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Impact of Domestic Credit to Private Sector on Gross Domestic Product in Bangladesh

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Abstract: *The study examined the impact of domestic credit to private sector by bank on real GDP in Bangladesh by using time series data for the period of 1983-2017. ADF test were used for testing stationarity of taken variables in the model and all the variables were stationary at first difference, as a result the Johansen's co-integration techniques was used and the result revealed that there was no co-integrated equation in the model. Therefore, the vector autocorrelation (VAR) was used for the estimation. The result showed that there is a negative and statistically significant (at 10% level) relation between real GDP and domestic credit to private sector (PRC) but insignificant relationship between public credit (PUC) and real GDP.*
Key words: Domestic credit to private sector, Real GDP, VAR.

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I. Introduction

Economic growth is mostly depending on an efficient banking sector. It has an important influence on transforming deposits into financial assets. Banking sector can ensure efficient allocation of resources by transferring deposits that they have collected to the needed sectors of an economy. Credit is "one of the most critical mechanisms we have for allocating resources" (Cecchetti and Schoenholtz,2011). Bank provided credit to individuals, business organizations and government. Individuals borrow credit for consumption and investment purposes, business organizations borrow to invest in plant, raw materials and machinery and government borrows loans to mitigate the cyclical pattern of tax revenues and to invest in infrastructure projects. So credit promote economic activity. Private sector credit is the most important for economic development. It plays a pivotal role in increasing investment, employment, providing efficiency and productivity and reducing poverty.

Bangladesh is a developing country with per capita income $1,610 in FY2017.In 2015, Bangladesh graduated to the status of lower middle income country from a low income country. The average growth rate of Bangladesh during the last decade is more than 6 percent. Bangladesh has adopted the vision 2021 and the associated perspective plan 2010-2021 where Bangladesh aimed at middle income status by 2021 and targeted GDP growth rate is 8 percent by 2021.To achieve the goal of middle income status by average GDP growth rate will have to rise current 6 percent to 7.5-8.0 percent. To secure the projected GDP growth rate, the investment will need to expand around 34.4 percent by 2020. For expanding investment, reducing poverty credit can be one of the most important factor.

The main purpose of this study is to analyze the impact of private sector credit by bank on real GDP in Bangladesh, drawing on along dataset which covered 40 years of data. This study tries to examine this relationship empirically by using the Vector AutoRegressive(VAR) analysis. This method is employed because level of integration for all variables is I(1).

The objectives of this study is to investigate the impact of credit to private sector by bank on economic development by implementing standard econometric models applicable for time series data.

II. Literature Review

A number of empirical works investigated the relationship between private sector credit and economic growth. Chaudhury (2008) analyzed the role of financial liberalization in macroeconomic performance of Pakistan. The results of the study showed that financial sector development had a positive short run and long run impact on economic growth.Akpansung & Babalola (2011) studied the relationship between banking sector credit and economic growth in Nigeria for the period of 1970-2008 by granger causality and Two Stage Least squares (TSLS). Their result showed that economic growth positively impacted by private sector credit.Ivie (2008) analyzed the composition of credit markets in the United States and the extent to which financial markets contribute to economic growth. In the study a Granger Causality test is designed to test if credit issued in the

private sector causes economic growth. The study identified a significant causal relationship between credit and economic growth. Aliero et al. (2013) analyzed the relationship between private sector and economic growth in Nigeria for the period of 1974-2010.They used autoregressive distributed lag (ARDL) and the result of their analysis showed that there is a long run relationship between private sector credit and economic growth in Nigeria.Emecheta B. C. and Ibe. R. C. (2014) investigated the impact of bank credit on economic growth in Nigeria for the period of 1960-2011 by using vector autoregressive (VAR) technique. The result of their examination showed that there is a significant positive relationship exist between private sector bank credit and economic growth.Eatzaz and Malik (2009) empirically analyzed the relationship between financial development and economic growth of 35 developing countries over the period of 1970-2003. The result of their analysis showed that financial sector development affects per capita GDP mainly through efficient resource allocation. Pradhan (2009) examined the nexus between financial development and economic growth in India. Based on the granger causality test the result found that there is a bidirectional causality between bank credit and economic growth in India.Ahmed (2008) empirically investigated the financial liberalization, financial development and growth in Sub Saharan Africa's economic reform. They found a long run relationship between financial development and economic growth.Kiran et al (2009) analyzed the financial development and economic growth of 10 emerging countries over the period 1968-2007. They used panel data unit root tests and the Padroni panel data integration technique and the result indicates that the long run relationship exists between financial development and economic growth.Korkmaz S. (2015), studied the impact of bank credits on economic growth and inflation for 10 European countries. The result of their study proved that banking domestic credits affect the economic growth of selected 10 European countries.

Nwakanma, et al. (2014), evaluated the nature of long-run relationship existing between bank credits to the private sector and economic growth in Nigeria for the period of 1981-2011 by using ARDL and granger causality techniques. The result indicated that there is a significant long-run relationship between bank credit to the private sector and economic growth but there is no significant causality in any direction.Were et al. (2012) studiedthe impact of private sector credit on economic performance in Kenya by using sectoral panel data. The result of their study found that there is a positive and significant impact of credit on sectoral gross domestic product.

On the other hand, some study found negative relationship berween private sector credit and economic growth. Mohammed,et al (2015), investigated the financ-growth nexus of MENA countries for the time period 1975-2012 by using four estimation techniques, pooled OLS, fixed effect estimation, random effect estimation, and the system GMM estimation. They exemplified that financial sector development especially, the banking sector has not been strong and efficient enough to effectively influene the economic development.Mohamed (2008), examined the short-run and long –run relationship between financial development and economic growth in Sudan by using autoregressive distributed lag approach (ARDL).He finds that relationship between financial development and economic growth is weak, and the impact of credit of private sector by banks to real GDP is negative and insignificant.Tahir et al (2015), examined the association among bank credit to prvate sector and economic growth in Pakistan for the period 1973-2013. The regression result of their study showed that there is a adverse impact of bank credit on economic growth.Samargandi,et al (2013), investigated the relationship between financial development and the economic growth in the context of an oil-rich economy "Saudi Arabia case study" and applied the Autoregressive Distributed Lag (ARDL).The study found that the financial development has a positive impact on the growth of the non-oil sector in Saudi Arabia. The study showed a negative and insignificant impact on total GDP growth.

Mukhopadhyay and Pradhan (2010) examined the causal relationship between financial development and economic growth of seven Asian developing countries (Indonesia, Malaysia, the Philippines, China, Thailand, India and Singapore), using multivariate VAR model. The study failed to reach any consensus on the finance-growth relationship in the context of developing countries.The above literature review showes that the results regarding the effects of private sector credit on econmic development has been mixed. While some studies found empirical support for a positive effect, others failed to. These mixed findings imply that there is yet no consensus on the size and direction of relationship between private sector credit and economic growth, especially in Bangladesh.

TREND OF GDP GROWTH AND PRIVATE SECTOR CREDIT IN BANGLADESH

Table 1: Trends of GDP growth rate and private sector credit growth in Bangladesh.

Year	GDP Growth rate	Growth of Private sector credit by bank
FY08	6.01	24.94
FY09	5.05	14.62
FY10	5.57	24.24
FY11	6.46	25.84
FY12	6.52	19.72
FY13	6.01	10.85
FY14	6.06	12.27

FY15	6.55	13.19
FY16	7.11	16.78
FY17	7.28	15.66

Source: World Development Index; Bangladesh economic review, ministry of finance.

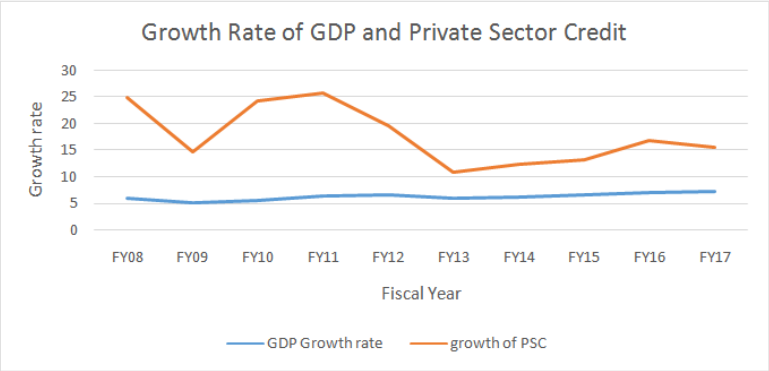


Figure 1: Trends of GDP growth rate and private sector credit growth in Bangladesh.

Table 1 shows that trend of GDP growth rate and private sector credit growth for a decade. From fiscal year 2008 to fiscal year 2013 the GDP growth rate was fluctuating that is there was no increasing or decreasing trends. On the same time the growth of private sector credits also does not show any increasing or decreasing trends. In FY08 GDP growth rate and growth of private sector credit by bank were 6.01 and 24.94 respectively. In fiscal year 2009 both were decreased compared to previous fiscal year. From FY 2010 to 2012 GDP growth rate showed increasing trend and in FY13 it was again fall to 6.01 from 6.52 in 2012. On the other hand, growth of private sector credit was increase from 2009 to 2011. In FY 2013 it was decrease to 10.85 from 25.84 in FY 2011. After fiscal year 2013 both rate indicated increasing trend till fiscal year 2016 but in 2017 private sector credit by bank fall to 15.66 from 16.78 in 2016. That is the table 1 and figure 1 shows that from FY13 to FY16 there exists a positive relationship between GDP growth rate and private sector credit growth in Bangladesh.

III. Methodology

The study has been conducted based on the secondary data and time period spanning from 1983 -to 2017. Secondary sources include Bangladesh Economic Review publish by Ministry of Finance, government of the people's republic of Bangladesh and World Development Indicator publish by World Bank. In this study RGDP has been use as a proxy of economic growth.The respective model of the study on the impact of Private sector credit (PRC) by bank on Real Gross Domestic Product (RGDP) in Bangladesh can be written as below:

$$\mathbf{GDP_t = \beta_0 + \beta_1\, PRC_t + \beta_2 PUC_t + \varepsilon_t.}$$

Here $\boldsymbol{\varepsilon_t}$error term which means there could be some other factors that can effect RGDP and $\boldsymbol{\beta_0}$is a scalar parameter, $\boldsymbol{\beta_1}$, and $\boldsymbol{\beta_2}$ are the slop coefficient parameters. I transform this model into log linear model:

$$\mathbf{LNRGDP_t = \beta_0 + \beta_1\, LNPRC_t + \beta_2\, LNPUC_t + \varepsilon_t}$$

Here,β_0 = the constant term, β_1 = Coefficient of variable Private Sector (PRC), β_2 = coefficient of variable public sector credit (PUB), LNRGDP= log of Gross fixed capital formation that measured in terms of million us$., LNPRC= log of Foreign Direct Investment which is measured in terms of million us$., LNPUB= log of Real Gross Domestic Product in terms of million us$., t = The time trend, ε = The random error term.

EMPIRICAL ANALYSIS

Unit root test

To wether the data stationary of non stationart I employ Augmented Dickey Fuller (ADF) test. The result of the ADF shows (table 2) thatall variables (LNRGDP, LNPUC and LNPRC) used in this study are non-stationary at both intercept and intercept and trend at level. At first difference LNPUC and LNPRC both variables are stationary at intercept and intercept and trend but variable LNRGDP is non stationary at intercept and it is stationary in intercept and trend it is stationary.

Table 2: Summary of the ADF test

Variables			ADF Test	p-value	Decision	Conclusion
LNRGDP	Level	Intercept	4.188099	1.0000	Unit Root	Non- stationary
		Trend and Intercept	-0.624306	0.9699	Unit Root	Non- stationary
	1st Diff.	Intercept	-0.997918	0.7405	No Unit Root	Stationary
		Trend and Intercept	-5.362890	0.0006	No Unit Root	Stationary

LNPRC	Level	Intercept	-1.543684	0.4998	Unit Root	Non- stationary
	.	Trend and Intercept	-2.899187	0.1753	Unit Root	Non-stationary
	1st Diff	Intercept	-5.247376	0.0002	Unit Root	Non-stationary
		Trend and Intercept	-5.164836	0.0012	No Unit Root	stationary
LNPUC	Level	Intercept	0.078820	0.9593	Unit Root	Non-stationary
		Trend and Intercept	-1.931581	0.6163	Unit Root	Non-stationary
	1st Diff	Intercept	-4.933519	0.0003	No Unit Root	stationary
		Trend and Intercept	-4.861090	0.0023	No Unit Root	stationary

Sources: prepared by the writter from eviews result.

Optimal lag Selection:

Vector Autoregressive (VAR), is used to determine the optimal lag length.The Akaike information criteria (AIC), Schwarz information criteria (SC) and Hannan-Quinn information criterion (HQ) were used to determine the maximum lag p. The lower the values of Akaike, Schwarz and Hannan-Quinn statistics, the better is the model. The results are presented in Table 3.

Table 3: result summary of lag selection criterion (see appendix 1)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	100.1307	NA	3.81e-07	-6.266499	-6.127726*	-6.221263
1	112.7003	21.89538*	3.04e-07*	-6.496794*	-5.941702	-6.315848*
2	117.8093	7.910764	3.98e-07	-6.245764	-5.274353	-5.929108
3	124.9674	9.698055	4.71e-07	-6.126931	-4.739201	-5.674566

*Indicate lag order selected by respective criterion

The selected order is lag one (1) according to the criteria of Akaike information criterion and Hannan-Quinn information criterion. This implies that we have VAR (1).

Johansen Co Integration Test:

Since all the variables are stationary at 1st difference the Johanson's co-integration approach can be used to determine whether the variables are co-integrated or not.

Table 4: Result summery of Johansen Co Integration Test (see appendix-2)

Unrestricted co-integration rank test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 critical value	Prob**	Max-Eigen Statistic	0.05 critical value	Prob**
None	0.403574	25.52614	29.79707	0.1435	16.53761	21.13162	0.1950
At most 1	0.238486	8.988533	15.49471	0.3664	8.718305	14.26460	0.3103
At most 2	0.008409	0.270228	3.841466	0.6032	0.270228	3.841466	0.6032

Sources: Table filled up by writer from e-views result shown in appendix-2.

Table 4 (see appendix-2) presents the result of Johansen co-integration test both at the trace and maximum eigenvalue. Here Trace and maximum eigenvalue indicates there is no co-integration equation(s) at the 5% level. That means there is no long-run equilibrium relationship among the variables. Since variables are not co-integrated, we can run VAR.

Vector Autoreggrasive Analysis (VAR) estimation

VAR model is used to determine the inter-relationships among the variables. The VAR model estimation results are presented in apendix 7.The VAR result presented in apendix 6 shows that in the D(LNRGDP) regression the one period lagged RGDP has positive effects on the current RGDP and it is statistically significant at the 5% level. the coefficient of lagged RGDP is about 0.74. That is to say that if last year's RGDP increased by one unit current RGDP will increase by about 0.74. Considering the previous one year record of private sector credit by bank on RGDP. The coefficient of lag private sector credit -0.01. This means that if last one year record of PRC increased current RGDP will decrease this effects is statistically significant at 10% level. that is if PRC is increased by 1 unit the current RGDP will decrease by 0.01unit.In the LNPRC and LNPUC both regression there is no variables are individually statistically significant.

Granger-causality test

We use the Granger causality test for it provides useful information on the variables for the prediction of the other variablesincluded in the analysis. We should notice that Granger causality indicates what variables may signal a subsequent change o+-f the other variables included in the study (Boțel, 2002).Apendix 7shows the

granger-causality test results. Above table shows that the short run relationship among RGDP and the explanatory variables.Private Credit (PRC) granger causes RGDP at 5% level of significance But RGDP does not causes PRC. That is there is a unidirectional relationship between RGDP and PRC. The result also revealed that there is no causal relationship between PUC and RGDP, PRC and PUC.

STABILITY TEST:

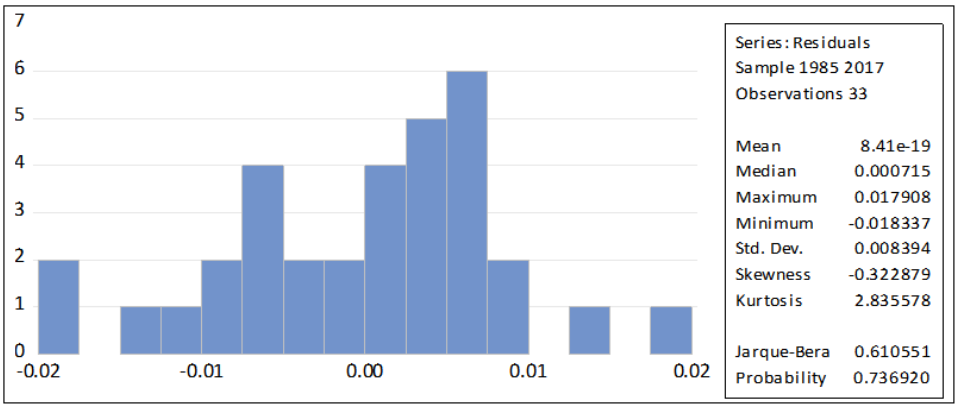
I check the stability of this VAR model that shows that this VAR model is satisfy the stability condition. The result shows in appendix-5

DIAGNOETIC TEST:

Residual diagnostic (see appendix-6 and appendix-7)) was applied for checking autocorrelation, heteroscedasticity and serial correlation in the residual.

Test of Normality: To test the normality of the data I employ Jarque Bera test. So null and alternative hypothesis are:Ho: The data are normally distributed, H1: The data are not normally distributed.

Figure 2: Jarque Bera Test



From the figure 2 p-value of Jarque Bera is 0., 0.6864>0.05 and the value of Jarque-Bera is 0.610551 and corresponding p-value is 0.736920, which is greater than 0.05. Since 0.736920>0.05, we can reject the alternative hypothesis. That means the data are normally distributed according to the normality preconditions.

Test for serial correlation:

For testing serial correlation in the model I used Breusch-Godfrey Serial Correlation LM Test. The null hypothesis and alternative hypothesis are as below:

Ho: there is no serial correlation of any order.

H1: there is serial correlation in the residual.

Table 5:Result summary of Breusch-Godfrey Serial Correlation LM Test (appendix- 5)

F- statistic	3.194399	Prob. F(1,28)	0.0847
Obs* R-squared	3.379298	Prob. Chi-Square(1)	0.0660

Sources: Table filled up by writer from e-views result shown in appendix-4.

From Table 5 we can see that the Obs* R squared is 3.38 and p-value is 0.0660. So p-value> 0.05, as a result we cannot reject the null hypothesis instead we reject the alternative hypothesis. So there is no serial correlation in the residual.

Test for Heteroskedasticity:

I used Breusch-Pagan-Godfrey test to detect heteroskedasticity we can take two hypotheses:

Ho: Homoskedasticity

H1: Heteroskedasticity

The results of the test are given in appendix-5

Table 6: result summary of Breusch-Pagan-Godfrey test

F-statistic 1.903171		Prob. F(6.26) 0.1183	
Obs* R- squared	10.07049	Prob. Chi-Squared(6)	0.1217
Scaled explained SS	7.137752	Prob. Chi-Squared(6)	0.3083

Sources: Table filled up by writer from e-views result shownin appendix-5.

Table 6shows the result summary of Breusch-Pagan-Godfrey test. From the table we can see that obs* r-squared p-value > 0.05, so we can reject the alternative hypothesis. That means there is no heteroskedasticity in this model.

IV. Conclusion

This paper conducted an analysis the impact of private credit by bank on Economic Growth in Bangladesh. The two techniques used are Granger causality tests and VAR analysis. The variables used in this study are not stationary at level but Augmented Dickey-Fuller (ADF) test on the first differenced series showed that all series are stationary at 1% level of significance. The selection of lag order was done using the criteria of Akaike information criterion and Hannan-Quinn information criterion and lag one (1) was selected. Therefore, the appropriate model is VAR (1).The VAR estimation shows that the coefficient of lagged RGDP, PRC and constant are statistically significant and coefficient of lagged PUC is insignificant in the regression of the RGDP. Here private sector credit negatively effect the real gross domestic product in the short run. Granger causality tests show that there is unidirectional causality between RGDP and PRC.

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APPENDICES

Appendix-1

VAR Lag Order Selection Criteria
Endogenous variables: D(LNRGDP) D(LNPRC) D(LNPUC)
Exogenous variables: C
Date: 10/05/18 Time: 02:36
Sample: 1983 2017
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	100.1307	NA	3.81e-07	-6.266499	-6.127726*	-6.221263
1	112.7003	21.89538*	3.04e-07*	-6.496794*	-5.941702	-6.315848*
2	117.8093	7.910764	3.98e-07	-6.245764	-5.274353	-5.929108
3	124.9674	9.698055	4.71e-07	-6.126931	-4.739201	-5.674566

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix-2

Date: 10/05/18 Time: 02:37
Sample (adjusted): 1986 2017
Included observations: 32 after adjustments
Trend assumption: Linear deterministic trend
Series: D(LNRGDP) D(LNPRC) D(LNPUC)
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.403574	25.52614	29.79707	0.1435
At most 1	0.238486	8.988533	15.49471	0.3664
At most 2	0.008409	0.270228	3.841466	0.6032

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.403574	16.53761	21.13162	0.1950
At most 1	0.238486	8.718305	14.26460	0.3103
At most 2	0.008409	0.270228	3.841466	0.6032

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

D(LNRGDP)	D(LNPRC)	D(LNPUC)
21.34446	2.599949	0.081735
17.36592	-0.388949	17.21188
-121.3033	0.033663	17.20001

Unrestricted Adjustment Coefficients (alpha):

D(LNRGDP,2)	-0.002844	-0.001671	0.000553
D(LNPRC,2)	-0.357082	0.174922	-0.012043
D(LNPUC,2)	-0.027315	-0.034561	-0.002629

1 Cointegrating Equation(s): Log likelihood 118.2023

Normalized cointegrating coefficients (standard error in parentheses)

D(LNRGDP)	D(LNPRC)	D(LNPUC)
1.000000	0.121809	0.003829
	(0.02855)	(0.21534)

Adjustment coefficients (standard error in parentheses)

D(LNRGDP,2)	-0.060706
	(0.03184)
D(LNPRC,2)	-7.621728
	(2.37393)
D(LNPUC,2)	-0.583018
	(0.34204)

2 Cointegrating Equation(s): Log likelihood 122.5614

Normalized cointegrating coefficients (standard error in parentheses)

D(LNRGDP)	D(LNPRC)	D(LNPUC)
1.000000	0.000000	0.837788
		(0.33029)
0.000000	1.000000	-6.846441
		(3.08326)

Adjustment coefficients (standard error in parentheses)

D(LNRGDP,2)	-0.089723	-0.006745
	(0.04008)	(0.00383)
D(LNPRC,2)	-4.584048	-0.996431
	(2.91683)	(0.27867)
D(LNPUC,2)	-1.183209	-0.057574
	(0.40116)	(0.03833)

Appendix 3

Vector Autoregression Estimates
Date: 10/05/18 Time: 02:38
Sample (adjusted): 1985 2017
Included observations: 33 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	D(LNRGDP)	D(LNPRC)	D(LNPUC)
D(LNRGDP(-1))	0.739388	-3.211899	1.494492
	(0.14907)	(9.80929)	(1.46700)
	[4.95997]	[-0.32743]	[1.01874]
D(LNPRC(-1))	-0.005399	-0.009460	-0.017599
	(0.00269)	(0.17693)	(0.02646)
	[-2.00783]	[-0.05347]	[-0.66511]
D(LNPUC(-1))	-0.021426	2.362863	-0.076276
	(0.02238)	(1.47288)	(0.22027)
	[-0.95722]	[1.60425]	[-0.34628]
C	0.015837	0.116141	-0.004382
	(0.00708)	(0.46619)	(0.06972)
	[2.23535]	[0.24913]	[-0.06285]
R-squared	0.513924	0.085863	0.049721
Adj. R-squared	0.463640	-0.008703	-0.048584
Sum sq. resids	0.002255	9.762857	0.218353
S.E. equation	0.008817	0.580216	0.086772
F-statistic	10.22047	0.907966	0.505783
Log likelihood	111.4306	-26.72925	35.97447
Akaike AIC	-6.510947	1.862379	-1.937846
Schwarz SC	-6.329552	2.043774	-1.756452
Mean dependent	0.050382	0.118418	0.062322
S.D. dependent	0.012040	0.577707	0.084738

Determinant resid covariance (dof adj.)	1.94E-07
Determinant resid covariance	1.31E-07
Log likelihood	120.9596
Akaike information criterion	-6.603610
Schwarz criterion	-6.059425
Number of coefficients	12

Appendix-4

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	3.194399	Prob. F(1,28)	0.0847
Obs*R-squared	3.379298	Prob. Chi-Square(1)	0.0660

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/13/18 Time: 11:47
Sample: 1985 2017
Included observations: 33
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.251731	0.201237	1.250920	0.2213
C(2)	-0.000198	0.002595	-0.076130	0.9399
C(3)	-0.006923	0.021926	-0.315745	0.7545
C(4)	-0.012063	0.009603	-1.256180	0.2194
RESID(-1)	-0.458297	0.256420	-1.787288	0.0847

R-squared	0.102403	Mean dependent var	8.41E-19
Adjusted R-squared	-0.025825	S.D. dependent var	0.008394
S.E. of regression	0.008502	Akaike info criterion	-6.558375
Sum squared resid	0.002024	Schwarz criterion	-6.331632
Log likelihood	113.2132	Hannan-Quinn criter.	-6.482083
F-statistic	0.798600	Durbin-Watson stat	2.091028
Prob(F-statistic)	0.536286		

Appendix 5

Roots of Characteristic Polynomial
Endogenous variables: D(LNRGDP) D(LNPRC) D(LNPUC)
Exogenous variables: C
Lag specification: 1 1
Date: 10/05/18 Time: 02:39

Root	Modulus
0.688337	0.688337
-0.017343 - 0.131029i	0.132172
-0.017343 + 0.131029i	0.132172

No root lies outside the unit circle.
VAR satisfies the stability condition.

Appendix 6

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.903171	Prob. F(6,26)	0.1183
Obs*R-squared	10.07049	Prob. Chi-Square(6)	0.1217
Scaled explained SS	7.137752	Prob. Chi-Square(6)	0.3083

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/13/18 Time: 11:47
Sample: 1985 2017
Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002880	0.001936	1.487598	0.1489
LNRGDP(-1)	0.001178	0.002426	0.485581	0.6313
LNRGDP(-2)	-0.001578	0.002551	-0.618601	0.5416
LNPRC(-1)	-1.54E-05	3.01E-05	-0.511612	0.6132
LNPRC(-2)	6.38E-07	3.11E-05	0.020476	0.9838
LNPUC(-1)	8.35E-05	0.000244	0.342216	0.7349
LNPUC(-2)	0.000121	0.000238	0.507470	0.6161

R-squared	0.305166	Mean dependent var	6.83E-05
Adjusted R-squared	0.144820	S.D. dependent var	9.40E-05
S.E. of regression	8.69E-05	Akaike info criterion	-15.67710
Sum squared resid	1.96E-07	Schwarz criterion	-15.35966
Log likelihood	265.6722	Hannan-Quinn criter.	-15.57029
F-statistic	1.903171	Durbin-Watson stat	1.532913
Prob(F-statistic)	0.118278		

Appendix 7

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 10/05/18 Time: 02:42
Sample: 1983 2017
Included observations: 33

Dependent variable: D(LNRGDP)

Excluded	Chi-sq	df	Prob.
D(LNPRC)	4.031389	1	0.0447
D(LNPUC)	0.916271	1	0.3385
All	4.891571	2	0.0867

Dependent variable: D(LNPRC)

Excluded	Chi-sq	df	Prob.
D(LNRGDP)	0.107213	1	0.7433
D(LNPUC)	2.573619	1	0.1087
All	2.716186	2	0.2572

Dependent variable: D(LNPUC)

Excluded	Chi-sq	df	Prob.
D(LNRGDP)	1.037836	1	0.3083
D(LNPRC)	0.442377	1	0.5060
All	1.506390	2	0.4709

Hamida Begum. "Impact of Domestic Credit to Private Sector on Gross Domestic Product in Bangladesh." IOSR Journal of Economics and Finance (IOSR-JEF) , vol. 10, no. 1, 2019, pp. 45-54.