The Causal Relationship between Institutions and Economic Growth: An Empirical Investigation for Pakistan Economy

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This paper investigates relationship between institutional quality and economic performance in Pakistan using the Johansen-Juselius cointegration technique and the Granger causality test. The study results indicate that Institutions and growth are cointegrated and thus exhibit a reliable long run relationship. The Granger causality test findings indicate that the causality between Institutions and growth is uni-directional. However, there is no short run causality from Institutions to growth and vice versa. Therefore, as a policy implication that institutional quality may cause to the sustainable increase in country's income in the long run, and success of any policy could be influenced by the soundness of institutions.

1. Introduction

Exploring the relationship between economic performance and the quality of domestic institutions has been a major area of interest. The better quality of institutions has a positive and significant effect on growth and human development and this effect is more vehement for long term growth than short term. The role of regulatory institutional capacity also play important role for the cross-country variations in economic growth through positive impact on total factor productivity. The causality between institutions and economic performance is also important issue and studies shows better institutions leads to a higher income rather than causation being in the opposite direction. Some studies find that the quality of governance and institutions is important in explaining the higher rates of investment through improving the climate for capital creation .Other studies reiterated institutional roles in improving

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international capital flows in particular FDI and portfolio investment. However most of the empirical evidence about the relationship between institutions and growth are based on cross-sectional and cross-country analysis. Quite apart from general methodological flaws relating to model specification and econometric procedure, there are two fundamental limitations that make results from any cross-country study on the subject rather dubious. First, cross-country regression analysis is based on the implicit assumption of "homogeneity" in the observed relationship across countries. This is very restrictive assumption. Secondly, given vast difference among countries with respect to nature and quality of data, cross-country comparison is fraught with danger. These considerations point a need for undertaking econometric analysis of individual countries over time in order to build a sound empirical foundation for informing the policy debate. There is a rich literature on Solow growth model, extended growth model, endogenous growth model and extended endogenous growth model. This literature assumes transmission mechanism, distributive policies and institutions, are working properly and income is converging to high level. However, in developing countries such as Pakistan, this assumption is may not be valid and could be one of the most important reasons for low productivity and skewed income distribution.

The present study makes an early attempt to test empirically the role of institution on economic development of Pakistan. However, there is compelling evidence that many macroeconomics time series are non-stationary and as a result, OLS estimates using these data may produce spurious results. Although by now there exist well-developed techniques for handling non-stationary time series data. So far, no attempt has yet been made in Pakistan to study the long run causal relationship between institutions and economic performance by using well developed econometric techniques. This study employ *Johansen-Juselius cointegration technique and the Granger causality test to* examines the long run causal relationship between institutions and economic performance on annual data for Pakistan

economy over the period 1984-2006. Earlier studies use data bases and indices which cover one or few aspects of the institutional capacity. For this paper we develop a comprehensive index of "institutionalized social technologies" which is build on theoretical framework of contract and predatory theories set by North (1981). This index is made up of Risk reducing technologies based on contract theory and Anti-Rent seeking technologies based on predatory theory of state. The plan of the paper is as follows: Section 2 covers review of literature, Section 3 presents an overview of quality of institutions in Pakistan; In Section 4, presents the model and econometric techniques and data Description; Section 5 presents and analyzes the empirical findings. And Section 6 present a concluding summary.

2.Review of Literature

North (1990) defines institutions as the rules of the game in a society or, more formally, "the humanly devised constraints that shape human interaction". These rules of game can be in form of formal institutions like laws and regulations or informal ones which assimilated to culture Tabellini (2005) or social capital Putnam & at al. (1993). Some institutions lowers transaction cost thereby result in innovation and productivity whereas other institutional features impedes information flow, raising information costs and eroding the gains from information, and limit entrepreneurial activity. Examples of institutions that stunt economic growth include government, police and/or court corruption, excessive taxation and/or regulation, unstable and/or inconsistent monetary and fiscal policy. (Frye and Shleifer 1997; Johnson, Kaufmann, Zoido-Lobaton 1998; Shleifer and Vishney 1993, 1994; Soto 1989, 2000; Rodrik at al. 2003, 2004; Easterly and Levine 2002; Kaufmann and Kraay 2002; Kaufmann, Kraay and Mastruzzi 2005; Knack and Keefer 1995; Mauro 1995; Meon and Sekkat 2004; Barro 1997,2000; Sachs and Warner 1995). On distinguishing between kinds of institutions, North (1981) proposes two theories, a "contract theory" of the state and a

"predatory theory" of the state. According to the first theory, the state and associated institutions provide the legal framework that enables private contracts to facilitate economic transactions hence reducing transaction costs. According to the second, the state is an instrument for transferring resources from one group to another.

Neoclassical growth modelling Solow (1956) predicted economies move toward their steady-state growth path which means that in the long run, income per capita levels will converge. However, lack of empirical support for convergence has presented a major challenge to these models. A more refined endogenous growth theory by Romer (1986) and Lucas (1988) and its empirics provides the evidence of 'conditional'' convergence, where convergence is conditional on factors some of which are related to institutions. This is explained by new growth theories as "knowledge spillovers" assumption whereby any sector in less advanced countries can catch-up with the current technological frontier whenever it "innovates". The term "innovation" also refers to the adaptation of technologies which in turn depends upon the institutional arrangements. As argued by North and Thomas (1973), that far from being exogenous, technological changes crucially depend just on the prevailing institutions through their impact on incentives and transaction costs: it is these that largely determine how fast, if at all, technological changes will actually progress.

Institutions contributes to growth and development by reducing risk of doing business thus preventing diversion of resources and by preventing predatory rent seeking activities thereby diverting resource towards innovation. A society free of diversion, productive units are rewarded by the full amount of their production and individual units do not need to invest resources in avoiding diversion. In particular (Acemoglu et al. 2001, 2002, 2005) show that quality of institutions have a more important effect on long term growth than on short term one. Jalilian et al. (2007) emphasises the role of regulatory institutional capacity in accounting for cross-country variations in economic growth Méon and Weill (2006) , Olson

et al. (1998) find evidence suggesting that institutional factors are strongly related to total factor productivity. As productivity growth is higher in countries with better institutions and quality of governance. With regards to causal effect between institutions and economic performance , studies like Acemoglu, Johnson, and Robinson 2000; Olson et al. 1998; Rodrik et al. 2004; Kauffman et al. 2005, p. 38), indicates indicate that a better institutions leads to a higher income rather than causation being in the opposite direction. In particular Kauffman suggests that a one standard deviation improvement in governance institutions leads to a two to threefold difference in income levels in the long run. Acemogu and Johnson (2005) who attempted to distinguish between anti-rent seeking institutions and risk-reducing institutions, as they termed them as "property rights" and "contracting" institutions respectively. They found strong support for the importance of anti-rent seeking institutions on economic outcome but In contrast, indicate that the role of risk reducing institutions is more limited. The reason they give to this fact is, in absence of formal risk reducing institutions – contracting institutions, the gap is filled by private alternative institutional arrangement. Like in earlier times when formal institutions of courts and police don't exist or ineffective, people then resort to dwell in groups where contracts are honoured through informal pressure and risk of expulsion from group. Hence their rights are secured in other ways. In contrast, protection from rent seeking behaviour relates to the relationship between the state and the citizens. When the state have major problems of corruption, inefficiency or no checks on the state, on politicians, and on elites, individuals don't have a level playing fields and adds to uncertainty. In this case, they are also unable to enter into private arrangements to circumvent these problems. In regional context, Fernandes and Kraay (2007) employing firm level data found the similar evidence that firms in the South Asian countries are able to circumvent failures in formal "contracting institutions", by resorting frequently to informal channels such as belonging to a business association. Some studies find that the quality of governance and

institutions is important in explaining the rates of investment, as they suggested they effect economic performance through improving the climate for capital creation (Kirkpatrick, Parker, & Zhang 2006; World Bank, 2003). Other studies reiterated institutional roles in improving international capital flows in particular FDI (Reisen and De Soto 2001; Smarzynska and Wei 2000). And portfolio investment Gelos and Wei (2002)

A number of studies have made attempts to examine institutions in Pakistan as well in south Asian region. Mahbub ul Haq Human Development Centre (1999), Ahmed (2001) illustrated that institutions appears to be a significant problem in South Asia. Specially in Pakistan, institutional decay has led to poor governance, which has resulted in *ad hoc* policy-making. Instability and unpredictability has discouraged long-term investment and encouraged lobbying, corruption, and misuse of power, resulting in frustration and dysfunctional behaviour [For details, see DRI/McGraw-Hill (1998)]. [Hussain (1999)]. Asserts weak institutions have been used by èlite to extract rents in Pakistan. Institutional impact on poverty is explored in Pakistan (1999), Hassan (2002) Haq and Zia (2009), which shows institutions are negatively and significantly correlated with poverty, hence weak institutions to increase in poverty in Pakistan. However in contrast to the popular notion, Studies like Shafique and Haq (2006) based on world bank's governance indicators, find weak institutions do improve welfare of the society but it has negative influence on GDP growth rate. At another place, Fernandes and Kraay (2007) and Easterly (2003) in a study suggest that Pakistan have per capita incomes that are considerably higher than their very weak institutional performance would suggest based on average cross-country relationships.

3. Overview of quality of institutions and economic growth in Pakistan

We take index of institutionalized social technology, as well as its sub indices of Risk reducing technologies and Anti-rent seeking technologies for measurement of institutional quality. Risk reducing technology removes information asymmetry, creates mutual trust and hence decreases the risk of creating long term business relationships. It re-price contravention activities through increasing risk of getting caught. Anti-Rent seeking technologies plugs in predatory opportunities that arise due to gaps or loopholes in ineffective or week institutions, creating rents for controlling agents betting them higher return than though innovation hence is making society moves from innovative to rent seeking activities. This index specially focuses on technologies which helps curb the rent seeking opportunity arising from institutions, policies and political system. Table 1 focuses on periodic trends in institutional quality and growth. Over all institutional indicators fairly remain stable. They witness stable increase in periods of 1984 to 1999. Especially 1996-99 periods witnessed sharp increase in institutional quality. But afterwards, institutional index saw a sharp decline but again saw some improvements in later periods. On the political front, democratic era of 1988 to1999 saw a considerably higher institutional quality index then era govern by military dictatorships. Era of Transition to civilian democracy in 1988 witnessed sharp increase of about 19% in institutional quality especially anti-rent seeking technologies increases by about 55%, while Era followed by military takeover after 1999 saw a sharp decline of about 31% in institutional quality. This trend can also be witnessed from Figure 1. Hence strong political institutions do produce a huge impact of other social institutions in the country and reforming and strengthening the political institutions become pivotal in economic and social development. On the other hand, growth in economy measured by real GDP per capita, witnessed a stable increase over the years. However, comparatively higher growth was witnessed in era of 1984- 91. In era of 90s, income level became fairly stable, and it sharply picked up later in 2000-06 period (Figure 2) Here the overall trend indicate authoritarian rule

have comparatively higher growth whereas a lower institutional quality. The similar assessment is made by SPDC (2000), which shows that while governments under authoritarian rule in Pakistan were good for economic growth, they were not necessarily as successful in improving human endowment.

Table 1
Average Periodic Trend in institutional quality and growth

obs	RGDPPC	IIST	RI	SII
1984-87	2163.99	0.456977956	0.412333333	0.501622578
1988-91	2418.43	0.543300359	0.6415	0.445100719
1992-95	2574.73	0.54365293	0.570125	0.517180861
1996-99	2680.8925	0.630186855	0.5821875	0.67818621
2000-03	2788.5375	0.434945959	0.407270833	0.462621085
2004-06	3247.29	0.448225958	0.396166667	0.500285249

Figure 1

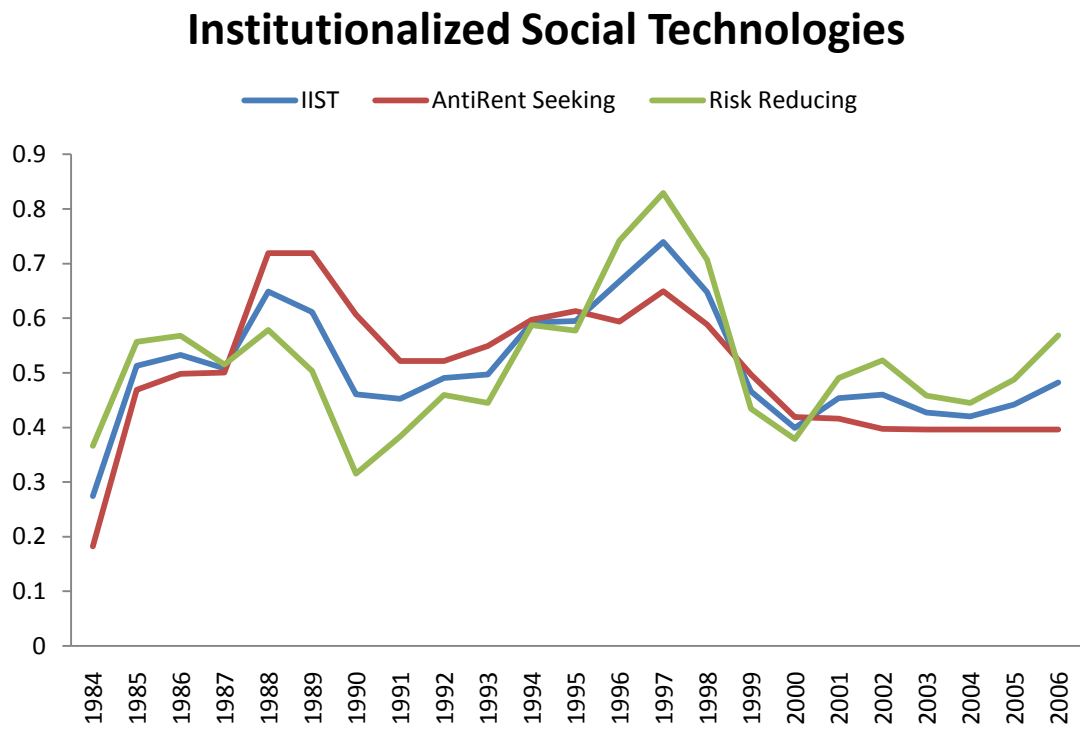
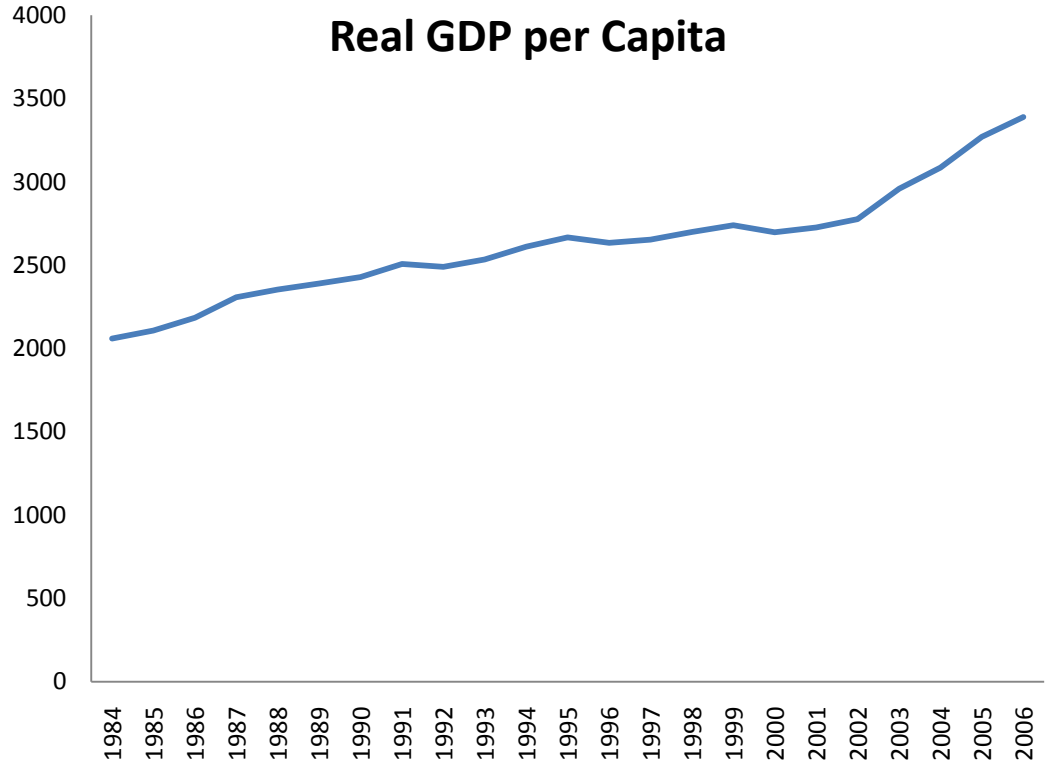


Figure 2



4. The model and econometric techniques and Data Description

4.1 Model Specification and Data Description

To explore the causality between Institutions and Growth,

we use the following model

$$y_t = \beta_0 + \beta_1 I_t + \beta_2 p_t + \beta_2 O_t + \epsilon_t$$

where y_t is real output in year t, I_t is a measure of institutional quality, p_t it is inflation, O_t is openness measured by total trade to GDP and ϵ_t is an error term. Since the direction of causality is not clear we also specify the model

$$I_t = \beta_0 + \beta_1 y_t + \beta_2 p_t + \beta_2 O_t + \epsilon_t$$

Both equations are to be considered as long run, or equilibrium relations. We may, of course, have more cointegrating relations involving inflation or trade share as the dependent variable. Provided all variables involved are integrated of order one, or I(1), valid economic inferences can be drawn only if these relations (or perhaps more, having investment share or inflation as dependent variable) are cointegrating relations, otherwise spurious inferences would result. Regarding the data, we use Real GDP per capita in real term as a measure of economic growth. For the institutional variables we have used recently developed indices by Siddiqui and Ahmed (Unpublished) for the measure of institutional quality. We take index of institutionalized social technology, as well as its sub indices of Risk reducing technologies and Anti-rent seeking technologies for measurement of institutional quality. This index and its sub indices are build on theoretical framework of contract and predatory theories set by North. Specifically sub index of Risk reducing technologies is based on contract theory whereas index of Anti-Rent seeking technologies is based on predatory theory of state. These indices are in 0 to 1 ranges where higher values indicating better institutional quality. By the nature of this construction, these variables are bounded above and below by random numbers, which makes it impossible for the series to be non-stationary. Thus, we transform the index using inverse logit function to allow it to vary without limit. Inflation rate is measured using the consumer price index. Whereas Trade share in GDP is Total trade (Exports plus Imports) as a percentage of GDP. Income and trade data are taken from Heston and Summers (2009) whereas Inflation, are taken from World Development Indicators. Table 2 gives detailed information about the variables and their data source whereas descriptive statistics of variables used are given in Table 3

Table 2
Data Sources and Description

	Variable Name	Description		Source
1	RGDPPC	Real GDP per capita at constant price (Laspeyres)	initial Factor	Heston and Summers (2009)
2	INFCPI	Inflation, consumer prices (annual %)	Macro-economic Stability	World Development Indicators, World Bank
3	OPEN	Total trade (Exports plus Imports) as a percentage of GDP. (export, import and GDP figures are expressed in real values)	Openness	Heston and Summers (2009)
4	IIST	Index Institutionalized Social Technologies	Institutions	Siddiqui and Ahmed (unpublished)

Table 3
Descriptive Statistics

	RGDPPC	IIST	WINFCPI	OPEN
Mean	2619.487	0.5122	7.4730	30.0948
Median	2632.580	0.4906	7.8443	29.5600
Maximum	3388.570	0.7395	12.3682	38.6100
Minimum	2058.170	0.2741	2.9141	26.3000
Std. Dev.	335.2862	0.1050	3.1318	3.1742
Skewness	0.5038	0.2035	0.0319	1.1306
Kurtosis	3.0544	3.0077	1.7241	3.8064
Jarque-Bera	0.9759	0.1589	1.5639	5.5235
Probability	0.6139	0.9236	0.4575	0.0632
Sum	60248.1900	11.7809	171.8781	692.1800
Sum Sq. Dev.	2473170	0.2426	215.7741	221.6568
Observations	23.0000	23.0000	23.0000	23.0000

4.2 Econometric Methodology

The following sequential procedure will be adopted.

Step 1: Unit root test and order of integration

we have used Augmented Dickey Fuller (ADF) test to test the stationarity of variables. For time series data, ADF test is a test for unit root. Strong negative numbers of unit root has

rejected the null hypothesis that there is unit root at some level of confidence. Following equation check the stationarity of time series data used in the study:

$$\Delta y = \beta_0 + \beta_1 t + \Phi y_{t-1} + \alpha_i \Sigma \Delta y_{t-1} + \epsilon_t$$

Where ϵ_t is white noise error term,

These tests have determined that whether the estimates of Φ are equal to zero or not. Dickey and Fuller (1979) provided cumulative distribution of the ADF statistics by showing that if the calculate-ratio (value) of the coefficient is less than critical value from Fuller table, then y is said to be stationary. However, this test is not reliable for small sample data set due to its size and power properties (Dejong et al, 1992 & Harris, 2003). For small sample data set, these tests seem to over-reject the null hypotheses when it is true and accept it when it is false. Two new tests, i.e., Dicky-Fuller Generalized Least Square (DF-GLS) and Ng-Perron could solve the problems of data size and power properties.

Step 2: Cointegration analysis

The second step is to identify whether all the variables that are included in the system are cointegrated, i.e. tied in a long run relationship. A widely used approach is Johansen's (1988) and Johansen and Jesulius (1990) procedure based on 'Maximum Likelihood method' and 'eigen value statistics' to confirm the existence of long run relationship among all tested variables. Cointegration is said to exist if the values of computed statistics are significantly different from zero. Thus, variables if found to be cointegrated, implies that there exist a linear, stable and long-run relationship among variables, such that the disequilibrium errors would tend to fluctuate around zero mean. This means that variables tend to move together to its steady state path in the long run.

Step 3 Vector Error-Correction Modeling (VECM)

If a number of variables are found to be cointegrated with at least one cointegrating vector, then there always exists a corresponding error-correction representation which implies that changes in the dependent variable can be formulated as a function of the level disequilibrium in the cointegration relationship and fluctuation in other explanatory variables. In other words the error-correction term in the VECM provides additional channel for the detection of Granger causality. Thus third stage includes conducting standard Granger causality tests augmented with a lagged error-correction term. The Granger (1986) (1988) representation theorem suggests that there will be Granger causality either unidirectional or bi-directional in at least one direction if there exists co-integration relationship among the variables provided the variables are integrated order of one. Engle-Granger (1987) cautioned that if the Granger causality test is conducted at first difference through vector auto regression (VAR) method than it will be misleading in the presence of co-integration. Therefore, an inclusion of an additional variable to the VAR method such as the error-correction term would help us to capture the long-run relationship. The residuals from the long run estimates can be used as the error correction term (ECT) to explain the short run dynamic.

The error correction model representation of the Granger causality model is given in following equations.

$$\Delta y_t = c + \Sigma \theta_i \Delta y_{t-i} + \Sigma \beta_i \Delta I_{t-i} + \Sigma \Phi_i \Delta p_{t-i} + \Sigma \alpha_i \Delta O_{t-i} + \lambda(y_{t-1} - I_{t-1} - p_{t-1} - {}_i \Delta p_{t-i} O_{t-i}) + \epsilon_t$$

$$\Delta I_t = c + \Sigma \theta_i \Delta y_{t-i} + \Sigma \beta_i \Delta I_{t-i} + \Sigma \Phi_i \Delta p_{t-i} + \Sigma \alpha_i \Delta O_{t-i} + \lambda(y_{t-1} - I_{t-1} - p_{t-1} - {}_i \Delta p_{t-i} O_{t-i}) + \epsilon_t$$

Where Δ is a difference operator, λ representing the coefficient error-correction term derived from long-run co-integrating relationship, c is constant and ϵ_t are serially uncorrelated random disturbance term with zero mean. Through the ECT, the VECM provide new directions for Granger causality to appear. Long-run causality can be revealed through the significance of the lagged *ECTs* by t test since it contains long-run cointegration information

between the variables, because it is derived from the long-term cointegration relationship(s), while F-statistic or Wald test investigate short-run causality through the significance of joint test with an application of sum of lags of explanatory variables in the model. The non-significance of both the t-and F-test in the system indicates econometric exogeneity of dependent variable. The purpose of the VECM is to focus on the short run dynamics while making them consistent with long run solution.

5. Empirical Results and Analysis

The Johansen co-integration method and vector error-correction model technique has been used in order to examine the long run and the short run dynamic of system respectively.[3]

Prior to testing the long run co-integration relation, it is necessary to establish the order of integration presented. To this end, an Augmented Dickey Fuller (ADF) test with the null hypothesis of unit root, was carried out on the time series levels and difference forms. The critical value for this test is provided by MacKinnon (1991).

The results are given in table 4 and as this table shows, all the variables have a unit root in their levels and are stationary in their first difference.

Table 4
Unit Root Estimation (Augmented Dickey Fuller (ADF))

Variables	No Trend				Trend			
	LEVEL		FIRST DIFFERENCE		LEVEL		FIRST DIFFERENCE	
	t-Statistic	lag	t-Statistic	lag	t-Statistic	lag	t-Statistic	lag
IIST	-2.447474	1	(-3.896221)***	1	-2.487936	1	(-3.842135)**	1
rgdppc	1.484928	0	(-5.016628)***	0	-2.451442	2	(-5.18409)***	0
infcpi	(-3.809795)***	1	(-5.967625)***	0	(-3.741659)**	1	(-5.927934)***	0
Open	-1.033062	0	(-4.698918)***	0	-2.026745	0	(-4.586755)***	0

*MacKinnon (1991) one-sided test.

[3] The johansen-Juselius (1990) can find multiple cointegrating vectors; Engle-Granger approach has several limitations in the case of more than one cointegration vector.

The lag order has been selected based on Schwarz Information Criterion. Then we explored the stationarity evidence of DF-GLS, and Ng-Perron test statistics. DF-GLS and Ng-Perron are more power full and suggestive tests than

ADF test as already been explained in theoretical background. The statistics are given in Table 5 and 6. As it shows, institution variable in stationary at level, but when trend is included it becomes stationary at first difference. Rest of the variable also become stationary at first difference. Hence we can safely conclude the presence of unit root and stationarity of the first differences; Thus these variables are integrated of order one I(1).

Table 5
Unit Root Estimation (Dicky Fuller GLS(ERS))

Variables	No Trend				Trend			
	LEVEL		1st Difference		LEVEL		1st Difference	
	t-Statistic	Lag	t-Statistic	lag	t-Statistic	lag	t-Statistic	lag
IIST	(-2.003690)**	1	-1.078435	2	-2.416822	1	(-3.592467)***	1
Rgdppc	1.039024	2	(-2.67745)***	1	-2.451442	2	(-5.18409)***	0
Infcpi	-1.320502	5	(-2.562337)**	5	-2.850557	0	(-5.952165)***	0
Open	-0.998304	0	(-4.584298)***	0	-2.191557	0	(-4.840034)***	0

*MacKinnon (1991)

*The optimal lags for conducting the test were determined by **SIC (Schwarz information criteria).***

Null Hypothesis: has a unit root

Table 6
Unit Root Estimation (Ng-Perron test)

Variables	No Trend									
	LEVEL					FIRST DIFFERENCE				
	MZa	MZt	MSB	MPT	LAG(SIC)	MZa	MZt	MSB	MPT	LAG(SIC)
IIST	(-6.21988)*	(-1.75940)*	0.28287	(3.95179)*	1	-2.13126	-1.02687	0.48182	11.4451	2
rgdppc	0.56815	0.2691	(0.47363)***	(19.5896)***	2	(-20.8428)***	(-3.14566)***	(0.15092)***	(1.46188)***	0
infcpi	(-10.0383)**	(-2.22875)**	(0.22203)**	(2.48616)**	0	(-21.545)***	(-3.28202)***	(0.15233)***	(1.13761)***	0
open	-2.39524	-0.76641	(0.31997)***	(8.42842)***	0	(-10.4354)**	(-2.19724)**	(0.21056)**	(2.67157)**	0
Variables	Trend									
	LEVEL					FIRST DIFFERENCE				
	MZa	MZt	MSB	MPT	LAG(SIC)	MZa	MZt	MSB	MPT	LAG(SIC)
IIST	-8.069	-2.00342	0.24829	11.3065	1	(-15.5511)**	(-2.75605)**	(0.17723)*	(6.04418)*	1
rgdppc	(-73.326)***	(-5.92471)***	(0.0808)***	(1.79406)***	2	(-21.4138)**	(-3.25058)**	(0.1518)***	(4.38586)**	0
infcpi	-11.567	-2.40167	0.20763	7.89492	0	(-21.7168)**	(-3.29231)**	(0.1516)**	(4.21364)**	0
open	-6.91945	-1.79855	0.25993	13.2149	0	-10.2728	-2.13967	0.20828	9.4107	0

*Ng-Perron (2001, Table 1)

*The optimal lags for conducting the test were determined by **SIC (Schwarz information criteria).***

Null Hypothesis: has a unit root

Spectral Estimation Method: GLS-detrended AR

Given the common integration properties of variables under consideration the next stage to test the presence of multilevel cointegration in the multi dimensional VAR model (RGDPPC,IIST,INFCPI and OPEN) by employing the johansen(1988) and johansen and juselius(1990) procedure using the trace statistic and maximal eigenvalue test. The results of the cointegration tests are given in Table 7. There is evidence that the results are often sensitive to choice of lag lengths. In literature there exist a number of suggested methods for choosing the lag orders. Here an Akaike information criterion table 8 has been used**.** This suggests two lags of each variable.

Table 7

Johansen's Test For Multiple Cointegration Vectors

Null Hypothesis	Lag	Eigenvalue	Trace Statistic()[1]	Max-Eigen Statistic()[1]	Result at 5% level of both statistics
r = 0*	2	0.904324	(97.11535)***	(46.93567)***	co-integrated
r ≤ 1*	2	0.74257	(50.17968)***	(27.14016)***	co-integrated
r ≤ 2	2	0.507191	(23.03952)***	(14.15267)*	not co-integrated
r ≤ 3*	2	0.358755	(8.886859)***	(8.886859)***	co-integrated

** denotes rejection of the hypothesis at the 0.05 level and both tests*

[1] *MacKinnon-Haug-Michelis (1999) p-values*

Table 8

Lag order selection criteria for VAR

K	1	2
Log likelihood	-113.7897	-85.81825
Akaike information criterion	13.50379	12.98183
Schwarz criterion	14.89648	15.17244

The λtrace statistic indicating that there exist four cointegrating vector, with null hypothesis of no, one, two and three cointegration among the variables, the trace statistic cointegrating vector exceeds the 99 per cent critical value of the λtrace statistic (critical value is 30.45), it is possible to reject the null hypothesis, in the favour of the general alternative r≥3 (Table 6). Similarly, On the other hand, λmax statistic reject the null hypothesis as the calculated value λmax in null hypotheses of no, one and

three conintegration exceeds the 99 per cent critical value (23.65). λmax in null hypotheses of two cointegration exceed 90 per cent critical value. The finding of cointegration has several implications. First, the presence of cointegration vectors shows that there exists a long run relationship between the variables. Second, this evidence of cointegration between these variables rules out spurious correlations and also implies at least one direction of Granger causality. The Normalized Cointegration vector in Table 9 indicates that there is a long run positive relationship between institutions and growth. Also there is a positive relationship between openness and growth, and negative relationship between inflation and growth as expected.

Table 9
Normalized Co-integration vector

RGDPPC	C	$IIST_{t-1}$	$INFCPI_{t-1}$	$OPEN_{t-1}$
1	4504.567	-1830.188 (-0.85794)	110.5259 (8.72397)***	-226.5489 (-13.2214)***

t-stats in parentheses
*** significant at 1% level

Regression analysis deals with dependence of one variable on the other variables; it does not necessarily imply causation. In other words existence of a relationship between variables does not prove causality or direction of influence. Engle and Granger (1987) demonstrated that once a number of variables are found to be cointegrated, there always exists a corresponding error correction representation which implies that changes in the dependent variable are a function of level of disequilibrium in the cointegration relation (capture by the error-correction model) specifies that the first differences of all I(1) variables are function of the lagged differences of all these terms in addition to lagged equilibrium error terms. In this respect, since the error-correction term is stationary, all variables in this model are also stationery. This implies that OLS standard errors will also consistent and efficient.

Table 10
Vector Error Correction Models

Dependent Variable	ΔRGDPPC (Eq. 1)	ΔIIST (Eq. 2)
Independent Variables	Coeficients, (t-Statistics in paranthesis)	
ECT_{t-1}	-0.20042	1.54E-05
	[-7.08614]***	[0.89197]
$\Delta RGDPPC_{t-1}$	-0.133217	0.0000436
	[-0.84784]	[0.45390]
$\Delta RGDPPC_{t-2}$	0.124019	0.0000695
	[0.65149]	[0.59693]
$\Delta IIST_{t-1}$	-650.6761	0.353231
	[-1.23986]	[1.10063]
$\Delta IIST_{t-2}$	646.2234	-0.000614
	[1.65096]	[-0.00256]
$\Delta INFCPI_{t-1}$	14.76375	0.000721
	[3.09334]**	[0.24702]
$\Delta INFCPI_{t-2}$	5.739393	-0.005459
	[1.35058]	[-2.10060]*
$\Delta OPEN_{t-1}$	-36.93979	0.00376
	[-4.49780]***	[0.74861]
$\Delta OPEN_{t-2}$	-28.09337	0.008295
	[-4.46130]***	[2.15413]*
C	91.78006	-0.012028
	[6.44991]***	[-1.38223]
R-squared	0.894539	0.540216
Adj. R-squared	0.799623	0.126411
F-statistic	9.424608	1.305483
Log likelihood	-87.92084	60.06964
Akaike AIC	9.792084	-5.006964
Schwarz SC	10.28995	-4.509097
Durbin-Watson stat	2.324982	1.635949

From the estimated results reported in Table 10, it is evident from the table that error correction term is only significant in equation (1). So Institutional quality Granger causes growth in the long run. The error correction term is not significant in equation (2). Thus, Growth does not cause institutional quality in long run. The results indicate that the long run causality between growth and institutions is uni-directional: There is only one-way long run causality from institutions to growth; however, no long run causality, in the Granger sense,

was found in opposite direction. This indicates that institutions causes economic growth in Pakistan.

To determine the dunamics of shrot run causality, we took F-statistic or Wald test of sum of lags of explanatory variables in the model The results of bivariate Granger causality tests are in Table 11.

Table 11
Summary of Bi-variate Granger causality tests

Dependent Variable	F Statistics			Coeficient and t-Statistics	
	$\Delta YRGDPPC2_{t-n}$	$\Delta IIST_{t-n}$	ECT_{t-1}		
Δ YGDPPC2	-	1.716399	(50.21337)***	-0.201146	[-7.05326]***
Δ IIST	0.395241	-	0.795603	0.000066	[0.87015]

The estimated F Statistics of joint test shows that lags of Institutions are insignificant in growth equation (1) equation and lags of growth are also insignificant in institutions equation (2). Thus there is no short run causality from institutions to growth and vice versa.

Table 12
Diagnostic Tests

VEC Models	E(1)	E(2)
	Δ GDPPC	Δ IIST
Functional Form[1]	0.352350 (0.5674)	1.185570 (0.3045)
Autocorrelation[2]	5.503359 (0.3201)	0.437426 (0.8352)
Normality[3]	1.197621(0.549465)	0.886806 (0.641848)
Heteroskedasticity[4]	1.890833 (0.1675)	1.322892 (0.3331)

[1]Ramsey RESET Test
[2]Breusch-Godfrey Serial Correlation LM (langrene Multiplyer) Test *F*-statistic (for the joint significance of all lagged residuals) with 9 lag inclusion based on AIC
[3]Jarque-Bera(JB) Residual Normality Tests.
[4]Breusch-Pagan-Godfrey test

Diagnostic tests for serial correlation, heteroscedisticity and functional form are conducted and the results are shown in Table 12. These tests show that short run model passes through all diagnostic tests. The results also indicated that there is no evidence of serial correlation

among variables because functional form of model is well specified and there is no evidence for white heteroscedisticity as in each case the null hypothesis could not be rejected at conventional 5% level of significance, implying thereby that our results are statistically free from any specification problems.

6. Conclusion

In this paper, we have examined the question of whether Quality of institutions, Granger-cause economic growth or *vice versa*. This paper has examined the long run relationship between institutions and growth in Pakistan using annual data for the period 1984-2006. The empirical investigation consists of: (1) the application of cointegration analysis to ascertain the long run relationship between institutions and growth (2) the determination of the direction of causality among the variables in the context of vector error correction model. Our results indicate that institutions and growth are cointegrated and thus exhibit a reliable long run relationship. The results indicate that the causality between institutions and growth is **uni-directional**: There is only one-way long run causality from institutions to growth; however, no long run causality, in the Granger sense, was found in opposite direction. Similarly, there is no short run causality from institutions to growth and vice versa. The most important implication of our findings is a policy recommendation: If policy makers want to promote growth, then attention should be focused on long run policies, for example the creation of sound political and social institutions that minimize rent seeking opportunities and reduce risk of doing businesses. However its positive impact could be felt in long run, as in short run, it could cause adverse impact in form of curbing opportunities of rent seekers. However the notion of increased economic growth would lead to strong institutions in long

run cannot be accepted. Hence sustainable growth could only occur in the ambit of sound social and political institutions. As in their absence, even best policies for development and attracting investment might fail as no incentive can balance the huge business risk that could arise if property rights are not secured and contract enforcement is week. Also menses of corruption and nepotism divert any policy incentives given to entrepreneurs towards rent seekers making economy stuck in structural rigidities making any policy ineffective.

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