The Role of Political Stability on Economic Performance:
The Case of Bangladesh

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Political stability generally plays pivotal role in the process of economic development of any country. In this paper, we investigated the direct effect of political stability on the economic performance of Bangladesh for the period of 1984-2009. Two different techniques of cointegration have been used to analyse the long run and short run effect. The Engle-Granger method of cointegration did not find any cointegration while Bound Testing Approach did .Once cointegration is found the long run relationship as well as the short run relationship is established. Our findings indicate that political stability has negative effect on economic performance in long term while the short run effect is positive. This result is rare but not unique as it supports to the work of Goldsmith (1987) to shed light on Mancur Olson's theory of political stability and growth.

1. Introduction

Political instability has been a notable feature of Bangladesh since her birth in 1971. The country faced enormous challenges in the path of growth but still maintained a good rate. However, till now, the country still falls into category of the least developed countries .The population growth was around 2%[3] until 1997 which swallowed up the economic

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growth to some extent. There are other adverse economic and socio-economic situations which make it hard to grow the country faster. So, it is of importance to analyse the effect of non-economic factors like political stability on economic performance. The political and civil-military bureaucratic leadership has failed to meet people's expectation in the last four decades. Economic growth has been pretty steady but income inequality is very high as compared to other developing countries. In comparison basis the growth was lower than some countries in South Asia. So, if the country becomes politically stable will it be contributing to the growth? Or, is it already performing well in such adverse socio-economic situation? Is the effect long term or short term? These questions will be answered later in this paper. In this paper, the effect of political stability on economic performance of Bangladesh has been empirically analysed based on both theoretical specification and empirical specification.

The paper is outlined as follows: section 2 reviews some previous studies regarding political stability and economic performance, section 3 specifies the theoretical model and data, section 4 focuses on the methodology and empirical specification, section 5 presents the results of estimation section 6 includes result discussion and sensitivity analysis and section 7 concludes the paper.

2. Literature Review

In this section, some earlier studies regarding the relationship between political stability and economic growth are discussed. Most of the existing empirical studies link political instability rather than stability with economic growth. The earlier works include the studies by Venieris and Gupta (1986) and Gupta (1990). Barro (1990) in his cross sectional analysis found that economic growth is affected negatively by political instability as property rights are hardly implemented in unstable political situation. Edwards and Tabellini (1991) showed that a heavy borrowing due to short term fiscal policy by unstable political leaders deter long run economic growth. Devereux and Wen (1996) argued that unstable political situation discourages private investments which in turn affects economy negatively. Alesina and Perroti (1996) used three different variables to proxy for the political instability and found it causing a decrease in economic growth. In Edward's (1998) report negative relation is found between political instability and

productivity growth for a panel of 93 countries for the period of 1960-1990, though the relation was relatively weak. Drazen (2000) identified two reasons for which political instability affects economic performance. Firstly, it creates uncertainty about future return from the investment of firms and private agents, which inhibits the society as a whole to accumulate physical capital. Again, there is a direct effect of political instability on productivity as it distorts the functions of the market. Lower economic growth due to lower human capital accumulation owing to endemic political instability is the finding of Maloney (2002) for his study of Latin American countries. Campos and Karanasos (2007) used power ARCH framework with yearly data for Argentina for the period 1896-2000 and came up with the conclusion that both the informal political stability (assassinations and strikes) and the formal political stability (constitutional and legislative changes) have direct negative effect on economic performance. The effect of formal instability was stronger in the long run while the effect of informal instability was stronger in the short run in their study. Yunis et. al (2008) investigated the effects of various political instability factors on economic growth for selected Asian countries during 1990-2005. The study found close relationship between political stability and economic growth and the results showed that the role of political stability is more important than economic freedom. Aisen and Veiga (2010) used GMM estimator for linear dynamic panel data models on a sample of 169 countries, and 5-year periods from 1960 to 2004 to investigate the link between political instability and economic growth, and found that lower growth is associated with higher degree of political instability.

Country specific studies include the study of Munoz (2009) and Astteriou and Price (2001). Munoz (2009) used ARDL framework to investigate the link between political instability and economic growth for Venezuela for the period of 1983-2000. He found that political instability affects growth negatively but not through the channel of investment. Astteriou and Price's study was to test the influence of political instability on UK economic growth for 1961-1997 using GARCH-M model which revealed negative effect on growth and positive effect on growth certainty. Astteriou and Siriopoulos (2000) examined the relationship empirically for Greece and found strong negative association. The only study which, showed that political stability has negative impact on economic growth was by Goldsmith

(1987).Though he found that for LDCs, political stability negatively affected economic growth, it was only to a little extent.

There are not many econometric studies to analyse the effect of political stability on economic performance for Bangladesh. Quazi (2003) found that political instability affect negatively to the savings of Bangladesh using Engle-Granger Cointegration approach for the period 1971-2003. There is another mentionable study by the Dhaka Chamber of Commerce and Industry (DCCI) which is more an economic policy paper rather than econometric study.

3. Model and Data

3.1 The Model:

The role of political stability on economic growth can be analysed using the Solow growth model. The "Growth accounting"[4] can be used to find the other proximate causes of growth and the exercise begins by postulating the Cobb-Douglas production function as follows:

$$Y = BK^a L^{1-a}$$

Here,

Y =Real gross domestic product

L =Number of labours

K =Physical capital

B = Hicks-neutral productivity term

α =share of physical capital in the production

$1-\alpha$ =share of labour in the production

In per worker term,

$$\frac{Y}{L} = \frac{BK^\alpha L^{1-\alpha}}{L}$$
$$\Rightarrow y = B(\frac{K^\alpha}{L^\alpha})\frac{L}{L}$$
$$\Rightarrow y = Bk^\alpha$$

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[4] Abramovitz(1956) and Solow(1957)

$y = \dfrac{Y}{L} =$ Real GDP per unit of labour and $k = \dfrac{K}{L} =$ physical capital per unit of labour

By taking logarithm both side

$$\log y = \log B + \alpha \log k \qquad (3.1)$$

Now, let us incorporate political stability in the above specification. North (1990) argued that institutions in a country determine its long-run economic performance. Here, institutions refer to political stability, quality of government, independent judicial system, political rights, property rights etc. Political stability can directly affect the growth through affecting total factor productivity of the country. It is assumed that political stability affects economic growth by enhancing or reducing total factor productivity (TFP) term B. Assume the total factor productivity term B as a function of political stability, ρ

$$B(\rho) = Be^{\sigma\rho} \qquad (3.2)$$

Where $\sigma =$ magnitude of political stability growth

$\rho =$ political stability

$$B = B_0 e^{gt}$$

g= growth rate of technology, t=time

Combining equations (3.1) and (3.2),

$$\log y = \log B + \sigma\rho + \alpha \log k$$

$$\Rightarrow \log y = \log(B_0 e^{gt}) + \sigma\rho + \alpha \log k$$

$$\Rightarrow \log y = B_1 + gt + \sigma\rho + \alpha \log k \qquad 3.3$$

where $B_1 = \log B_0$

The coefficient σ will measure the effect of political stability on economic growth directly. It is to be noted that it is often hard to

estimate structural equation like (3.3) using purely time series data because of the nonstationary properties of the data. Estimation in the structural form can lead to spurious regression if cointegration is not found among the variables. More is discussed in the section 4.2 later.

3.2 Data

The variables of interest in this study are real GDP per worker (one of the measures of economic performance), investment per worker and political stability. Real GDP per capita (y_t) and investment as a percentage of real GDP (k_t) will be used for proxies of real GDP per worker and investment per worker. The annual time series data from 1984 to 2009 for Bangladesh will be used in the study. The sources of the data for these two variables are Penn World Table (Version 7.0) of Alan Heston, Robert Summers and Bettina Aten. The source of the "Political stability" variable is the PRS (Political Risk Services) group from the ICRG (International Country Risk Guide). Further historical data was not possible to use because of the data of political stability is only available from 1984. The variable political stability is a kind of political risk rating which provides a way of assessing the political stability of the countries covered by ICRG on a comparable basis. Based on risk ratings the countries can be divided into five categories. The political risk rating of 0.0% to 49.9% indicates a very high risk; 50.0% to 59.9% high risk; 60.0% to 69.9% moderate risk; 70.0% to 79.9% low Risk; and 80.0% or more very low risk. It means that if the point increases the political stability increases.

4. Methodology

Most economic time series variables are non-stationary. Estimates based on these non-stationary variables usually lead to spurious regression and the result is not meaningful to interpret. These variables can be made stationary by appropriate differencing depending on its order of integration. But we can lose long run information because of differencing. But the regression in level form will be meaningful if the variables are cointegrated. To test the existence of long run relationship in time series econometrics, the cointegration technique is a dominant one. There are several approaches to test the long run relationship. Two step residuals based test (Engle-Granger,1987), the system based reduced rank regression approach(Johansen: 1991,1995),the variable

addition approach(Park,1990),the residual based approach of Shin(1994),stochastic common trend approach(Stock and Watson,1988),and ARDL Bound testing approach(Pesaran and Shin,1999 and Pesaran, Shin and Smith: 1996,2001) are the techniques used in different circumstances. We will investigate the existence of cointegration with two methods for their respective strength in each case. The methods are Engle-Granger's two step residuals based test and Bound Testing Approach of cointegration.

4.1 Engle-Granger's Two Step Method for Testing Cointegration:

This test allows the theoretical model to be tested for any existence of long run relationships, and if they are found to be cointegrated then the long run relationship can be represented   in the structural form (as in equation 3.3). It allows estimating the short run disequilibrium relationship at the same time. Economically speaking, two or more variables are cointegrated when they have a long run or equilibrium relationship among them. So in other word, an attempt to test for the existence of cointegration is nothing but the investigation of long run relationship among the variables. The well-known test of cointegration suggested by Engle-Granger(1987) is to run the following regression(4.1.1) to establish the relationship found in the equation (3.3) after verifying that the underlying variables are in the same order of cointegration.(The unit root test as a way of finding the order of integration of the variables will later be discussed in section 4.3)

$$\ln y_t = \alpha + \beta_1 \ln k_t + \beta_2 pst_t + u_t \qquad (4.1.1)$$

where y_t = real GDP per capita, k_t = investment as a percentage of real GDP, pst_t =political stability index, u_t =error term

The asymptotic distribution of β s is not standard. But Engle-Granger advocated that betas are to be estimated by OLS and then to test stationarity or existence of unit root of the following residual

$$\widehat{u}_t = \ln y_t - \widehat{\alpha} - \widehat{\beta}_1 \ln k_t - \widehat{\beta}_2 pst_t$$

The null hypothesis is none existence of cointegration. However, the limiting distribution of t test does not follow the limiting distribution of

Dickey-Fuller used in unit root test. Though Engle-Granger (1987) first supplied the critical values for one regressor, later it was extended by Engle and Yoo (1987) and at present MacKinnon (1999, 2010) has the most completed table so far. It is to be noted that testing cointegration and representation of long run relationship are two different things. Once it is found that the cointegration exists among the variables, the following equation in level form can be estimated and it will not then be spurious.

$$\ln y_t = \alpha_1 + \beta_1 \ln k_t + \beta_2 pst_t + gt + e_t$$

Finally, the following error correction model can estimated to capture the short run dynamics.

$$\Delta \ln y_t = \alpha_1 + \lambda_1 \Delta \ln k_t + \lambda_2 \Delta pst_t + gt + \gamma_1 ECM_{t-1} + \upsilon_t$$

Where,

$$ECM_{t-1} = \widehat{e}_{t-1} = \ln y_{t-1} - \widehat{\alpha}_1 - \widehat{\lambda}_1 \ln k_{t-1} - \widehat{\lambda}_2 pst_{t-1} - \widehat{g}(t-1)$$

$\Delta \ln y_t$ = first difference of $\ln y_t$, t= time trend, ECM_{t-1} =error correction term at period t-1

4.2 ARDL Bound Testing Approach:

There are number of factors which make the ARDL Bound test approach more appealing. The approach is suitable for small sample (Pesaran *et al*., 2001). The Johansen's cointegration technique requires large sample to yield a valid result.(Ghatak and Siddiki, 2001). The methodology is applicable for purely I(1) and I(0) variables ,or mixed of I(1) and I(0) variables. The ARDL model concedes consistent estimator of long run coefficients irrespective of whether the underlying repressors are purely I(0),I(1) or mutually conintegrated(Pesaran et al 2001) .In ARDL approach, only a simple reduced form of equation is required (Pesaran and Shin,1995) whereas in other techniques there are system of equations. The ARDL bound testing allows tractability of using different lags of the regressors as opposed to the cointegration VAR models where different lags of different variables is not allowed.(Pesaran et al,2001) .In the ARDL bound testing procedure

both dependent and independent variables can be introduces with lags. The term "auto regressive" refers that the lag of dependent variable are allowed to determine the present dependent variable whereas the term "distributed lag" refers to the lag of independent variables. This technique is plausible as the change in independent variable may or may not cause change to dependent variable instantaneously as considered in theoretical model.

However, to apply the bound testing approach we need to make sure there is no existence of I(2) variables. The critical F statistics are not valid in the presence of any I(2) variable in the abovementioned approach.(Outtara, 2004).And, we should be careful about using the critical values for small sample size. In this study the critical values from Narayan (2004) will be used as the sample size is small.

To apply the ARDL bound testing approach we need to define our model empirically. The reason is, this test may not allow us to follow the structural form of model (*equation 3.3*). Then, we need to proceed based on the reduced form of equation. Such reduced form of equation can be:

$$y_t = f(k_t, pst_t)$$

We will use the reduced form of equation in double log form as

$$\log y_t = \alpha + \beta_1 \log k_t + \beta_2 \log pst_t$$

where y_t = real gdp per capita, k_t = investment as a percentage of real gdp, pst_t =political stability index

There are several intuitions to define the model in such way. If variables are expressed in log form the problem of non-normality can be reduced.(Wooldridge, 2006). In Bound test approach if the existence of cointegration is found then in the presentation of long run relationship often requires lag of dependent and independent variables as regressors which is not the case in the Engle-Granger presentation of long run relationship. This is the reason of deviating from our defined theoretical model into the empirical model. But our objective of finding any long run relationship between economic growth and political stability can still be achieved with this procedure. In some sense this

technique of finding long run relationship has the advantage that endogeinity problem can be solved by dint of adding lag dependent variables in the regressor's side.(Wooldridge,2006) .It is to be noted that it is not necessary to have many determinants of growth in the equation as the lag dependent variables can serve the purpose of omitted variables if any.

For our case the following unrestricted error correction version of the ARDL model can be presented.

$$\Delta \ln y_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \Delta \ln y_{t-i} + \sum_{i=0}^{p} \theta_i \Delta \ln k_{t-i} + \sum_{i=0}^{p} \lambda_i \Delta \ln pst_{t-i} +$$
$$\partial_1 \ln y_{t-1} + \partial_2 \ln k_{t-1} + \partial_3 \ln pst_{t-1} + \nu_t \qquad (4.2.2)$$

$\Delta \ln y_t$ = first difference of $\ln y_t$, $\Delta \ln k_t$ = first difference of $\ln k_t$, $\Delta \ln pst_t$ = first difference of $\ln pst_t$

The equation (4.2.1) can be estimated using the OLS method. An F test is performed to test the existence of the long run relationship. The null hypothesis of no cointegration H_0 : $\partial_1 = \partial_2 = \partial_3 = 0$ is tested against alternative hypothesis of $\partial_1, \partial_2, \partial_3$, are not simultaneously 0. But the asymptotic distribution of F statistics is non-standard. It depends on the number of regressors, the number of I(0) and I(1) variables and the inclusion of trend and intercept. As we have a relatively small sample size, critical values reported by Narayan(2004) are used for this study. There are two sets of critical values for each sample size: lower critical value (lower bound) which assumes the variables are purely I(0) and upper critical value(upper bound) which assumes the variables are purely I(1).If the calculated F statistic exceeds the upper bound then the null hypothesis of no cointegration can be rejected, which means there exists long run relationship among underlying variables. If the calculated F statistic is below the lower bound, the null hypothesis of no cointegration cannot be rejected, which means there is no long run relationship among the variables. However, the inference is inconclusive if the calculated statistic falls between lower and upper bound. Then it is necessary to analyse time series characteristic of the variables before reaching to any conclusion.

In every case lag can be selected based on Akaike information Criterion (AIC) or Schwarz Bayesian Criteria (SBC) given that the model does not suffer from autocorrelation, ARCH and non-normality. Pesaran and Shin(1999) recommended to use 2 lags as maximum lag for annual data. If cointegration is found then the long run model is estimated as in the following:

$$\ln y_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \ln y_{t-i} + \sum_{i=0}^{p} \phi_i \ln k_{t-i} + \sum_{i=0}^{p} \psi_i \ln pst_{t-i} + u_t \qquad (4.2.2)$$

Even though the cointegration exists among the variables the result will be of no importance if the parameters are not stable along the data periods. Instability in parameter arises because of structural breaks, so it is important to check whether parameters are stable to make the inference fully dependable. Pesaran and Pesaran (1997) advocated to apply the cumulative sum of recursive residuals (CUSUM) test (Brown *et al* ,1975) as a test of parameter constancy.

If there exists a long run relationship (existence of cointegration) the following error-correction version of ARDL model can be estimated:

$$\Delta \ln y_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \Delta \ln y_{t-i} + \sum_{i=0}^{p} \theta i \Delta \ln k_{t-i} + \sum_{i=0}^{p} \lambda_i \Delta \ln pst_{t-i} +$$
$$\gamma(ECM_{t-1}) + \nu_t \qquad (4.2.3)$$

Where,

$$ECM_{t-1} = \ln y_{t-1} - \alpha_0 + \sum_{i=2}^{p} \beta_i \ln y_{t-i} + \sum_{i=1}^{p} \phi_i \ln k_{t-i} + \sum_{i=1}^{p} \psi_i \ln pst_{t-i} \qquad (4.2.4)$$

The sign of the coefficient of the error correction term (ECM_{t-1}) must be negative i.e. $\gamma < 0$. The absolute value of γ decides how quickly the equilibrium is restored. The value of error correction term ranges from 0 to -1.

4.3. Unit Root Test

Unit root test examines the existence of unit root of a data generating process. It will help us to conclude about the order of the integration of the underlying variables. For Engle-Granger's cointegration test it is necessary to have same order of integration of the variables. Then we

can proceed to test whether there cointegration exists or not. For ARDL Bound testing approach it is important to make sure that no variable is I (2.) The Augmented Dickey-Fuller test will be employed as a test of unit root in this paper.

Consider the following stochastic process:

$$Y_t = \tau Y_{t-1} + u_t \tag{4.3.1}$$

Where u_t is the white noise error term.

If $\tau = 1$, that is, in the case of unit root becomes a random walk without drift which is non-stationary stochastic process. The equation (4.3.1) can also be presented as

$$\Delta Y_t = (\tau - 1)Y_{t-1} + u_t$$
$$= Y_{t-1} + u_t \tag{4.3.2}$$

where $\Delta Y_t = Y_t - Y_{t-1}$

With drift and trend into consideration the following two models can be written. The equation (4.3.3) contains only drift and the equation (4.3.4) contains both drift and trend.

$$\Delta Y_t = \alpha + \theta Y_{t-1} + u_t \tag{4.3.3}$$

$$\Delta Y_t = \alpha + \theta Y_{t-1} + \delta t + u_t \tag{4.3.4}$$

The parameter of interest in all equations (4.3.2-4.3.4) is θ, if $\theta = 0$ then the sequence Y_t contains a unit root. The test involves estimating one (or more) equation of the above using the OLS to get the estimated value of θ, and associated standard error. Comparing the resulting t statistics with the appropriate critical value of the Dickey-Fuller table it can be said whether to accept or reject the null hypothesis of $\theta = 0$.

However in the Dickey-Fuller test, it is assumed that error terms u_t are uncorrelated with each others. In cases where u_t are correlated the augmented version of Dickey-Fuller test is used. It is done by adding

lags of dependent variables. An optimum number of lag is often decided empirically. The idea is to include enough lag terms so that the error terms are not correlated.

5. Graphical Analysis and Estimation:

5.1 Graphical Analysis

It is always better to inspect the variable graphically before going to the formal test. From the Figure-1 it can be easily understood that none of the variables are stationary in their level form because the mean is not constant throughout the periods. Bangladesh maintained a steady growth in real GDP per capita (in log form), and rating of political stability was never high. The log of investment to GDP ratio also maintained a steady rate except one or two occasions.

Figure-1: Plot of the time series variables in level form
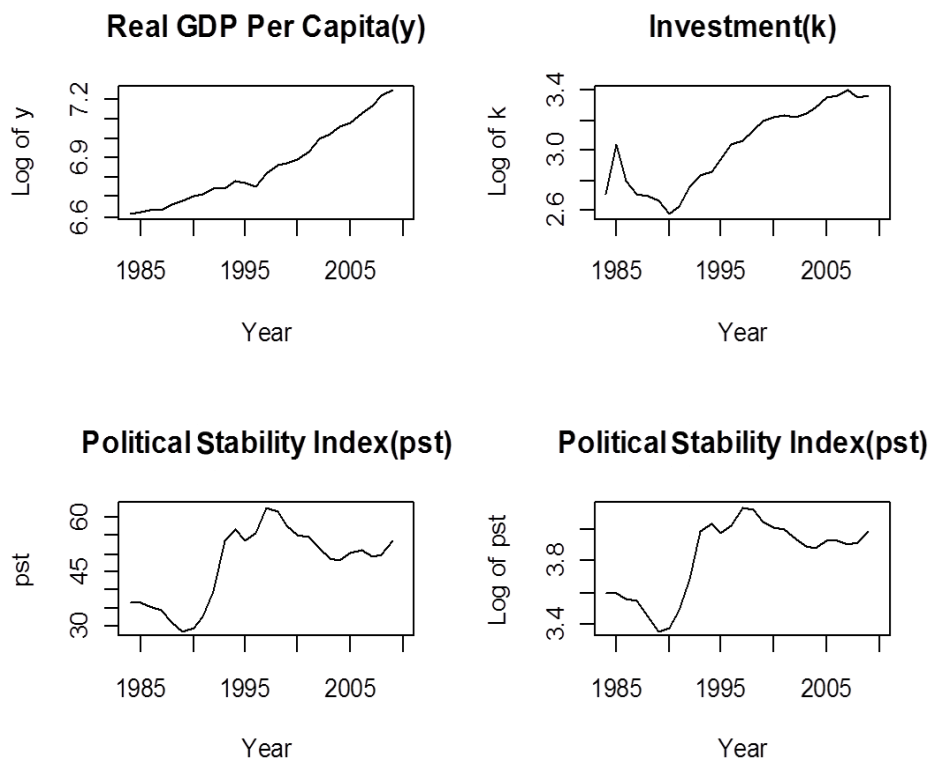
5.2 Results of Unit Root Test

To conduct the Augmented Dickey-Fuller (ADF) test as a test of unit root the procedures described in Enders (2004) has been followed. The result is presented in Table-1:

Table-1: Result of Unit root test (Augmented Dickey-Fuller Test)

Variable	Trend and Constant	Constant	No Trend and No Constant	Order of Integration
$\ln y_t$	$- 0.30(2)^+$	-	-	I (1)
$\Delta \ln y_t$	$-5.69\,^{***}(1)$	-	-	
$\ln k_t$	$-2.73\,(3)$	$-1.18\,(3)$	$1.25\,(3)$	I (1)
$\Delta \ln k_t$	$- 3.27^{*}\,(1)$	-	-	
pst_t	$-1.39\,(2)$	$-1.32\,(2)$	$0.54\,(2)$	I (1)
Δpst_t	$-3.45\,^{*}(1)$	-	-	
$\ln pst_t$	$-1.57\,(2)$	$- 1.34\,(2)$	$0.74\,(2)$	I (1)
$\Delta \ln pst_t$	$-3.26^{*}(1)$	-	-	

Notes:
1. The null hypothesis=unit root
2. ***, ** and * represent significance at 1%, 5% and 10% respectively
3. Lag lengths are in the parenthesis
4. + inference made using normal distribution
5. $\Delta \ln y_t$ = first difference of $\ln y_t$, $\Delta \ln k_t$ = first difference of $\ln k_t$,

$\Delta \ln pst_t$ = first difference of $\ln pst_t$, Δpst_t = first difference of pst_t

Table-1 shows that, all the underlying variables have unit root in their level form but do not have unit root in their first difference form. The level of significance was 10% which is often set by researcher as it is very hard to reject the null hypothesis of unit root due to low power of ADF test. From the unit rest test it can be said that all variables are I(1). So the Engle-Granger Cointegration test can be performed as the variables are of the same order of integration. And, the Bound Testing procedures can be applied as no variable has order of integration of two or more.

5.3 Result of Engle-Granger Cointegration Test

In the Engle-Granger test of cointegration the equation 4.1.1 has been estimated using OLS. Then the Augmented Engle-Granger test is performed on the estimated residuals of the above mentioned equation to test the null hypothesis of no cointegration. The Augmented Engle-Granger test is same as the ADF test except the critical values are different. The test is performed with no trend and no constant, and lag lengths were selected in such way so that error terms are not auto-correlated. The critical values were extracted from the table in Mackinnon (2010) using the formula stated in his paper. *(Appendix-C)* Comparing the calculated statistics with the critical values the null hypothesis of no cointegration cannot be rejected even at 10% significance level. (Table-2) As no cointegration is found among the variables, the equation cannot be estimated in level form as in *equation (3.3)*, so does the long run relationship as the theoretical model. Therefore I will proceed with Bound test of cointegration which may not estimate the exact theoretical model but it may come up with long run information if cointegration is found.

Table-2: Engle-Granger Cointegration Test

Calculated Statistics	Critical Values		
	1%	5%	10%
-1.20	-4.88	-4.08	-3.69

Note: Critical values are calculated using the table in Mac Kinnon(2010)[5]

5.4 Results of Bound Test of Cointegration

To proceed with the bound test approach it is needed to specify a general unrestricted the ARDL model and then reduce the model like in *equation (4.2.1)*. "General to Specific" method is followed to acquire the specific unrestricted model. As the sample size is limited in the study, the start did not have too many lags. But in every stage of reducing the model from the general the ARDL model the criteria of no autocorrelation, no ARCH and normality is maintained. The reduction

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[5] See Appendix C

took place by removing the least significant lag from the model except the intercept and the variables in level form. As in the process of reduction there were several unrestricted ARDL models fulfilling the abovementioned criteria, the specific model was selected based on the lowest Schwartz-Bayesian Criteria (BIC) and the lowest Akaike Information Criterion (AIC*).*

[Appendix-A:Table A1] Once the unrestricted model is selected (*ARDLUN1*), the null hypothesis of no cointegration is tested as described in *section 4.2* .The results are given in the *Table 3*. The calculated F statistic is higher than upper critical bound so that the null hypothesis of no cointegration can be rejected. It is to be noted that the critical values were for sample size 30 whereas the sample size in this study is 26. It was the nearest possible critical value to compare. Still the calculated F statistics is high enough for such conclusion.

Table-3: Bound Test of Cointegration

Calculated F Statistics	Critical Values		
	1%	5%	10%
	I(0) I(1)	I(0) I(1)	I(0) I(1)
33.27	6.18 7.87	4.26 5.47	3.43 4.47

Notes: 1. The null hypothesis is no cointegration
2. Critical values are from Narayan (2004) for unrestricted intercept and no trend

5.5 Results of Long Run and Short Run Dynamics

The existence of cointegration in the lights of Bound testing approach will allow the estimation of the long run model. The selection of the long run will be based on Schwartz Bayesian Criterion and Akaike Information Criterion, given that, the model suffers from no auto correlation, no ARCH (auto regressive conditional heteroskedasticity) and non-normality. The starting selection of the lag was bit trivial as starting with 2 lags of each variable was not enough to attain the objective of no auto correlation. But the model with the lowest SBC and AIC was selected as the optimal long run model(*LR5*) given that fulfils the abovementioned criteria. (See Appendix A: Table A1)   The estimated coefficients of the selected long run model are given in Table: 4 in the following:

Table-4: Long run Estimates

Dependent Variable: $\ln y_t$		
Regressors	Coefficients	Standard Errors
Constant	0.09	0.28(0.32)
$\ln y_{t-1}$	0.97***	0.05(18.14)
$\ln k_{t-2}$	0.08*	0.04(1.82)
$\ln pst_{t-1}$	0.08*	0.05(1.68)
$\ln pst_{t-2}$	-0.10*	0.06(-1.82)
F statistics=542.6(p value:0.00) Jarque-Bera test=0.87(p value:0.65) Shapiro-Wilk test=0.95(p value:0.42)		

Note: 1. Calculated t statistics are in the parenthesis

2. ***, ** and * represent significance at 1%, 5% and 10% respectively

3. $\ln y_{t-1}$ =one period lag of $\ln y_t$, $\ln k_{t-2}$ = two period lag of $\ln k_t$, $\ln pst_{t-1}$ =one period lag of $\ln pst_t$, $\ln pst_{t-2}$ =two period lag of $\ln pst_t$

From the table 4, it is clearly evident that the coefficient of investment has its expected sign and it is positive. The coefficient is significant at 10% level significance which is acceptable for such small sample size. However, the model contains two lags of political stability and both of them are significant at 10% level. The long run multiplier for investment k_t and political stability, pst_t is calculated as 2.33 and -0.67 (See Appendix C: C2). We should be careful about the interpretation as both the independent variables are expressed in percentage and their log forms are used as regressors. It means that 1% point increase in the political stability index (pst_t) will result in a decrease of 0.67% in real GDP per capita. And for investment variable, it can be said that investment to real GDP ratio (k_t) goes up by one percentage point, the real GDP per capita will increase by 2.33%. Once the long run model is established, the short run dynamics can be presented using error correction model. The Engle-Granger's two step procedure of error correction model has been estimated and the results are presented in table 5.

Table-5: Short Run Dynamics: Error Correction Model

Dependent Variable: $\Delta \ln y_t$		
Regressors	Coefficients	Standard Errors
Constant	0.02***	0.01 (2.00)
ECM_{t-1}	-0.75*	0.37(-2.02)
$\Delta \ln y_{t-1}$	0.48*	0.22(2.14)
$\Delta \ln y_{t-2}$	-2.31	0.13(-1.68)
$\Delta \ln y_{t-3}$	0.20	0.16(1.28)
$\Delta \ln y_{t-4}$	0.09	0.09(0.94)
$\Delta \ln k_t$	0.24**	0.09(2.58)
$\Delta \ln k_{t-1}$	0.001	0.06(0.03)
$\Delta \ln k_{t-2}$	-0.04	0.40(-1.06)
$\Delta \ln pst_{t-1}$	0.07***	0.02(3.43)
F statistics =22 (*p* value: 0.00) Jarque-Bera test =0.06 (*p* value:0.97) Shapiro-Wilk test =0.96 (*p* value:0.86)		

Notes: 1. Reported standard errors are Newey-West standard errors

2. t statistics in the parenthesis

3. ***, ** and * represent significance at 1%, 5% and 10% respectively

4. $\Delta \ln y_{t-1}$ =one period lag of $\Delta \ln y_t$, $\Delta \ln y_{t-2}$ =two period lag of $\Delta \ln y_t$, $\Delta \ln y_{t-3}$ =three period lag of $\Delta \ln y_t$, $\Delta \ln y_{t-4}$ =four period lag of $\Delta \ln y_t$, $\Delta \ln k_{t-1}$ =one period lag of $\Delta \ln k_t$, $\Delta \ln pst_{t-1}$ =one period lag of $\Delta \ln pst_t$, $\Delta \ln pst_{t-2}$ =two period lag of $\Delta \ln pst_t$, ECM_{t-1} =one period lag of ECM_t

However the inference will be made based on Newey-West correction because the error correction model suffers from autocorrelation. The error correction term is negative and significant at 10% level. It shows how quickly the equilibrium is restored once the model is out of equilibrium and the significance of the coefficient tells whether it adjust in the same period or not. If the coefficient is not significant it means that the adjustment takes place in the same period. In this study the coefficient of error correction term (ECM_{t-1}) is significant at 10% level and the absolute value is 0.75. So, once the model deviates from the equilibrium it adjusts 75% in that period. However, the error correction

model tells that the political stability has positive effect on economic performance in short run.

6. Result Discussion and Sensitivity Analysis:

In examining the relationship between political stability, it is found that the political stability has a negative effect in the long run but positive effect in the short run. Though the findings contradict most of the similar studies, on the other hand it gives support to the Mancur Olson's theory of political stability and growth. He averred that political stability has such effect on economic growth because of the activities of self-seeking interest group or "distributional coalition" (Goldsmith, 1987). A society which does not change with boundaries inclines to cumulate more collusion. Olson concludes that distributional coalition slows down the capacity to adopt new technologies in the face of changing economic condition, and thereby reduces the economic growth. Distributional coalition also creates the scope for rent seeking for the interest groups at the same time. For a least developed country like Bangladesh the theory suits more as Olson stated and Goldsmith confirmed in his research note. I would like to quote the reasoning of Olson as Goldsmith did in his research notes.

"The dense network of distributional coalitions that eventually emerges in stable societies is harmful to economic efficiency and growth, but so is instability. There is no inconsistency in this; just as special-interest groups leads to misallocation of resources and divert attention from production to distributional struggle, so instability diverts resources that would otherwise have gone into productive long term investments into forms of wealth that are more easily protected. On the whole stable countries are more prosperous than unstable ones and this is no surprise. But, other things being equal, the most rapid growth will occur in the society that have lately experienced upheaval but are expected nonetheless to be stable for the foreseeable future."

However, it should be noted that the effect of political stability on economic performance in this study is not channelled through investment. The result can be different if the effect of political stability is examined through investment channel and should not be confused with the results found in this study. Now, we turn our discussion to analyse critically about the estimated econometric model. Two methods

of cointegration technique have been used to find the long run relationship between economic performance and political stability. The Engle-Granger procedure did not find any cointegration following the theoretical model. It may be due the sample size, model specification or due to low power of test. With the empirical specification the Bound test approach by Pesaran has been applied and the cointegration among the variables has been found. In finding the unrestricted ARDL model for bound test the criteria of no serial correlation, no ARCH and normality have been strictly maintained. The autocorrelation was not only tested for a specific lag but for lags upto 15 with a boundary of p value of 30%. I think the procedure is superior to any rules of thumb for selecting a specific lag to test the autocorrelation. Similar point goes for the test of the presence of ARCH. The null hypothesis of no ARCH was tested for upto 15 lags and conclusion of no ARCH has been made when there was no ARCH for each of these lags. Non-normality is not a serious problem a for a large sample size. But the major challenge in the study was the small size. From selecting lag to diagnostic tests I needed to very careful keeping in mind of the small sample size. Therefore maintaining normality assumption was not an exception. However for the standard error of the error correction model needed to be corrected for autocorrelation before making inference as it does not allow adding more lags to solve the problem. The inference was made based on the Newey-West standard error. The parameter constancy was confirmed with recursive CUSUM test and OLS CUSUM test. (*Appendix B: figure B10 and B11*)

The study only used investment and political stability as independent variables. It ignores an important variable of human capital which is identified as an important determinant of growth. There were few reasons for not including it; small sample size was most important reason of all. Unfortunately the data was not available for the whole period of study. Omitting human capital from the regression is not a problem until it is correlated with political stability. If human capital is correlated with political stability then the estimates result in biased estimators. But the problem has been tackled using lag of dependent variable as a proxy human capital and all other determinants of growth which are likely to be correlated with political stability. The study commenced with the only possibility of causality from political stability to economic performance. It did not consider the reverse causality.

These are few caveats of this study. It is may be due to very small sample size or not including some important determinants.

7. Conclusion:

In this paper, we have investigated the direct impact of political stability on economic performance of Bangladesh for the period 1984-2009. To the best of our knowledge, this is the first study which attempts to analyse the relationship between political stability and economic performance for Bangladesh using time series econometric approach. Our objective of the paper is to examine the existence of long run as well as the short run effect of political stability on economic performance of Bangladesh. Two different techniques of cointegration have been used in this regard. At First, the Engle-Granger method of cointegration is applied to estimate the augmented Solow model of economic growth in structural form where political stability is incorporated in total factor productivity term. The Engle-Granger method does not find any cointegration, therefore nothing can be inferred about long run relationship. Then the ARDL Bound Testing approach has been implemented on the reduced form of the model and cointegration has been found. Once cointegration is found, the long run relationship as well as the short run relationship has been established. The results of this study indicate that political stability has negative effect on economic performance in the long run while the short run effect is positive. . Undoubtedly, destabilizing events interrupt economic activities in the short term, but these can set the stage for more rapid growth in the medium term. Political stability can have such negative effect on economic growth in the long run because of the activities of self-seeking interest group or "distributional coalition". A society which does not change with boundaries inclines to cumulate more collusion and distributional coalition slows down the capacity to adopt new technologies in the face of changing economic condition, and thereby reduces the economic growth. Distributional coalition also creates the scope for rent seeking for the interest groups at the same time. Again, one should not misinterpret the result found in this study that political instability can improve the economic performance of Bangladesh. Political instability diverts resources that would otherwise have gone into productive long term investments just as special-interest groups leads to misallocation of resources and divert attention from production to distributional struggle in a stable society. There is no

inconsistency in this. Therefore, the findings from our study do not necessarily recommend that the political stability should be remained to improve economic performance of Bangladesh. In general, stable political environment is always expected to foster the economic growth in a least developed county like Bangladesh but overstressing political stability as the key determinant of economic performance can be redundant from a policy perspective.

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Appendix A:

Table-A1: Diagnostic tests of Unrestricted ARDL models

Unrestricted ARDL Model	No Auto-Correlation	No ARCH	Normality	SBC	AIC
ARDLUN1	Yes	Yes	JB=0.25(0.88) SW=0.97(0.78)	-119.57	-135.24
ARDLUN2	Yes	Yes	JB= 0.25(0.88) SW=0.97(0.78)	-122.61	-137.24
ARDLUN3	Yes	Yes	JB=0.13(0.94) SW=0.98(0.88)	-124.81	-138.39

Table-A2: Diagnostic tests of Long Run models

Long Run Model	No Auto-Correlation	No ARCH	Normality	SBC	AIC
LR1	Yes	Yes	JB= 0.90(0.64) SW=0.97(0.59)	-96.88	-108.66
LR2	No	Yes	JB=0.95(0.62) SW=0.97(0.59)	-100.05	-110.66
LR3	Yes	Yes	JB=0.61(0.74) SW=0.96(0.50)	-102.73	-112.15
LR4	Yes	Yes	JB= 0.05(0.98) SW=0.97(0.63)	-105.31	-113.56
LR5	Yes	Yes	JB=0.87(0.65) SW=0.96(0.42)	-107.53	-114.60

Notes:
1. SBC and AIC represent Schwartz Bayesian Criteria and Akaike Information Criteria respectively
2. Figures related to auto-correlation test are given in Appendix B
3. p values are mentioned in the parentheses for the Normality test(JB=Jarque-Bera test, SW=Shapiro-Wilk test) .The null hypothesis is residuals are normal.

Table A3: Test for ARCH for unrestricted ARDL models

| ARDLUN1		ARDLUN2		ARDLUN3	
TxR-sq	Chi-sq(q)	TxR-sq	Chi-sq(q)	TxR-sq	Chi-sq(q)
1 0.9074042	3.841459	1 0.9098648	3.841459	1 0.6456204	3.841459
2 0.5737690	5.991465	2 0.5830913	5.991465	2 0.1960560	5.991465
3 1.7545421	7.814728	3 1.7647258	7.814728	3 2.8474550	7.814728
4 1.5273834	9.487729	4 1.5464106	9.487729	4 2.6750229	9.487729
5 2.3261160	11.070498	5 2.3229951	11.070498	5 3.5368037	11.070498
6 3.5878697	12.591587	6 3.5814078	12.591587	6 4.5494917	12.591587
7 3.2215039	14.067140	7 3.2122443	14.067140	7 4.8672966	14.067140
8 6.6796609	15.507313	8 6.7458372	15.507313	8 7.2437978	15.507313
9 8.4243854	16.918978	9 8.4328932	16.918978	9 10.3500273	16.918978
10 11.0000000	18.307038	10 11.0000000	18.307038	10 11.0000000	18.307038
11 10.0000000	19.675138	11 10.0000000	19.675138	11 10.0000000	19.675138
12 9.0000000	21.026070	12 9.0000000	21.026070	12 9.0000000	21.026070
13 8.0000000	22.362032	13 8.0000000	22.362032	13 8.0000000	22.362032
14 7.0000000	23.684791	14 7.0000000	23.684791	14 7.0000000	23.684791
15 6.0000000	24.995790	15 6.0000000	24.995790	15 6.0000000	24.995790

Notes: 1.The null hypothesis is no ARCH.
   2.The presence of ARCH is tested up to 15 lags.
        3.In every column the values in the left side are calculated statistics and the

values in the right side are critical χ^2 statistics

Table A4: Test for ARCH for unrestricted ARDL model

LR1		LR2		LR3	
TxR-sq	Chi-sq(q)	TxR-sq	Chi-sq(q)	TxR-sq	Chi-sq(q)
1 0.2090837	3.841459	1 0.1887824	3.841459	1 0.1086632	3.841459
2 2.1348807	5.991465	2 2.1588362	5.991465	2 2.2026139	5.991465
3 2.5467353	7.814728	3 2.5925910	7.814728	3 2.3998104	7.814728
4 3.3220358	9.487729	4 3.3338694	9.487729	4 2.6419374	9.487729
5 2.8782068	11.070498	5 2.8831276	11.070498	5 2.4870650	11.070498
6 3.7430192	12.591587	6 3.7298716	12.591587	6 3.2955053	12.591587
7 4.8869319	14.067140	7 4.8632067	14.067140	7 4.8647057	14.067140
8 5.0929608	15.507313	8 5.0409244	15.507313	8 5.2716537	15.507313
9 4.7807380	16.918978	9 4.7279785	16.918978	9 4.9908709	16.918978
10 7.7378323	18.307038	10 7.7832901	18.307038	10 8.1961846	18.307038
11 12.5175624	19.675138	11 12.5052150	19.675138	11 12.6116763	19.675138
12 12.0000000	21.026070	12 12.0000000	21.026070	12 12.0000000	21.026070
13 11.0000000	22.362032	13 11.0000000	22.362032	13 11.0000000	22.362032
14 10.0000000	23.684791	14 10.0000000	23.684791	14 10.0000000	23.684791
15 9.0000000	24.995790	15 9.0000000	24.995790	15 9.0000000	24.995790

Table A4: Test for ARCH for unrestricted ARDL model (Continued)

LR4	LR5
TxR-sq Chi-sq(q)	TxR-sq Chi-sq(q)
1 0.01544479 3.841459	1 0.3956865 3.841459
2 2.00937625 5.991465	2 2.5223136 5.991465
3 1.97254443 7.814728	3 2.4162638 7.814728
4 2.32691550 9.487729	4 3.4159921 9.487729
5 2.27005827 11.070498	5 3.2721897 11.070498
6 2.54177564 12.591587	6 3.2408672 12.591587
7 5.03779213 14.067140	7 5.2696242 14.067140
8 5.58613918 15.507313	8 5.3403925 15.507313
9 5.30055960 16.918978	9 4.9819825 16.918978
10 7.88210939 18.307038	10 7.5826401 18.307038
11 12.91629121 19.675138	11 12.9875130 19.675138
12 12.00000000 21.026070	12 12.0000000 21.026070
13 11.00000000 22.362032	13 11.0000000 22.362032
14 10.00000000 23.684791	14 10.0000000 23.684791
15 9.00000000 24.995790	15 9.0000000 24.995790

Notes: 1. The null hypothesis is no ARCH.
2. The presence of ARCH is tested up to 15 lags.
3. In every column the values in the left side are calculated statistics and the   values   in the right side are critical χ^2 statistics
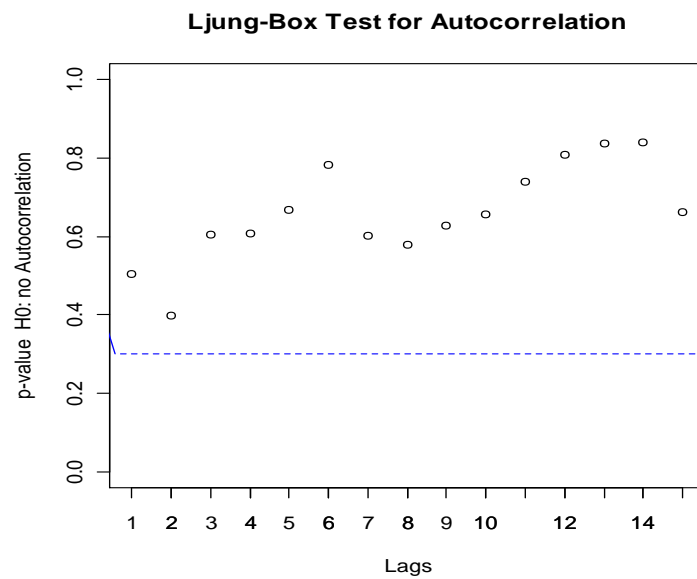
Appendix: B

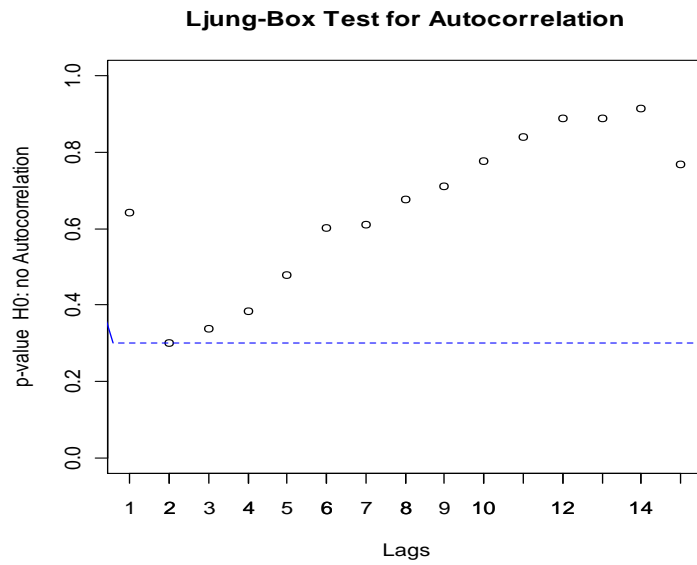**Figure B1:** Test of auto-correlation for unrestricted ARDL model 1
(ARLDLUN1)

Ljung-Box Test for Autocorrelation
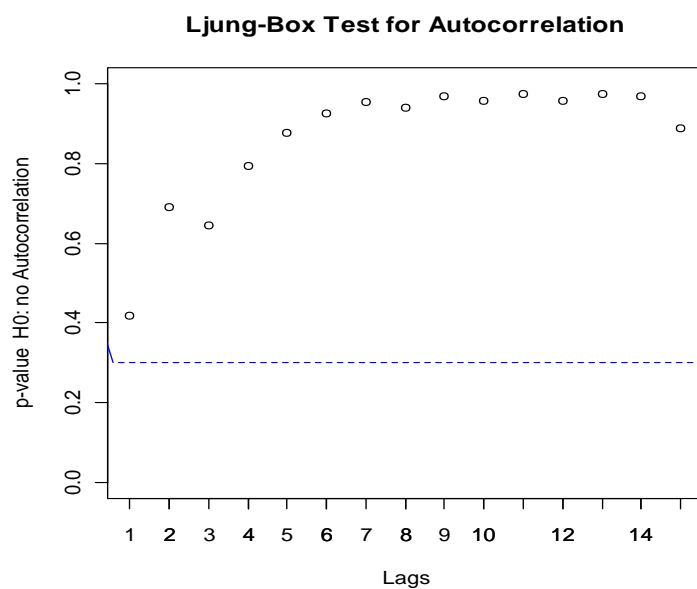
Figure B2: Test of auto-correlation for unrestricted ARDL model 2
(ARLDLUN2)

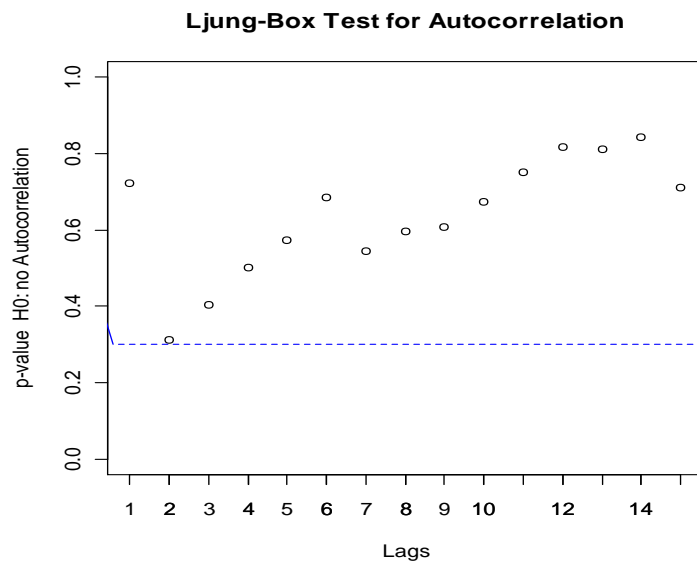**Ljung-Box Test for Autocorrelation**
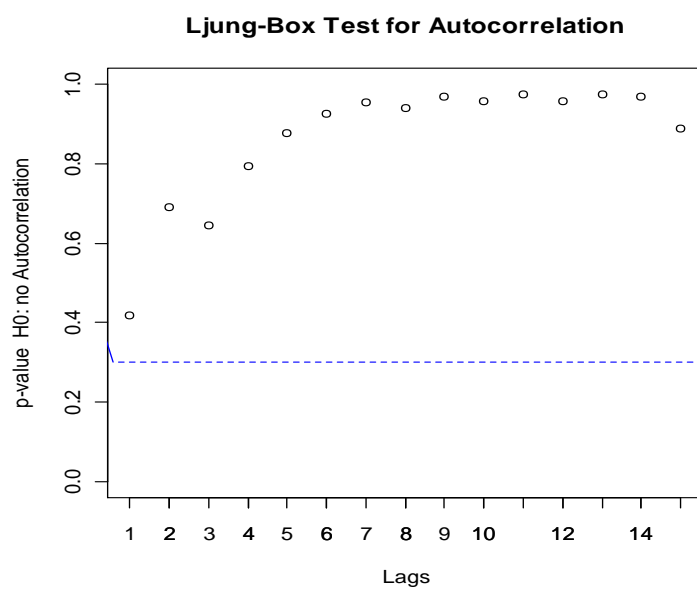
Figure B3: Test of auto-correlation for unrestricted ARDL model 3
(ARLDLUN3)

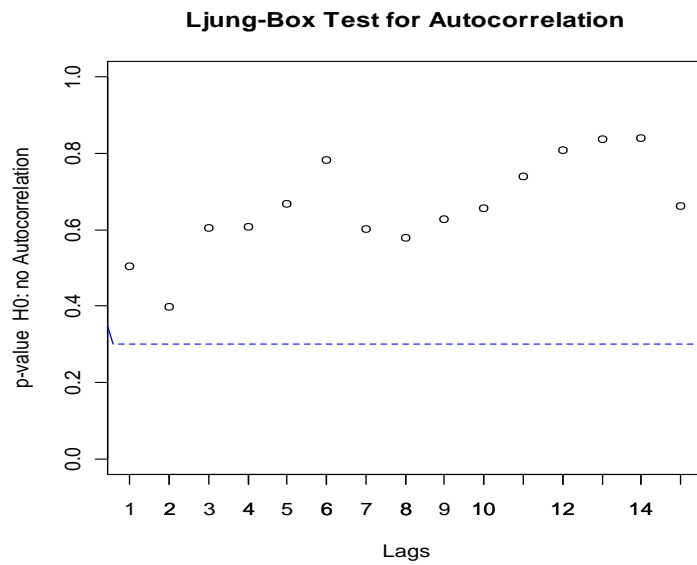**Figure B4:** Test of auto-correlation for Long run model 1 (LR1)
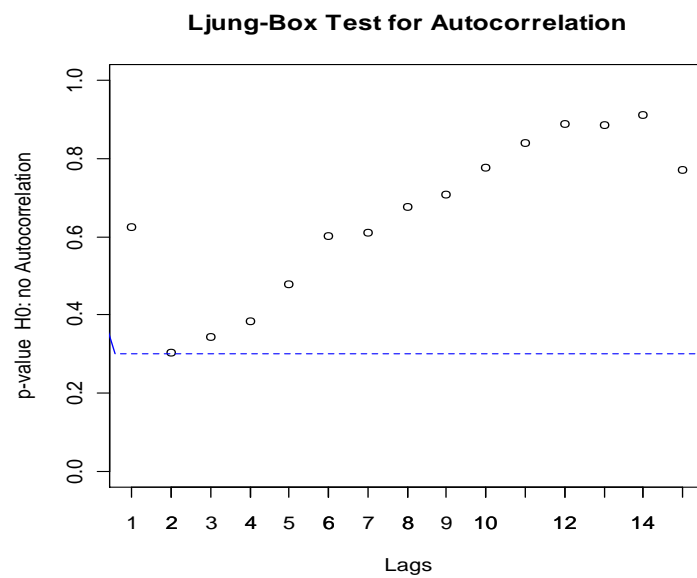
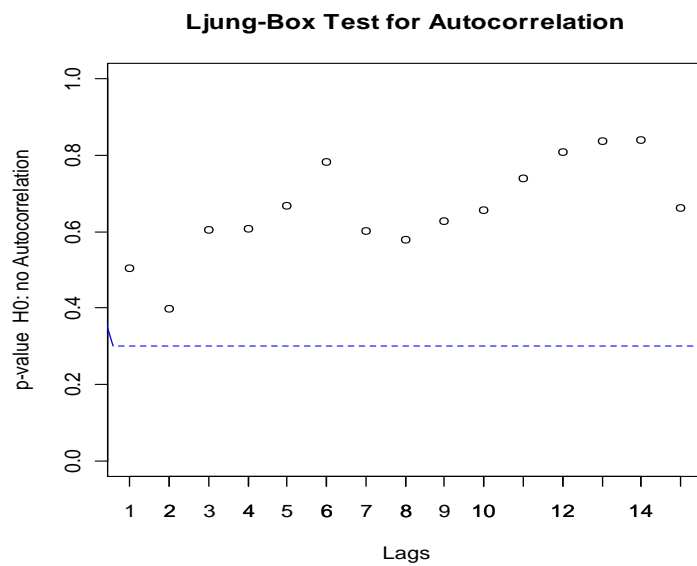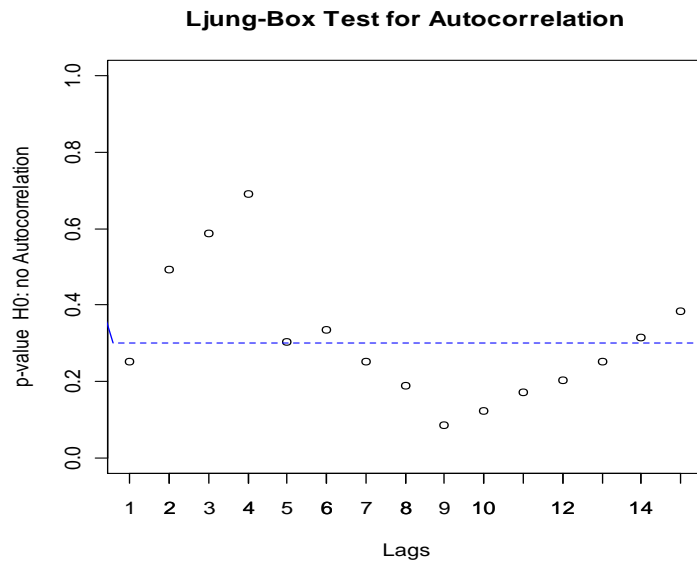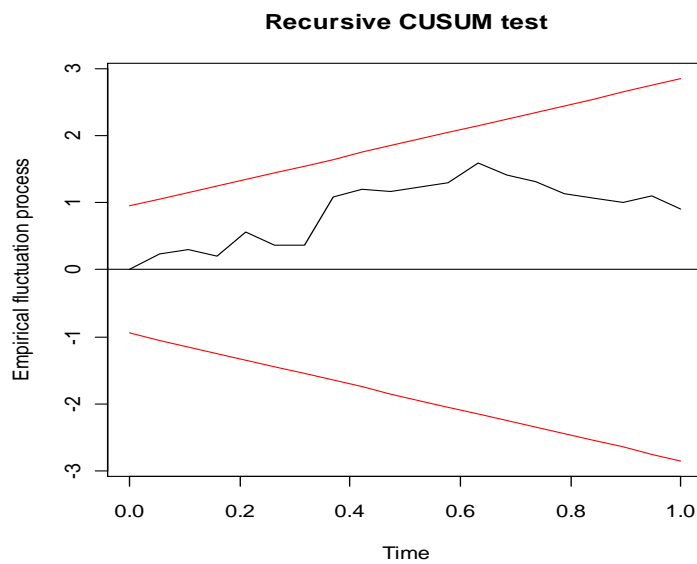**Figure B5:** Test of auto-correlation for Long run model 2 (LR2)

Ljung-Box Test for Autocorrelation

Figure B6: Test of auto-correlation for Long run model 3 (LR3)

Ljung-Box Test for Autocorrelation

Figure B7: Test of auto-correlation for Long run model 4 (LR4)

Ljung-Box Test for Autocorrelation

Figure B8: Test of auto-correlation for Long run model 5 (LR5)

Ljung-Box Test for Autocorrelation

Figure B9: Test of auto-correlation for Error Correction model

Ljung-Box Test for Autocorrelation

Figure B 10: Recursive CUSUM test for long run model

Recursive CUSUM test

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Figure B 11: OLS based CUSUM test for long run model
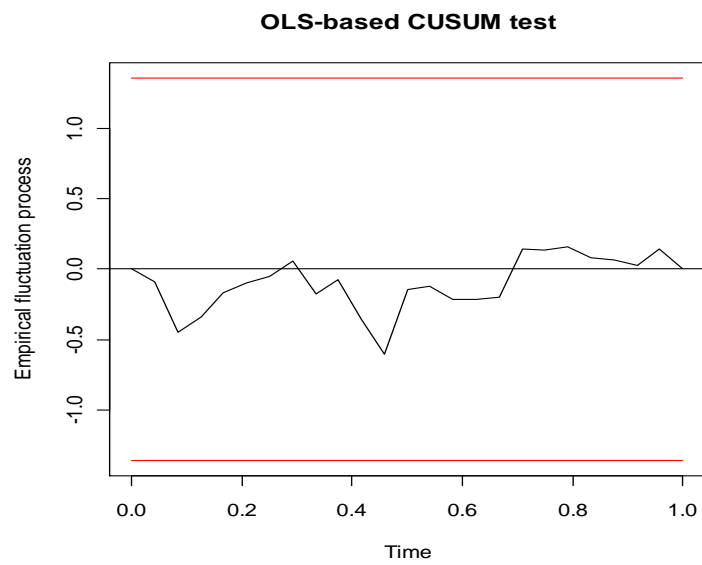
Appendix: C

C1. Critical Value calculation for Engle-Granger Test
(Mac Kinnon, 2010)

T=Number of observation=26, N=Number of I(1) series which null of non-cointegration is being tested=3, β_∞: Estimated asymptotic critical values (with estimated standard errors in parentheses) , β_1: Coefficient on $T-1$ in response surface regression , β_2: Coefficient on $T-2$ in response surface regression , β_3: Coefficient on $T-3$ in response surface regression. Formula for estimation of critical values is given below:

$$\beta_\infty + \frac{\beta_1}{T} + \frac{\beta_2}{T^2} + \frac{\beta_3}{T^3}$$

Table C1: Critical Values for Engle-Granger test for cointegration

1%	5%	10%
-4.88	-4.08	-3.69

Note: Critical values mentioned here are for test with constant as values for test with no constant and no trend was unavailable

C2. Calculation of long run multiplier from Table 4

In long run

$$\ln y_t = \ln y_{t-1} = \ln y_t *$$
$$\ln k_{t-2} = \ln k_t *$$
$$\ln pst_{t-1} = \ln pst_{t-2} = \ln pst_t *$$

So according to our estimated long run model:

$$\ln y_t{}^* = \alpha + \beta_1 \ln y_t{}^* + \gamma_1 \ln k_t{}^* + \lambda_1 \ln pst_t{}^* + \lambda_2 \ln pst_t{}^*$$

$$\Rightarrow \ln y_t{}^* - \beta_1 \ln y_t{}^* = \alpha + \gamma_1 \ln k_t{}^* + (\lambda_1 + \lambda_2) \ln pst_t{}^*$$

$$\Rightarrow (1 - \beta_1) \ln y_t{}^* = \alpha + \gamma_1 \ln k_t{}^* + (\lambda_1 + \lambda_2) \ln pst_t{}^*$$

$$\Rightarrow \ln y_t{}^* = \frac{\alpha}{1 - \beta_1} + \frac{\gamma_1}{1 - \beta_1} \ln k_t{}^* + \frac{\lambda_1 + \lambda_2}{1 - \beta_1} \ln pst_t{}^*$$

So the long run multiplier for $\ln k_t$ is $\dfrac{\gamma_1}{1 - \beta_1}$ and the long run

multiplier for $\ln pst_t$ is $\dfrac{\lambda_1 + \lambda_2}{1 - \beta_1}$.

Appendix: D

List of variables and their sources

Variable	Source
Real GDP per capita(y_t)	Penn World table 7.0
Investment as a percentage of real GDP(k_t)	Penn World table 7.0
Political stability(pst_t)	International Country Risk Guide