} + \beta_2 IQ_{it} + \beta_3 C_{it} + e_{it} \quad (2)$$

where, *EG* stands for economic growth; and in Equations (1) and (2), *VEG* stands for volatility of economic growth, *HC* stands for human capital, *IQ* is quality of institutions; and C_t is for all the control variables, i.e., inflation, population growth rate, trade, moratality rate government consumption, real exchange rate, real interest tax revenue and the life expectancy. In order to estimate the impact of quality of institutions on economic growth and volatility of economic output, the study apply fixed effect, random effect, pooled OLS and dynamic equation models.

IV. Data Sources and Variable Information

A panel dataset of 140 open economies with yearly observations from 2002 to 2014 were collected from various international sources. Therefore, empirical proxies are categorized into three relatively homogenous groups of formal institutions which are legal, political and economic. Voice and Accountability (VA), Political Stability and Absence of Violence (PS), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and the Control of Corruption (CC) measured the quality of institutions which has been collected from the International Country Risk Guide (ICRG). The study also uses the average of all indicators of ICRG, as proxy of quality of institutions. Human capital is measured by number of enrollment in secondary education taken from the World Bank online database. Moreover, the data for control variables, such as inflation, consumer price index (annual per cent), population, trade (per cent of GDP), infant mortality rate (per 1,000 live births), general government final consumption expenditure, real exchange rate, real interest rate, tax revenue and life expectancy was taken from the World Bank data base 2016. Output volatility, is captured by the standard deviation of residual of an economic regression [Serven (1995)]. The paper uses the following method to calculate the economic volatility:

$$v_t = \propto_0 + \propto_1 t + e_t \quad (3)$$

In Equation (3) economic volatility is measured by standard deviation of residual which is obtained by regressing v_t on a linear trend [Pritchett (2000) and Mobarak (2005)].

V. Econometric Methodology

1. Fixed Effect

The fixed effect method is only used when the impact of variable vary over time. The fixed effect discovers links between predictor and results of variables within entity like economy, company, etc. Every entity has its unique charateristics which may or

may not affect the predictor variables, for example, trade or GDP which can be influenced by political system of a country. The paper assumes that proper control is something which impacts or is a bias predictor or is the outcome. The paper can assess the net effect of predictors on results variable as fixed effect and remove the effect of timevairate characteristics.

The other assumption of fixed effect is that characteristics of time-invariant are unique for an individual and it does not correlate with another individual. The error term and the constant, do not correlate with with an other; as each entity is different. Fixed effect is not suitable if error term is correlated, which is the Huasman test rationale.

$$H_{it} = \alpha_i + \beta_2 I_{it} + e_{it} \tag{4}$$

where α_i is the intercept which is unknown for each entity, H_{it} is the dependent variable i which is the entity, and t is the time. I_{it} represents independent variable, β represents the coffcient of independent variable, and e_{it} is the error term. James, et al. (2007) documented that any change in dependent variable is due to influence of the other, than the fixed characteristics when unobserved variable does not change, over time.

2. Random Effect

The random effect assume that variation across entities is to be random and unrelated with predictor or independent variable which is unlike to fixed effect model. Greene (2008) documented that the important difference between fixed effect and random effect is either the unobserved individual effect which represents elements that are correlated with model regressors, and whether these effects are stochastic or not. The random effect is used when differences across entities have some influence on the dependent variable. Random effect includes time invariant variables, whereas it is observed in fixed effect by intercept.

$$K_{it} = \alpha_i + \beta L_{it} + e_{it} + u_{it} \tag{5}$$

where, e_{it} is between entity error and u_{it} is represented within entity error. The assumption of random effects is that entity error term is not correlated with predictors. Predictors allow to participate in the role as explanatory variables for time-invariant. Random effect specifies individual features that may or may not control the predictor variable. The random effect generalize the sample used in a model which is beyond the interference.

3. Arrellano-bond GMM Estimator

The Arrellano Bond solve the multiple problems which may arise by estimating the equation, like regressor may correlate with error term and the time-invariant country features may correlate with explanatory variables. The problem of autocorrelation rises

due to presence of lagged variable; the panel dataset has larger country dimension and short-time dimension.

In order to solve the problem of regressor (correlated with error term), the Arellano-Bond (1991) difference GMM estimator proposed by Holtz-Eakin, Newey and Rosen (1988) is used. The study includes the control variables as lagged level of endogenous regressor which pre-determines and do not correlate with the error term. To solve the problem, time-invariant country features correlated with explanatory variables, GMM difference uses the first difference to transform the following equations:

$$\Delta LEG_{it} = \alpha_0 + \alpha_1 \Delta HC_{it} + \alpha_2 I\Delta Q_{it} + \alpha_3 \Delta C_{it} + e_{it} \quad (6)$$

$$\Delta VEG = \beta_0 + \beta_1 \Delta HC_{it} + \beta_2 \Delta IQ_{it} + \beta_3 \Delta C_{it} + e_{it} \quad (7)$$

VI. Empirical Results

Prior to estimating the model of this study Mackinnon White and Davidson test is used to identfy the functional form of equations. The test results prefer the log-log form of the models. Table 1 presents the effect of all proxies of quality of institutions on economic growth and the output volatility. The table shows that voice and accountability, political stability, regulatory quality, rule of law, control of corruption and government effectivenes shave statistically significant effects on economic growth. These indicators of institutional quality contribute 15.4, 18.6, 13.4, 12.6 and 11.7 per cents to boost economic growth, respectively. R-square shows that explanatory variables

TABLE 1

Impact of Quality of Institution on Economic Growth and Output Volatility

	Dependent Variable: EG		Dependent Variable: VEG	
	Coefficient	t-statistic	Coefficient	t- statistic
Voice Accountability	0.1541*	45.76	-2.87*	8.05
Political Stability	0.1865*	30.18	-3.46	-0.53
Regulatory Quality	0.1347*	34.11	-1.40 *	-3.32
Rule of Law	0.1267*	34.49	-1.51*	3.89
Control of Corruption	0.0518*	10.97	-4.73	-0.95
Government Effectiveness	0.1173*	32.2	-1.89 *	-4.92
Constant	-0.7252*	-195.04	4.59	1.17
No. of Observation	1820		No.of obs.	1805
R-squared	0.964		R-squared	0.44
F-statistic	83.05		F-statistic	13.92

Note: * represents 1% level of significance.
Source: Authors' estimation.

explaine 96 per cent variations in economic gowth; while voice and accountability, regulatory quality, rule of law and government effectiveness have significant and negative effect on output volalitity. These indicators reduce output volatility by 28.7, 14, 15 and 18.9 per cents, respectively.

TABLE 2

Estimates of Output Volatility Model through various Econometric Techniques

Dependent Variables GDP Volatility	Fixed Effect	Random Effect	Pooled Regression	Arrellano-Bond
Voice Accountability	-9.21*	-9.63*	-1.35*	-2.02***
	(2.83)	(3.17)	(5.57)	(-1.73)
Inflation	-8.8**	-8.94*	-1.53***	-2.61*
	(-2.23)	(-2.28)	(-1.74)	(-3.60)
Population Growth	-1.43*	-1.37*	9.47	-1.44
	(3.65)	(-3.57)	(0.17)	(-1.46)
Trade	-1.6	-1.8	-3.47*	-1.25*
	(1.29)	(-1.52)	(-3.13)	(-3.29)
Human Capital	-17.674*	-24.407**	-64.15*	-2.8**
	(-2.22)	(-2.33)	(-1.91)	(-2.02)
Mortality Rate	-3.33	-2.87	-1.78	-5.42
	(-1.06)	(-0.98)	(-0.08)	(-1.27)
Govt. Consumption	-1.03***	-8.9*	2.66*	-3.98*
	(-1.87)	(-1.48)	(2.88)	(-2.86)
Real Exchange Rate	6.911	7.01	5.62	9.27
	(1.48)	(1.51)	(0.54)	(0.88)
Real Interest	-7.88**	-7.84*	-7.16	-3.32*
	(-2.30)	(-2.30)	(-0.96)	(-3.94)
Tax Revenue	4.43*	1.38*	2.27*	3.77*
	(4.43)	(4.51)	(3.61)	(5.47)
Life Expectancy	2.86	2.45	-1.69*	-2.15
	(1.29)	(1.12)	(-4.22)	(-0.04)
Constant	4.98	4.68	8.06*	
	(1.52)	(1.25)	(2.16)	
R-square	0.33	0.33	0.42	
No. of Observation	1805	1805	1805	1665

Note: *, ** and *** represents 1%, 5 % and 10 % level of significance, respectively and ( ) represents t or z statistics. For dynamic equation, Arellano-Bond test for AR(1) in the first differences: z = -9.23, Pr > z = 0.000 and Arellano-Bond test for AR(2) in first differences: z = -7.10, Pr> z = 0.
Source: Authors' estimation.

TABLE 3

Economic Growth and Quality of Institutions

Dependent Variable log of Growth Rate	Fixed Effect	Random Effect	Pooled Regression	Arrellano-Bond
Average	0.87*	0.845*	0.738*	0.800*
	(4.25)	(9.04)	(9.17)	(8.05)
Log Foreign Direct Investment	0.014*	0.0139*	-0.019**	0.01**
	(3.27)	(3.01)	(2.02)	(2.27)
Log Inflation	-0.079	-0.038	0.01	-0.094
	(-1.16)	(-0.55)	(0.09)	(-1.02)
Log Population Growth Rate	-0.011*	-0.011	0.044*	-0.059*
	(-1.71)	(-1.04)	(2.14)	(-2.53)
Log Trade	0.05**	0.061	0.021*	0.042
	(2.08)	(2.52)	(7.08)	(1.07)
Log Financial Development	0.018	-0.096	0.04	-0.23*
	(0.68)	(-0.38)	(1.67)	(-5.68)
Log Human Capital	-0.018*	-0.033*	0.014**	0.01*
	(-2.37)	(2.67)	(1.91)	(2.07)
Log Mortality Rate	0.034*	0.025*	0.04**	-0.023*
	(8.84)	(8.26)	(3.02)	(-3.46)
Log Government Consumption	-0.013	-0.022	-0.06**	-0.023
	(-0.98)	(-1.64)	(-2.81)	(-1.37)
Log Real Exchange Rate	0.01*	0.011*	0.031*	0.012*
	(3.02)	(3.18)	(5.14)	(2.36)
Log Real Interest	0.052	0.015	0.019	0.047*
	(0.09)	(0.02)	(0.18)	(4.43)
Log Tax Revenue	-0.063*	-0.061*	0.03*	-0.016*
	(-1.78)	(-1.84)	(4.15)	(-2.65)
Log Life Expectancy	-0.036	-0.021	0.08	0.021*
	(-0.05)	(-0.25)	(0.58)	(2.08)
Constant	-0.818*	-0.786*	-0.74*	
	(3.47)	(-8.9)	(-2.02)	
R-square	0.929	0.928	0.958	
No. of Observation	1655	1655	1655	1441

Note: * and ** represents 1%, 5 % level of significance, respectively and () t or z statistics.
For dynamic equation, see Arellano-Bond test for AR(1) in first differences: z = -2.81 Pr > z = 0.005, Arellano-Bond test for AR(2) in first differences: z = -0.03 Pr > z = 0.979 and Sargan test of overid. Restrictions: chi2(141) = 372.77 Prob> chi2 = 0.000
Source: Authors' estimation.

The study uses four different methods (Fixed Effect, Random Effect, Pool Regression and Dynamic Equation) to ensure the effect of macroeconomic volatility on the quality of institutions. Table 2 presents that there is a negative and significant effect of proxy of quality of institutions, inflation, population growth, human capital and government consumption on output volatility. However, there is a positive significant effect of real interest rate and tax revenue on output volatility.

Table 3 shows the impact of quality of institutions on economic growth. The proxy of quality of institutions is measured by an average of all 6 indicators of International Country Risk Guide. Quality of institutions, foreign direct investment, trade, mortality rate and real exchange rate has significant and positive impact on economci growth. These variable contribute 8.7, 1.4, 5, 3.4 and 1 per cemts to increase the economic growth, respectively. R-square shows that explanatory variables explain 92 per cent variations in economic gowth.

VII. Conclusion

This paper uses the set of 140 countries and find a strong significant, and positive effect of an average of the international countries risk guide insitutional quality indicators on economic performance; which is measured by growth rate in the panel least square estimation. Acemoglu, et al. (2001), Hall and Jones (1999), Knack and Kneefer (1995), support the findings of this study.

Moreover, the paper focuses on the role of quality institutions on macroeconomic volatility, measuring fixed, random effect as well as the dynamic model of an impact on quality of macroeconomic volatility. According to the basic hypothesis of this study the quality of institutions has no effect on macroeconomic volatility, the paper finds that there is a negative relationship with quality of institutions as measured by the standard deviation of residuals of linear equation. There is a siginificant effect of human capital on macroeonomic volatility, which means that human capital has an important role in order to reduce the macroeconomic volatility.

Open economies have been facing the domestic and international threats which can be avoided by improved institutional qualities, improved national and international polices, and the stable government spending. National policies which smoothen the progress of institutions, should also promote the macroeconomic stability. One can conclude that in open economics, quality of institutions play a vital role in stabilizing the macroeconomic volatility. The utmost need of developing nations is a strong growth which must carefully allocate public expenditures to minimize negative and maximize beneficial growth effects on the economy.

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APPENDIX

TABLE-A1

List of Countries Under Investigation

Albania	Egypt, Arab Rep.	Latvia	Russian Federation
Algeria	El Salvador	Lebanon	Saudi Arabia
Angola	Estonia	Liberia	Senegal
Argentina	Ethiopia	Libya	Serbia
Armenia	Fiji	Lithuania	Sierra Leone
Australia	Finland	Luxembourg	Singapore
Austria	France	Madagascar	Slovak Rep.
Azerbaijan	Gabon	Malawi	Slovenia
Bahamas, The	Gambia, The	Malaysia	Somalia
Bahrain	Germany	Mali	South Africa
Bangladesh	Ghana	Malta	Spain
Belarus	Greece	Mexico	Sri Lanka
Belgium	Guatemala	Moldova	Sudan
Bolivia	Guinea	Mongolia	Suriname
Botswana	Guinea-Bissau	Morocco	Sweden
Brazil	Guyana	Mozambique	Switzerland
Brunei Darussalam	Haiti	Myanmar	Syrian Arab Rep.
Bulgaria	Honduras	Namibia	Taiwan, China
Burkina Faso	Hong Kong SAR, China	Netherlands	Tanzania
Cameroon	Hungary	New Zealand	Thailand
Canada	Iceland	Nicaragua	Togo
Chile	India	Niger	Trinidad and Tobago
China	Indonesia	Nigeria	Tunisia
Colombia	Iran, Islamic Rep.	Norway	Turkey
Congo, Dem. Rep.	Iraq	Oman	Uganda
Congo, Rep.	Ireland	Pakistan	Ukraine
Costa Rica	Israel	Panama	United Arab Emirates
Côte d'Ivoire	Italy	Papua New Guinea	United Kingdom
Croatia	Jamaica	Paraguay	United States
Cuba	Japan	Peru	Uruguay
Cyprus	Jordan	Philippines	Venezuela, Rep. Bol.
Czech Republic	Kazakhstan	Poland	Vietnam
Denmark	Kenya	Portugal	Yemen, Rep.
Dominican Republic	Korea, Rep.	Qatar	Zambia
Ecuador	Kuwait	Romania	Zimbabwe