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Impact of Banking Sector Efficiency and Profitability on Bangladesh Economy

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Abstract

This paper attempts to investigate how banking sector efficiency and profitability along with per capita electricity consumption, domestic investment, trade openness, external debt, and government expenditures affect Bangladesh economy both in the short run and in the long run by using time series data from 1972-2013. There exists cointegrating relationship among the variables in equation (1). Both efficiency and profitability have positive impact on per capita gross domestic product in the long run but the impact of efficiency is insignificant unlike that of profitability. Therefore, over time bank efficiency and profitability will boost up the Bangladesh economy.

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1. Introduction

A country's economic development largely depends on the banking sector. Banking sector accelerates the economic growth providing fund to business organization as and when necessary and performing other supporting activates such as payment mechanism, money transfer, assurance and guarantee in international trade, and foreign exchanges activities etc. In addition, commercial banks collect scattered idle money from depositors and help depositors to earn from their idle money using fund effectively and efficiently. That is, commercial banks accumulate segregated money from surplus unit of society and supply that fund to deficit unit. As a result idle money is invested and resources of society are utilized properly. Money multiplying activities of banks increase the money supply in the economy. In turn, employment opportunity increases in the economy. This is how banking sector helps a particular economy to embrace a decent growth regime. The recent banking sector scandals in Bangladesh have motivated to investigate whether banking sector profitability and efficiency are contributing to the Bangladesh economy or not. There are 56 commercial and specialized banks running in the economy. But the loan defaults and delinquencies, manipulated financial reporting, misconducted in resource allocation, nepotism in loan sanctioning, and manipulated profitability create a chronic disease in the financial sector of Bangladesh that can raise question about the contribution of this sector into the economy. The worst scenarios have been revealed in the scandals of Hall mark[1] including five other companies (BDT 3,547 crore) in Sonali Bank. The political involvements in the supervision and weak institutional framework create vulnerability in the loan repayment of commercial banks particularly in the govt. banks in the Bangladesh.

The main objective of this paper is to discover how and to what extent efficiency and profitability of Bangladesh banking sector affects the economy both in the short run and in the long run. The study has used time series data of per capita gross domestic product (PGDP), per capita electricity consumption in khw (PEC), domestic investment (DIV) as percentage of nominal gross domestic product, trade openness (OPN), external debt as percentage of nominal gross domestic product (EXD), government expenditures as percentage of nominal gross domestic product, banking sector efficiency (REX), and banking sector profitability (PROF) form 1972-2013. All data have been collected from The World Bank Development Indicators of the World Bank except banking sector efficiency and profitability. Banking sector efficiency and profitability have been collected from the time series data bank of Bangladesh Bank.

2. Literature Review

Only a few studies have been conducted on how and to what extent banking sector indicators (profitability, credit, lending rate, development, turnover, and efficiency etc.) affect the economy. For example- Dey and Flaherty (2005) have found that bank credit and turnover are not consistent determinants of economic growth unlike bank development. Cappiello *et al.* (2010) have found that credit growth has significant impact on gross domestic product (see also Mishra *et al*., 2000). Adekola (2016) has discovered that increase in banks' profitability increases the gross domestic product. Aurangzeb (2012) has found that profitability has significant positive impact on economic growth. Khulaifi *et al.* (1999) have suggested that banking sector profitability is responsible for

[1] Hallmark scandal in Sonali Bank include Hallmark group BDT. 2686.14 crore, T and Brothers BDT. 609.69 crore, Paragon Group BDT. 146.60 crore, Nakshi Knit BDT. 66.36 crore, DN sports BDT. 33.25 crore and Khanjahan Ali BDT. 4.96 crore. at Ruposhi Bangla Hotel Branch. (August 14, 2012, The Daily Star).

economic growth (see also Yazdani and Masoud, 2011). Kayode *et al.* (2010) have found that lending rate significantly affects economic growth.

From above mentioned literatures, still no one has conducted the study to find out impact of banking sector efficiency on economic growth and due to sample size and econometric methodologies the impact of profitability on economic growth might vary. To the best of my knowledge still no one in Bangladesh has conducted the study to find out the impact of profitability of banking sector on economy (per capita gross domestic product) both in the short run and in the long run. The study in this regard will fill out the gap and will also address the impact of efficiency on economic growth by using modern econometric tools. By introducing the impact of profitability along with efficiency on economy, this paper will be an excellent contribution in the field of literatures.

3. Defining Variables

PGDP represents per capita gross domestic product. It is calculated dividing the gross domestic product by the total population. OPN[2] represents the trade openness. Usually it is calculated dividing the summation of total export and import by the nominal gross domestic product. EXD[3] represents total external debt as percent of nominal gross domestic product, GOV represents total government expenditures as percentage nominal gross domestic product, PEC represents per capita electricity consumption in kwh. Usually it is calculated dividing total electricity consumption by the total population. DIV denotes domestic investment as percentage of nominal gross domestic product. REX[4] denotes the efficiency of the banking sector. It has been calculated dividing the total income of the entire banking sector by the total expenses of the entire banking sector. Here total income of the entire banking sector represents the total income of all banks in Bangladesh at a particular time (for example 2002) and total expenses of the entire banking sector represent total expenses of all banks in Bangladesh at a particular time (for example 2002). PROF denotes the total net profit of the entire banking sector. More specifically the summation of net profit of all banks in Bangladesh at a particular time. Here, it may give rise confusion about the high and significant correlation issue between PROF and REX. To make the puzzle more transparent, a simple example can be cited. For example, a bank's total income is USD 200 crore and total expense is USD 100 crore, therefore efficiency will be 2 and profit will be USD 100. Now income has been USD 250 and expenses have been USD 100. Therefore, efficiency will be 2.5 and profit will be USD 150 crore. It is clear that efficiency has increased by 25% where profit has increased by 50%. Therefore, PROF may not increase exactly in line with the REX. Therefore, apparently using REX and PROF in the same model may give rise to the confusion that high correlation exists but in reality it is not true.

4. Descriptive Statistics and Explanatory Graphs

To understand the nature of the distribution and variability in each variable, a few descriptive statistics have been given in Table I. Apart from that, to observe the trend of REX and PROF, their time series graphs have been given in Figure I and Figure II. PGDP has been measured by USD.

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[2] $OPN = \frac{Export\ at\ current\ price + Imports\ at\ current\ price}{Nominal\ Gross\ Domestic\ Product}$. Trade openness measures the degree of trade liberalization.

[3] External debt is the total long term debt of an economy.

[4] $REX = \frac{Total\ Income\ of\ banking\ sector}{Total\ Expenses\ of\ banking\ sector}$

OPN, EXD, GOV, and DIV have been expressed as percentage of nominal gross domestic product. PROF has been measured by USD crore.

Table I. Descriptive Statistics (See Note[5])

	PGDP	OPN	EXD	GOV	PEC	DIV	REX	PROF
Minimum	5.480	2.397	0.846	1.152	2.352	0.913	0.959	-197,167
Maximum	6.535	3.873	3.825	1.838	5.700	3.346	1.458	710,354
Mean	5.848	3.201	3.218	1.549	4.101	2.952	1.184	63652
St.Dev.	0.306	0.349	0.556	0.127	0.959	0.468	0.117	184,448
CV (%)	5.23	10.90	17.28	8.20	23.38	15.85	9.88	289.77
JB Statistic	5.186* (0.075)	0.856 (0.652)	125.11*** (0.000)	65.06 (0.661)	2.493 (0.288)	183.1*** (0.000)	0.841 (0.657)	85.061*** (0.000)
Sample Size	$n = 42$	$n = 42$	$n = 42$	$n = 42$	$n = 42$	$n = 42$	$n = 42$	$n = 42$

The distributions of PGDP, EXD, DIV, and PROF are not normal. Moreover, PROF has the highest variability and PGDP has the lowest variability.

Figure I. Efficiency of the Banking Sector

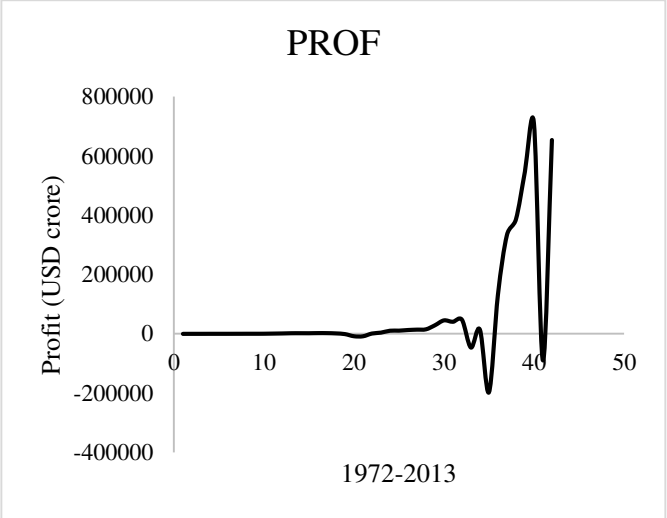

Figure II. Profitability of the Banking Sector

From Figure I, it can be concluded that efficiency has fallen from 1982-1992 after that it has reverted back. Again it has fallen after 2010. From Figure II, it can said that banking sector profit has experienced more fluctuations during 2002-2013. Before 2002, profit was more stable. Relatively profit has experienced more variability than efficiency.

5. Econometric Methodology, Results, and Discussion

The long run impact of banking sector efficiency (REX) and banking sector profitability (PROF) along with per capita electricity consumption in khw (PEC), domestic investment (DIV), trade openness (OPN), external debt as percentage of nominal gross domestic product (EXD), and

[5] Note: ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level.

government expenditures as percentage of nominal gross domestic product (GOV) on economy (PGDP) will be examined by the following equation:

$$\ln PGDP_t = \alpha_0 + \alpha_1 \ln PEC_t + \alpha_2 \ln DIV_t + \alpha_3 \ln OPN_t + \alpha_4 \ln EXD_t$$
$$+\alpha_5 \ln GOV_t + \alpha_6 \ln REX_t + \alpha_7 PROF_t + \varepsilon_t \qquad (1)$$

Here, $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5,$ and α_6 denote the long run elasticities of per capita gross domestic product with respect to per capita electricity consumption in khw, domestic investment as percentage of nominal gross domestic product, trade openness, external debt as percentage of nominal gross domestic product, government expenditures as percentage of nominal gross domestic product, and efficiency of the banking sector respectively. α_7 represents percentage change in per capita gross domestic product with respect USD one crore change in profit. GMM will be used to estimate the long run equation in the following form:

$$\ln PGDP_t = \alpha_0 + \sum_{i=0}^{p} \alpha_{1i} \ln PEC_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \ln DIV_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \ln OPN_{t-i} + \sum_{i=0}^{p} \alpha_{4i} \ln EXD_{t-i}$$
$$+\sum_{i=0}^{p} \alpha_{5i} \ln GOV_{t-i} + \sum_{i=0}^{p} \alpha_{6i} \ln REX_{t-i} + \sum_{i=0}^{p} \alpha_{7i} PROF_{t-i} + \varepsilon_t \qquad (2)$$

Appropriate lag length will be selected by AIC and SBIC criteria.

The following error correction model will be estimated to examine the short-run impact of per capita electricity consumption in khw, domestic investment as percentage of nominal gross domestic product, trade openness, external debt as percentage of nominal gross domestic product, government expenditure as percentage of nominal gross domestic product, banking sector efficiency, and banking sector profitability on per capita gross domestic product:

$$\Delta \ln PGDP_t = \theta_0 + \theta_1 \Delta \ln PEC_t + \theta_2 \Delta \ln DIV_t + \theta_3 \Delta \ln OPN_t + \theta_4 \Delta \ln EXD_t$$
$$+\theta_5 \Delta \ln GOV_t + \theta_6 \Delta \ln REX_t + \theta_7 \Delta PROF_t + \lambda ECM_{t-1} + \xi_t \quad (3)$$

Here, $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6,$ and θ_7 represent the short run impact of per capita electricity consumption, domestic investment as percentage of nominal gross domestic product, trade openness, external debt as percentage of nominal gross domestic product, government expenditure as percentage of nominal gross domestic product, banking sector efficiency, and banking sector profitability on per capita gross domestic product. λ represents the speed of adjustment to approach into the long run equilibrium if there is any shock in the system. The short run equation will be estimated in the following form:

$$\Delta \ln PGDP_t = \theta_0 + \sum_{i=0}^{p} \theta_{1i} \Delta \ln PEC_{t-i} + \sum_{i=0}^{p} \theta_{2i} \Delta \ln DIV_{t-i} + \sum_{i=0}^{p} \theta_{3i} \Delta \ln OPN_{t-i} + \sum_{i=0}^{p} \theta_{4i} \Delta \ln EXD_{t-i}$$
$$+\sum_{i=0}^{p} \theta_{5i} \Delta \ln GOV_{t-i} + \sum_{i=0}^{p} \theta_{6i} \Delta \ln REX_{t-i} + \sum_{i=0}^{p} \theta_{7i} \Delta PROF_{t-i} + \lambda ECM_{t-1} + \xi_t \quad (4)$$

ECM_{t-1} is the one period lagged error term derived from the long run equation. It is expected that the coefficient of ECM_{t-1} is negative and significant. If it is positive, the adjustment will be explosive. ECM_t has been defined in the following equation:

$$ECM_t = \ln PGDP - \hat{\alpha}_0 - \sum_{i=0}^{p} \hat{\alpha}_{1i} \ln PEC_{t-i} - \sum_{i=0}^{p} \hat{\alpha}_{2i} \ln DIV_{t-i} - \sum_{i=0}^{p} \hat{\alpha}_{3i} \ln OPN_{t-i} - \sum_{i=0}^{p} \hat{\alpha}_{4i} \ln EXD_{t-i}$$

$$- \sum_{i=0}^{p} \hat{\alpha}_{5i} \ln GOV_{t-i} - \sum_{i=0}^{p} \hat{\alpha}_{6i} \ln REX_{t-i} - \sum_{i=0}^{p} \hat{\alpha}_{7i} PROF_{t-i} \quad (5)$$

The appropriate lag length for short run equation will be selected by AIC and SBIC criteria. Logarithm has been avoided for PROF due to the existence of negative values.

Before estimation of long-run and short run equation, at first step unit root problem would be checked by the ADF test (Dicky and Fuller, 1979) with trend and intercept, with intercept only, and without trend and intercept. The form of ADF test with trend and intercept is given below:

$$\Delta Z_t = K_0 + K_1 t + \delta Z_{t-1} + \sum_{j=1}^{m} \theta_j \Delta Z_{t-j} + \mu_t \quad (6)$$

Here, Z is the variable under investigation. The variable is of I(1) if $\delta = 0$.

Apart from ADF test, PP test (Phillips and Perron, 1987) will be applied to get overwhelming conclusion. **All variables of are integrated of order one (I(1)) suggested by ADF test and PP test results. The test results have been provided in Table II and Table III.**

At this stage, test of cointegration will be applied to check whether there exists any long run relationship or not. The Johansen and Juselius (1990) test will be applied to check the existence of long run relationship among the variables. A brief description of this test is given below:

$$\Delta X_t = B_0 + \Pi X_{t-p} + \sum_{j=1}^{p} B \Delta X_{t-j} + \eta_t \quad (7)$$

Where, X_t represents the vector of endogenous I(1) variables, B_0 represents a vector of constant terms, is the matrix of co-efficients, η_t is the vector of residuals , p denotes the lag length. All variables in equation (7) are seemed to be endogenous. The long run relationship among X_t is determined by the rank of Π (say r). If $r = 0$, the variables in the level form do not have cointegration relationship and equation (7) can be transformed to VAR-model of pth order.

If 0 < r < n, then there are ($n \times r$) matrices of α and β such that:

$\Pi = \alpha\beta'$. The strength of co-integration relationship is measured by α. β is called the cointegration vector and $\beta' X_t$ is of I(0) even if X_t is of I(1). Johansen and Juselius (1990) test suggests there exists cointegration relationship among the variables. Therefore, there exists long run relationship among the variables. Therefore, in the long run all variables will move together. The test results have been provided in Table IV.

The co-integration relationship indicates the existence of causal relationship between variables but it does not indicate the direction of causal relationship between variables. Therefore it is common to test for detecting the causal relationship between variables using the Engle and Granger test (Engle and Granger, 1987) procedures. Due to the presence of co-integration relationship, the augmented form of the Granger causality test involves the error correction term and has been formulated in a multivariate *pth* order vector error correction framework which is given below:

$$\begin{bmatrix} \Delta \ln PGDP_t \\ \Delta \ln PEC_t \\ \Delta \ln DIV_t \\ \Delta \ln OPN_t \\ \Delta \ln EXD_t \\ \Delta \ln GOV_t \\ \Delta \ln REX_t \\ \Delta PROF_t \end{bmatrix} = \begin{bmatrix} C_1 \\ C_2 \\ C_3 \\ C_4 \\ C_5 \\ C_6 \\ C_7 \\ C_8 \end{bmatrix} + \sum_{i=1}^{p} M \begin{bmatrix} \Delta \ln PGDP_{t-i} \\ \Delta \ln PEC_{t-i} \\ \Delta \ln DIV_{t-i} \\ \Delta \ln OPN_{t-i} \\ \Delta \ln EXD_{t-i} \\ \Delta \ln GOV_{t-i} \\ \Delta \ln REX_{t-i} \\ \Delta PROF_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \\ \lambda_5 \\ \lambda_6 \\ \lambda_7 \\ \lambda_8 \end{bmatrix} ECM_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \end{bmatrix} \quad (8)$$

$$M = \begin{bmatrix} \psi_{11i} & \psi_{12i} & \psi_{13i} & \psi_{14i} & \psi_{15i} & \psi_{16i} & \psi_{17i} & \psi_{18i} \\ \psi_{21i} & \psi_{22i} & \psi_{23i} & \psi_{24i} & \psi_{25i} & \psi_{26i} & \psi_{27i} & \psi_{28i} \\ \psi_{31i} & \psi_{32i} & \psi_{33i} & \psi_{34i} & \psi_{35i} & \psi_{36i} & \psi_{37i} & \psi_{38i} \\ \psi_{41i} & \psi_{42i} & \psi_{43i} & \psi_{44i} & \psi_{45i} & \psi_{46i} & \psi_{47i} & \psi_{48i} \\ \psi_{51i} & \psi_{52i} & \psi_{53i} & \psi_{54i} & \psi_{55i} & \psi_{56i} & \psi_{57i} & \psi_{58i} \\ \psi_{61i} & \psi_{62i} & \psi_{63i} & \psi_{64i} & \psi_{65i} & \psi_{66i} & \psi_{67i} & \psi_{68i} \\ \psi_{71i} & \psi_{72i} & \psi_{73i} & \psi_{74i} & \psi_{75i} & \psi_{76i} & \psi_{77i} & \psi_{78i} \\ \psi_{81i} & \psi_{82i} & \psi_{83i} & \psi_{84i} & \psi_{85i} & \psi_{86i} & \psi_{87i} & \psi_{88i} \end{bmatrix} \quad (9)$$

Here, C's, ψ's , and λ's are the parameters to be estimated. ECM_{t-1} is the one period lagged error term derived from the long run cointegration equation. ε's are serially independent with mean zero and finite covariance matrix. The F-test has been applied to examine the direction of causal relationship among the variables. From the estimated result it has been found that there exists short run bidirectional causality between government expenditures as percentage of nominal gross domestic product and domestic investment as percentage of nominal gross domestic product. Short run unidirectional causalities exist from per capita electricity consumption, domestic investment as percentage of nominal gross domestic product, trade openness, external debt as percentage of nominal gross domestic product, government expenditures as percentage of nominal gross domestic product, and efficiency of the banking sector to per capita gross domestic product. Short run unidirectional causality exists from external debt as percentage of nominal gross domestic product to per capita electricity consumption, from government expenditures as percentage of nominal gross domestic product to external debt as percentage of nominal gross domestic product, from trade openness to government expenditures as percentage of nominal gross domestic product, from banking sector efficiency to government expenditures as percentage of nominal gross

domestic product, from per capita electricity consumption to banking sector efficiency, and from banking sector efficiency to banking sector profitability. Significance of the coefficient of $ECM(-1)$ has confirmed the existence of long run causality among the variables. The Ganger Causality test result has been given in Table V.

One may think that high and significant correlation may arise between PROF and REX. Due to this problem, the sign of coefficient of one variable might be changed hence the results will be misleading. The study has found moderate correlation between PROF and REX ($\rho = 0.53$, $p - value = 0.11$). The magnitude of correlation is moderate and insignificant at 1%, 5%, and 10% level. Therefore, no severe problem has arisen in estimation of short run and long run coefficients. The reason behind this can be that PROF is not increasing exactly in line with the increase in REX. Here, REX is a relative measure and PROF is an absolute measure.

From the estimated results of short run and long run equation, it has been found that bank profitability has significant positive impact both in the short run and in the long run but bank efficiency has positive insignificant impact in the long run. Since long run coefficients of bank efficiency and profitability are greater than short run coefficients, therefore overtime more efficiency and profitability of banking sectors will contribute more into the economy. Impact of per capita electricity consumption, domestic investment, and trade openness is significantly positive both in the short run and in the long run. Since long run coefficients of per capita electricity consumption, domestic investment, and trade openness are greater than short run coefficients, therefore, more electricity consumption, more domestic investment, and more trade openness will contribute more into the economy. The impact of external debt is significantly negative both in the short run and in the long run but the long run coefficient of external debt is becoming more negative. Therefore, more external debt in the long run will slow down the economy. The impact of government expenditures is positive both in the short run and in the long run but in the long the coefficient is becoming smaller. Therefore, government should control expenditures to boost up the economy. The coefficient ($\left|\hat{\lambda}\right| < 1$) of $ECM(-1)$ with expected negative sign is significant. If there is any shock to the per capita gross domestic product due to changes in per capita electricity consumption, domestic investment, trade openness, government expenditures, external debt, banking sector efficiency, and banking sector profitability, it will adjust by 34.85% in the first year. The full convergence process will take approximately 3 years to approach into the long run equilibrium if there is any shock to the per capita gross domestic product. The result has been provided in Table VI.

6. Conclusion

More profitability in banking sector will contribute more into the economy (See Adekola, 2016; Aurangzeb, 2012; Khulaifi *et al.*, 1999; Yazdani and Masoud, 2011). More efficiency in the banking sector will also contribute into the economy however the impact of efficiency on economic growth is insignificant in the long run. In the long run dependency on the external debt should be controlled since excess dependency on external debt will squeeze down the economic growth. Per capital electricity consumption, domestic investment, and trade openness will improve the economy in the long run. Therefore, more emphasis should be given on electricity consumption, domestic investment, and trade liberalization. If there is any shock to the per capita gross domestic product due to changes in per capita electricity consumption, domestic investment, trade openness, government expenditures, external debt, banking sector efficiency, and banking

sector profitability, it will adjust 34.85% in the first year. The entire convergence process will take approximately 3 years to approach into the long run equilibrium if there is any shock to the per capita gross domestic product.

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Table-II. Results of ADF Test and PP Test at Level Form

Model with Constant Term [Level Form]				
Variables	ADF test	P-value	PP test	P-value
$lnPGDP$	4.3719	1.0000	7.3660	1.0000
$lnPEC$	-0.8162	0.8039	-0.9752	0.7532
$lnDIV$	-1.9909	0.2894	-8.1463***	0.0000
$lnOPN$	-0.9417	0.7646	-0.5149	0.8779
$lnEXD$	-0.8973	0.7773	-7.3129***	0.0000
$lnGOV$	-2.1569	0.2247	-3.1271*	0.0323
$lnREX$	-1.3132	0.6144	-1.4087	0.5687
$PROF$	3.7933	1.0000	-2.7418	0.0758
Model with Constant and Trend Terms [Level Form]				
Variables	ADF test	P-value	PP test	P-value
$lnPGDP$	0.6063	0.9993	1.5913	1.0000
$lnPEC$	-2.8103	0.2028	-4.6145***	0.0033
$lnDIV$	-3.1877	0.1021	-7.0178***	0.0000
$lnOPN$	-3.5067*	0.0519	-3.5295**	0.0494
$lnEXD$	-1.6964	0.7328	-5.9468***	0.0001
$lnGOV$	-3.0383	0.1350	-3.7008**	0.0335
$lnREX$	-1.5115	0.8094	-1.6140	0.7700
$PROF$	2.9444	1.0000	-4.0343**	0.0151
Model without Constant and Trend Terms [Level Form]				
Variables	ADF test	P-value	PP test	P-value
$lnPGDP$	0.8229	0.8848	5.3032	1.0000
$lnPEC$	4.9385	1.0000	7.0282	1.0000
$lnDIV$	0.8861	0.8961	0.7673	0.8756
$lnOPN$	1.1144	0.9285	1.5980	0.9711
$lnEXD$	0.6756	0.8579	0.3981	0.7940
$lnGOV$	0.0301	0.6867	0.1042	0.7102
$lnREX$	-0.2787	0.5795	-0.3268	0.5615
$PROF$	3.9518	0.9999	-2.2849**	0.0232

Note: ***Denotes significance at 1% level, **Denotes significance at 5% level, *Denotes significance at 10% level. Appropriate lag length for both tests has been selected by AIC and SBIC criteria.

Table-III. Results of ADF Test and PP Test at Difference Form

Model with Constant Term [Difference Form]				
Variables	ADF test	P-value	PP test	P-value
$\Delta lnPGDP$	-6.3139***	0.0000	-5.8947***	0.0000
$\Delta lnPEC$	-7.8516***	0.0000	-10.9439***	0.0000
$\Delta lnDIV$	-6.5471***	0.0000	-6.6262***	0.0000
$\Delta lnOPN$	-8.0746***	0.0000	-9.3243***	0.0000
$\Delta lnEXD$	-7.0442***	0.0000	-7.0397***	0.0000
$\Delta lnGOV$	-8.1026***	0.0000	-8.1290***	0.0000
$\Delta lnREX$	-6.3290***	0.0000	-6.3268***	0.0000
$\Delta PROF$	-5.0038***	0.0002	-11.0576***	0.0000
Model with Constant and Trend Terms [Difference Form]				
Variables	ADF test	P-value	PP test	P-value
$\Delta lnPGDP$	-8.7557***	0.0000	-9.0789***	0.0000
$\Delta lnPEC$	-7.7089***	0.0000	-12.3673***	0.0000
$\Delta lnDIV$	-6.9253***	0.0000	-6.9509***	0.0000
$\Delta lnOPN$	-8.0802***	0.0000	-9.6830***	0.0000
$\Delta lnEXD$	-6.6646***	0.0000	-8.2526***	0.0000
$\Delta lnGOV$	-8.0060***	0.0000	-8.0305***	0.0000
$\Delta lnREX$	-6.2896***	0.0000	-6.2896***	0.0000
$\Delta PROF$	-5.0480***	0.0011	-11.0549***	0.0000
Model without Constant and Trend Terms [Difference Form]				
Variables	ADF test	P-value	PP test	P-value
$\Delta lnPGDP$	-8.9391***	0.0000	-3.1164***	0.0026
$\Delta lnPEC$	-2.9482***	0.0042	-4.6602***	0.0000
$\Delta lnDIV$	-6.3368***	0.0000	-6.4302***	0.0000
$\Delta lnOPN$	-5.9292***	0.0000	-8.1719***	0.0000
$\Delta lnEXD$	-7.3767***	0.0000	-7.1531***	0.0000
$\Delta lnGOV$	-8.1772***	0.0000	-8.2038***	0.0000
$\Delta lnREX$	-6.4257***	0.0000	-6.4216***	0.0000
$\Delta PROF$	-4.9947***	0.0000	-11.0648***	0.0000

Note: ***Denotes significance at 1% level, **Denotes significance at 5% level, *Denotes significance at 10% level. Appropriate lag length for both tests has been selected by AIC and SBIC criteria.

Table-IV. Johansen and Juselius (1990) Cointegration Test Results

CE	Trace Statistics	5% Critical values	P-value
None*	258.8690	159.5297	0.0000
At most 1*	179.8237	125.6154	0.0000
At most 2*	117.0391	95.7537	0.0008
At most 3*	73.4466	69.8189	0.0249
At most 4	43.8923	47.8561	0.1123
At most 5	22.9728	29.7971	0.2474
At most 6	5.3535	15.4947	0.7702
At most 7	1.2659	3.8415	0.2605

Note: ***Denotes significance at 1% level, **Denotes significance at 5% level, *Denotes significance at 10% level. Appropriate lag length has been selected by AIC and SBIC criteria.

Table-V. Granger Causality Results

	$\Delta lnPGDP$	$\Delta lnPEC$	$\Delta lnDIV$	$\Delta lnOPN$	$\Delta lnEXD$	$\Delta lnGOV$	$\Delta lnREX$	$\Delta PROF$	ECM [t-test]
$\Delta lnPGDP$		5.0037***	9.7707***	5.0355**	7.0554***	7.8003***	3.5616**	1.7518	-3.7266***
		(0.0063)	(0.0010)	(0.0164)	(0.0045)	(0.0029)	(0.0466)	(0.1979)	(0.0012)
$\Delta lnPEC$	0.1755		1.6478	0.0818	2.5983*	0.1843	1.0077	0.3242	-0.0590
	(0.8402)		(0.2164)	(0.9217)	(0.0981)	(0.8330)	(0.3820)	(0.7266)	(0.9535)
$\Delta lnDIV$	2.0058	0.8276		1.0579	0.4268	4.8978*	0.7768	0.0816	0.2749
	(0.1519)	(0.4509)		(0.3650)	(0.6581)	(0.0864)	(0.4727)	(0.9220)	(0.7861)
$\Delta lnOPN$	0.7400	0.9975	0.6384		0.0418	0.4871	1.2019	0.0910	-0.1955
	(0.4891)	(0.3856)	(0.5381)		(0.9592)	(0.6211)	(0.3205)	(0.9133)	(0.8469)
$\Delta lnEXD$	1.9513	0.7688	1.1628	0.6627		2.5810*	1.4744	0.1112	-1.2324
	(0.1670)	(0.4762)	(0.2231)	(0.5259)		(0.0995)	(0.2517)	(0.8953)	(0.2314)
$\Delta lnGOV$	0.9431	0.2687	3.4481*	6.9045***	0.5347		3.1784*	0.5249	-2.3341**
	(0.4053)	(0.7669)	(0.0507)	(0.0050)	(0.5936)		(0.0622)	(0.5992)	(0.0296)
$\Delta lnREX$	0.3169	2.7059*	0.8742	0.4775	0.3222	0.1560		0.0521	0.3724
	(0.7319)	(0.0900)	(0.4319)	(0.6269)	(0.7281)	(0.8565)		(0.9493)	(0.7134)
$\Delta PROF$	1.6650	0.7156	0.0393	1.0147	0.3063	0.4174	3.3767*		1.1161
	(0.2132)	(0.5005)	(0.9615)	(0.3796)	(0.7394)	(0.6641)	(0.0535)		(0.2770)

Note: ***Denotes significant at 1% level, **Denotes significant at 5% level, and *Denotes significant at 10% level. ($lnDIV \leftrightarrow lnGOV, lnPEC \rightarrow lnPGDP, lnDIV \rightarrow lnPGDP, lnOPN \rightarrow lnPGDP, lnEXD \rightarrow lnPGDP, lnGOV \rightarrow lnPGDP, lnREX \rightarrow lnPGDP, lnPEC \rightarrow lnEXD, lnGOV \rightarrow lnEXD, lnOPN \rightarrow lnGOV, lnREX \rightarrow lnGOV, lnPEC \rightarrow lnREX, lnREX \rightarrow PROF$).

Table-VI: Short Run and Long Run Estimation Results

Variables	Long Run ($n = 42$)	Short Run ($n = 41$)
Constant	4.915422*** (0.0000)	0.013449 (0.1984)
$lnPEC$	0.2555503*** (0.0000)	
$lnDIV$	0.152431* (0.0516)	
$lnOPN$	0.126286* (0.0669)	
$lnEXD$	-0.198125*** (0.0022)	
$lnGOV$	0.007859 (0.9216)	
$lnREX$	0.029779 (0.8523)	
$PROF$	0.00000014** (0.0388)	
$\Delta lnPEC$		0.118309*** (0.0006)
$\Delta lnDIV$		0.061002*** (0.0000)
$\Delta lnOPN$		0.031460** (0.0358)
$\Delta lnEXD$		-0.042602** (0.0366)
$\Delta lnGOV$		0.053710** (0.0317)
$\Delta lnREX$		-0.082721 (0.1174)
$\Delta PROF$		0.00000003*** (0.0013)
$ECM(-1)$		-0.348466*** (0.0088)
JB Statistic for normality	4.391551 (0.1112)	0.965974 (0.6169)
ARCH test (F-statistic)		0.916803 (0.4845)

Note: ***Denotes significant at 1% level, **Denotes significant at 5% level, *Denotes significant at 10% level. The short run equation has been estimated by Cochrane-Orcutt iterative method due to auto-correlation problem. Roots of AR lie within the unit circle.