Causality between Bank's major activities and Economic Growth: Evidences from Pakistan

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Abstract:

Banking is an important sector of Pakistan's economy. The two major activities perform by banks are saving and lending. More Deposit saved in banks and more credits provided by banks are considered to have positive impact on economic growth so the aim of this study is to investigate the fact. Johansen test of Co-integration and Granger Causality is employed by using time series data of Pakistan from 1961 to 2013. The results show that there is no co-integration or causal relationship between GDP growth and Deposits in Banks of Pakistan. However there is short run and long run causality running from GDP growth to bank's lending activities. Hence Government and central bank should make policies by keeping this fact in consideration that bank's two major activities that are saving and lending does not have impact on GDP growth however GDP growth affects bank's lending activities.

Keywords: Granger Causality, Cointegration, Economic Growth, Bank deposits, Bank's credit

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1. Introduction:

Banking sector is considered an important sector for economic growth there are two basic activities done by banks one is attract customer to save their savings(by giving certain amount called interest)and it is known as bank deposits and other is lending activities that is to provide loans for investment or personal uses and takes interest on them. Government of Pakistan and Central bank make different rules and regulations for banks with the aim to increase economic growth in long run. These rules and instructions also include increase in deposits with banks and provide loans on easy terms and condition. Central bank instructs and orders banks to introduce different types of accounts to attract savers to open and keep their savings in bank accounts with the perception that in long run it will contribute to enhance economic growth.

Banks uses these deposits to further lend money so it is compulsory for Government to know the fact that which activity of banking sector has cointegrated with economic growth so Government can make effective policies in future for the prosperity of Pakistan.

In Pakistan no one considered causal relationship specifically between pooling and lending activities of bank and economic growth but combine studies have been done by using bank deposit and bank's credit as a determinant of GDP or by keeping credits or deposits of banks as proxy of financial development with other additional variables. So this study will provide a guideline to policy makers that whether to consider bank deposit and bank's provided loans to increase the economic growth or also this study will tell to bank managements that either GDP growth has any short run or long run impact on banking sector.

The paper is organized as Introduction this section, section 2 presents review of literature, sections 3 presents data, methodology and results and section 4 concludes the paper.

2. Review of Literature:

Patrick (1966) first discussed the causality direction as demand-following and supply leading hypothesis. In 1988 Mckinnon buttressed this statement.

a) Demand-following hypothesis(growth led finance):

When because of economic growth, demand for financial services will increase and will result financial development. It is Demand-following hypothesis.

b) Supply-Leading hypothesis(finance led growth)

According to this hypothesis if there will be more activities of financial institutions then this will lead towards increase in productive capacity of a particular economy. And in this hypothesis causal relationship runs from financial development to growth.

Studies related to bank's deposits and economic growth:

Researchers concluded different result for different countries. Some researchers concluded that there is no relationship between bank's deposits and economic growth such as Kumar and Chauhan (2015) did study in India by using cointegration and granger causality and concluded that saving deposits with commercial bank does not granger cause GDP of India.

However according to some researcher there is unidirectional causal relationship running from economic growth to bank's saving.

Liang and Reichert (2006) found causal relationship between financial sector development and economic growth of developing and advance countries. They concluded that causality run from economic development to financial sector development. However this causal relationship is strong in case of developing countries as compare to advance countries.

M. Tahir (2008) did study in Pakistan and concluded that there is unidirectional causality running from economic development to financial development both in short run and long run. Real per capita GDP was used as a proxy of economic development while ratio of domestic credit to GDP, total capital formation to GDP, weighted average savings interest rate minus current GDP deflator and GDP deflator were used for financial development.

Awdeh (2012) did study in Lebanon and concluded that there is one way causality running from economic growth to banking or financial sector so this study supports demand following or growth led finance hypothesis.

Some researchers believe that there is bidirectional relationship between bank's deposits and economic growth.

Aurangzeb (2012) concluded that banking sector does a significant contribution in the economic growth of Pakistan by using regression and granger causality method. Regression result indicates that deposit, investment, advances, profitability and interest earnings have positive significant impact on economic growth of Pakistan. He further found that there is bidirectional causality between deposits, advances and profitability with economic growth while unidirectional causality running from investment and interest earning to economic growth of Pakistan.

Following studies concluded that bank's deposits have significant positive impact on economic growth.

Babatunde et.al (2013) did study in Malaysia and concluded that profitability loan and advances have positive significant impact on economic development while deposits and assets of banks does not have any impact on economic development in Malaysia.

Sharma and Ranga (2014) did study in India and concluded that saving deposits with commercial banks have positive significant impact on GDP of India.

Studies related to Bank's credit and economic growth:

According to some researchers there is positive significant impact of bank's credit on economic growth.

Korkmaz (2015) did study on 10 European countries and concluded that domestic credit provided by banking sector have effect on economic growth.
Marshal et.al (2015) did study in Nigeria and found strong positive correlation between bank;s credit and GDP.
Nwakanma et.al (2014) concluded that there is significant long run relationship between bank's credit to private sector and economic growth in Nigeria but without significant level of causality.
Osman (2014) investigated the impact of private sector credit on the economic growth of Saudi Arabia using ARDL model and concluded that there is long run and short run relationship between private sector credit and economic growth of Saudi Arabia. Moreover commercial bank's credit to private sector will contribute in the economic growth of Saudi Arabia.
Emecheta and Ibe (2014) did study in Nigeria using Vector Autoregressive technique and concluded that there is positive and significant relationship between bank credit to private sector, broad money and economic growth.

However following studies concluded that there is unidirectional causality running from economic growth to bank's credit.
Onuorah et.al (2013) did study in Nigeria and concluded that Banks credits does not granger cause GDP but GDP have effect on Bank's credit. He further concluded that there is short run relationship between Bank credits and GDP.
Marshal et.al (2015) found the causal relationship between banking sector credit and economic growth in Nigeria and concluded that there is unidirectional relationship running from GDP to banking sector credit.

These studies found unidirectional causal relationship running from bank's credit to economic growth.
Caporale et.al (2009) did study about ten new EU member countries by using granger causality test and concluded that there is unidirectional causal relationship running from financial development to economic growth in ten new EU member countries. Credit to private sector and interest rate margin to economic growth variable have been used as a proxy of financial development.
According to Obradovic and Grbic (2015) economic growth contributes to financial deepening process. They concluded that there is unidirectional causality running from private enterprise credit to GDP and household credit to GDP, to economic growth of Serbia. Moreover according to them there is bidirectional causal relationship between the share of bank credit to non-financial private sector in total domestic credit and growth rate of economy.
Alkhuzaim (2014) used cointegration and granger causality techniques and concluded that there is positive long run relationship between financial development indicators and GDP growth rate in Qatar. According to him in long run there is unidirectional causal relationship running from domestic credit provided by the bank sector to GDP growth while in short run direction of

causality is opposite. Further he concluded that there is no causal relationships exist between bank credits to private sector and GDP growth rate in long run or short run.

3. Data, Methodology and Results:

The basic purpose of this study was to investigate the causal relationship between banking sector two main activities (that is bank deposits and credits provided by banking sector) and GDP growth of Pakistan. The data was collected from World Bank development indicator's various issues. Annual time series data of Pakistan was used from the period 1961 to 2013.

Johansen and Juselius (1990) maximum likelihood estimation model is used to determine the cointegration between the variables. This model only describes the existence of cointegration between the variables but unable to describe the direction of causality. For this purpose Granger causality and VECM models have been use to determine direction of causality in short and long run. The mathematical form of the basic model is as under

$$LnEconomicGrowth_t=\beta_0+\beta 1\ Ln\ BankDeposit_t+\varepsilon_t \quad \text{(Model 1)}$$

$$LnEconomicGrowth_t=\beta_0+\beta 1\ Ln\ Bank's Credit_t+\varepsilon_t \quad \text{(Model 2)}$$

Bank deposits % of GDP, GDP growth (annual %) and Bank credit to private sector with GDP (annual %) has been used as a proxy of Bank deposit, Economic growth and Bank's credit respectively. Coefficient β1 in both models is expected to have positive sign in short run and long run.

In order to use cointegration model the first condition is that all the variables must be integrated at the same order, for this purpose Augmented Dickey Fuller (ADF) unit root test is employed.

The equation of ADF test can be presented as under. By adding lagged values this test checks the serial correlation.

$$\Delta Y_t = \beta_0 + \gamma t + \beta_1 Y_{t-1} + \sum_{i=1}^{n} \delta \Delta Y_{t-i} + \varepsilon_t$$

Where ε_t is white noise error term and $\Delta Y_t = Y_t - Y_{t-1}$

The results of both models, Model 1 and Model 2 are presented in the Table 1. From the results we can conclude that all the variables are non-stationary or have unit root at their levels but after first difference they became stationary.

So this result directs us towards the test of cointegration because condition of cointegration has been fulfilled because variables are integrated at the same order for both models.

Table no 1: Result of Unit Root Test (ADF test statistics)

	Bank Deposits		**GDP**		**Bank's Credit**	
	At Level	At First Difference	At Level	At First Difference	At Level	At First Difference
Constant	-3.18 (0.0270)	-5.48 (0.0000)	-5.49 (0.0000)	-8.21 (0.0000)	-3.34 (0.0181)	-5.56 (0.0000)

Constant and Trend	-4.20 (0.0086)	-5.62 (0.0001)	-6.31 (0.0000)	-8.11 (0.0000)	-3.04 (0.1314)	-5.79 (0.0001)
None	0.51 (0.8237)	-5.43 (0.0000)	-1.13 (0.2282)	-8.28 (0.0000)	-0.17 (0.6200)	-5.63 (0.0000)

Note:Figures in parenthesis are p values

Lag length Selection:

For lag selection in both models all crieteria that are LR test statistics,Final Prediction error,A/C Akaike information criterion and Hannan-Quinn information criterion suggested lag 4 for model 1 and lag 2 for model no 2.

This lag length selection will use for both cointegration and granger causality.

Cointegration Test:

For cointegrtion following unrestricted VAR model have to estimate:

$$Y_t = A_0 + \sum_{i=1}^{n} A_i Y_{t-i} + E_t$$

Where Y_t is n×1 vector of variable having unit root that is GDP growth and Bank deposit for Model one and GDP growth and Bank credit in second model.

A_0 is vector of contant, n is lag no, A_i is estimated parameter's 3×3 matrix and Et is error term.

If variables are cointegrated then VECM model will be employed to find the short run and long run causality instead of unrestricted VAR model.

Where $\Delta Y_t = A_0 + \sum_{i=1}^{n-1} \varphi i \Delta Y_{t-i} + \beta Y_{t-1} + E_t$

$\varphi = -\sum_{i=1}^{n-1} A_i$ And $\beta = \sum_{i=1}^{n} A_{i-l}$

Where I is identity matrix (n×n) and Δ is difference operator.

Trace test and Maximum Eigen value test of Johansen and Juselius (1990) have been used.

Model no 1:

Null hypothesis= no cointegration between bank deposit and economic growth

Alternative hypothesis= existence of cointegration between bank deposit and economic growth

Model no 2:

Null hypothesis= no cointegration between bank's credit and economic growth

Alternative hypothesis= existence of cointegration between bank's credit and economic growth

Results of cointegration for both models are as under.

Table no 2: Results of cointegration

		Model no 1				Model no 2			
		Trace		Max Eigen		Trace		Max Eigen	
H0	**H1**	**statistic**	**Critical Value**	**statistic**	**Critical Value**	**statistic**	**Critical Value**	**statistic**	**Critical value**
r =0	r ≥1	13.633	15.49	8.36	14.26	34.14	15.49	19.40	14.26

Cointegration result for model no 1 shows that trace statistics and Max Eigen statistics are less than their corresponding 5% critical values and p value is more than 5% so we can reject Alternative and can accept null hypothesis that no cointegration exist between bank deposit and economic growth.
Cointegration results for model no 2 shows that trace statistics and Max Eigen statistics are more than their corresponding 5% critical values and p values are less than 5% so we can reject null hypothesis and can accept alternative hypothesis that there is cointegration between bank's credit and economic growth.

Granger causality test:

In order to find the direction of causality, granger causality (1960) test has been employed because cointegration test does not tell about direction. Granger causality test used past value of a variable X in order to forecast second variable Y and shows result in a form X ganger cause Y.

Model no 1

$$\Delta \text{LnEconomicGrowth}_t = \sum_{i=1}^{n} \beta_{11} LnEconomicGrowth_{t-1} + \sum_{j=1}^{n} \beta_{12} LnBankDeposit_{t-j} + \text{E}_{1t}$$

$$\Delta \text{LBankDeposit}_t = \sum_{j=1}^{n} \beta_{21} LnBankDeposit_{t-1} + \sum_{i=1}^{n} \beta_{22} LnEconomicGrowth_{t-j} + \text{E}_{2t}$$

Model no 2

$$\Delta \text{LnEconomic Growth}_t = \sum_{i=1}^{n} \beta_{11} LnEconomic\ Growth_{t-1} + \sum_{j=1}^{n} \beta_{12} LnBank'sCredit_{t-j} + \text{E}_{1t}$$

$$\Delta \text{LBank'sCredit}_t = \sum_{j=1}^{n} \beta_{21} LnBank'sCredit_{t-1} + \sum_{i=1}^{n} \beta_{22} LnEconomicGrowth_{t-j} + \text{E}_{2t}$$

Where I and j is lag lengths

According to Engel and Granger (1969) if variables are cointegrated then to analyze causality VECM vector error correction model will be use. This will analyze both long and short term causality with direction. The following VAR framework will be used to estimate VECM.

Model no 1:

$$\text{EconomicGrowth}_t = \sum_{i=1}^{n} \varphi i EconomicGrowth_{t-i} + \sum_{i=1}^{n} \beta_{i\Delta} BankDeposit_{t-i} + \delta 1 \varepsilon_{t-1} + \mu_t$$

$$\text{BankDeposit}_t = \sum_{j=1}^{p} \varphi j BankDeposit_{t-j} + \sum_{j=1}^{p} \beta_{j\Delta} EconomicGrowth_{t-1} + \delta 2 \varepsilon_{t-1} + \mu_t$$

Model no 2:

$$\text{EconomicGrowth}_t = \sum_{i=1}^{n} \varphi i EconomicGrowth_{t-i} + \sum_{i=1}^{n} \beta_i \Delta Bank'sCredit_{t-i} + \delta 1 \varepsilon_{t-1} + \mu_t$$

$$\text{Bank'sCredit}_t = \sum_{j=1}^{p} \varphi j Bank'sCredit_{t-j} + \sum_{j=1}^{p} \beta_j \Delta EconomicGrowth_{t-1} + \delta 2 \varepsilon_{t-1} + \mu_t$$

Where ε_{t-1} is error correction term.

The short term causality will be analyzed using WALD test and long run causality using Granger Error correction models.

Model no 1: Granger Test Pairwise

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPG does not Granger Cause BD	49	2.13723	0.0940
BD does not Granger Cause GDPG		1.49928	0.2207

Note: GDPG=economic growth, BD=bank deposits

Model no 2: Granger Test Pairwise

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPG does not Granger Cause BCPS	51	4.13272	0.0224
BCPS does not Granger Cause GDPG		2.43007	0.0993

Note: GDPG=economic growth, BCPS=Bank's credit

From both cointegration test and Granger causality test it is confirm that there is no relationship between Bank deposits and economic growth but bank's credit and economic growth is integrated and from pairwise granger causality test it is concluded that causality runs from GDP or economic growth to Bank's credits so in order to see long term and short term effect of causality VECM model will be used for model no 2 because in that model variables are cointegrated.

Table no 3: Long run Causality

Causality	**ECM_{t-1}**	**T-statistics**	**P-value**
Long run causality from bank's credit to GDP**	-0.1416	-1.4627	0.1507
Long run causality from GDP to bank's credit *	-0.3045	-4.3841	0.0001
*LM Test=0.5496(Prob of chi-square),Heteroskedasticity test=0.23(prob of chi square),Jarque-Bera stat=1.42(0.49 prob)			
**LM Test=0.2067(Prob of chi-square),Heteroskedasticity test=0.3354(prob of chi square),Jarque-Bera stat=2.04(0.35 prob)			

The result of long run causality describes that both coefficients have negative sign which is good however result of GDPG cause BCPS shows that corresponding probability is significant at 5%

level of significance which shows that there is long run causality running from economic growth to Bank's credit.

However the result of BCPS cause GDPG shows that corresponding probability is insignificant at 5% level of significance which shows that there is no long run causality running from Bank's credit to economic growth.

WALD test has been used to test short run causality between Bank's credit and GDP. Results are as under.

Table no 4: Short run Causality

Causality	Wald Test Chi square Value	P-value
D(LnBank's Credit(-1))**	1.2353	0.5392
D(LnGDP(-1))*	8.1070	0.0174
*LM Test=0.5496(Prob of chi-square),Heteroskedasticity test=0.23(prob of chi square),Jarque-Bera stat=1.42(0.49 prob)		
**LM Test=0.2067(Prob of chi-square),Heteroskedasticity test=0.3354(prob of chi square),Jarque-Bera stat=2.04(0.35 prob)		

The result shows that there is short run causality running from GDP to Bank's credit because p value is less than 5%. However, there is no short run causality running from Bank's credit to GDP as p value is more than 5%.

The estimated results accuracy has been validated by different diagnostic tests that are Test of serial correlation (LM), Heteroskedasticity Test and Normality Test (Jarque bera). All tests validated the estimated results and showed that there is no serial correlation in residuals, no heteroskedasticity and residuals are normally distributed.

4. Conclusion and Implication:

This study concludes that in Pakistan which is a developing country, two major activities of banking sector that are saving and lending don't have any long run or short run causality towards economic growth however there is unidirectional causality run from GDP growth to credit provided by banking sector which show that economic prosperity or economic growth will have a major impact on lending activities of banks meaning that demand following hypothesis is true for Pakistan in case of GDP and Bank's credit or we can say that growth led Bank's credit in Pakistan. There can be two reasons of this causal relationship.

1. Economic prosperity of the country will determine that whether country is good for investment so if goods will produce in country mean increase in GDP then small and medium enterprises and investor will take loans from banks for investment purpose so causality will run from GDP to bank's credit.
2. Second reason can be that if GDP growth will slow so people will be poor that's why they will take loans from banks for their personal use and not for investment purpose this can also be a reason of unidirectional causality from GDP growth to bank's lending activities rather than bidirectional relationship.

There might be other factors which influence economic growth of Pakistan more than banking sector activities, which can be profitability, human resource, technology, infrastructure and other sectors of the economy.

So Government should make policies by considering the fact that there is no short term or long term causality run from banking activities to GDP growth however in short run and long run GDP growth effects bank lending activity in Pakistan.

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