Modeling the Relationship between Banking Sector Credit and Economic Growth: A Sectoral Analysis for Pakistan

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This study examined the impact of banking sector credit on sectoral and sub-sectoral level of economic growth of Pakistan by using time series data from 1982 to 2017. The empirical aggregated analysis indicates that the magnitude of the private sector credit has positive sign, but insignificant influence on aggregate level of economic growth. On the other hand, sectoral analysis reveals that agriculture sector is not positively influenced by providing credit to agriculture sector. In contrast, industrial sector relies more on banking sector finance for its long-lasting projects. Moreover, sub-sectorl analysis shows that manufacturing sector is positively and statistically significant with manufacturing sector credit. Similarly, transport and communication, construction, wholesale and retail trade are positively influenced by their respective sectors credits. Furthermore, government spending showed positive sign and significant impact on all the sectors' growth except in case of transport and communication. Similarly, investment also showed positive and significant impact in case of all analysis except in case of industrial and manufacturing sector growth which indicates that demand for funds is mainly focused on working capital not for fixed investment in these sectors. Hence, the results suggest that monetary authorities should design appropriate credit policies by considering the sectoral-specific characteristics. Moreover, banks should provide medium to long-term loans for agriculture and industrial sub-sectors and ensure that, their impact efficiently transmitted to real economic growth.

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1 Introduction

Since the concept of economic growth had been formulated by Schumpeter (1911), who stated that role of financial market is necessarily essential in the economic performance of any economy. Theoretical work by Greenwood and Jovanovic (1990) and Bencivenga and Smith (1991) also asserted the close links of financial progress and economic performance[3] while, others like Robinson (1952) supported that financial market depends on growth performance. On the contrary, Lucas (1988) found no connection between the financial-growth hypotheses. The endogenous growth theories[4], and Aghion and Howitt (1992) also claimed that the financial market promotes real economic growth. On the empirical side Levine (2005) postulated that financial institutions provide the main functions for economic growth, such as allocation of capital, minimized information costs, improve the risks of management and promote the innovation. According to Liang and Reichert (2006), efficient financial sector means that countries' scarce resources can be moved to most productive sectors and hence, economic growth reaches its fullest potential level.

The banking industry is the main source of financing for the business community and its role in economic growth and development is vital in developing countries like Pakistan. The allocation of credit to various private sectors has also significant impact on economic growth. In Pakistan the distribution of private sector credit was mostly entitled towards industrial sector, but significance of credit to other sectors was totally ignored. Although previous studies undertaken by Ali et al. (2014), Tahir et al. (2015) and Mushtaq et al. (2016) highlighted the economic significance of aggregate analysis of private sector credit in economic growth, but their aggregate analysis has low ability to provide deeper understanding between credit-growth relationship in Pakistan. So, a dire need had to be seen so as to conduct a research in which the complete and true picture of credit-growth relationship in Pakistan could be precisely presented. The ultimate objective of this research tends to capture the role of sector-specific credit in economic growth of sectors and their sub-sectors i.e. (agriculture, industrial, services) and their sub-sectors

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[3] Also see empirical worked by Goldsmith (1969), McKinnon (1973), King and Levine (1993) and Roubini and Sala-i-Martin (1992).
[4] Grossman and Helpman (1991) and Romer (1990).

such as (manufacturing, transport and communication, whole sale and retail trade, and construction) of Pakistan over the period from 1982 to 2017. The decomposition of private sector credit provide to different enterprises explores several adequate channels and resources through which bank-based financial theory is apparently connected to economic growth in its deep instance in Pakistan.

The remaining portion of the research work is designed as follows: Section 2 describes the subject related literature work. Section 3 presents the model that we have developed in this research. Furthermore, this section also discusses the econometric methodology, statistical approaches and data sources. Section 4 identifies the empirical findings of the estimations. Conclusion of the chapter and policy implication is presented on the basis of empirical findings in Section 5.

2 Review of Literature

Friedman and Schwartz (1963) argued that real economic changes create financial needs. Economic activities are the engine of financial growth in any economy. According to Patrick (1966), financial institutions facilitate the transformation of funds for lower growth sector to medium growth one. On the contrary, Lucas (1988) viewed was based on no connectivity between financial market and growth performance, whereas existence of bidirectional causality was explained by Demetriads and Hussain (1996). Zirek, Celebi and Hassan (2016) discusses growth and Islamic banking nexus in the OIC countries. Gazdar, Hassan, Grassa and Safa (2019) discusses the confluence of oil, Islamic banking and growth in the GCC countries. Yu, Kim and Hassan (2018) discusses the impact of financial inclusion on economic growth in the OIC countries. Yu, Hassan, Mamun and Hassan (2014) examines the financial market reforms and economic growth in Morocco. Hassan, Sanchez and Yu (2011) examines financial development and economic growth in the OIC countries. Hassan, Sanchez and Yu (2011) examines impact of financial development on economic growth using a multi-country panel data methodology.

Numerous empirical studies had been undertaken over financial institutions in promoting economic performance have got more attention during the last three decades. Empirically, King and Levine (1993) gauged the influence of financial measures on three growth measures (i.e. per capita growth, accumulation of capital and productivity growth) along

with four financial measures[5] by using a group of 80 economies. The regression findings found that initial level of financial depth seemed to be vital in the process of long-term growth.

Aghion et al. (2005) studied to test the Schumpeter's concept by using 71 economies from the period 1960 to 1995.The result found negative and significant relation of interaction term (which is measured by interaction between financial market and the initial relative output) with economic growth, whereas the financial growths' direct effect was not significantly diverse from zero. The cross-country empirical analysis accompanied various economic series and developed finance-led growth concept. The cross-section regression uses the average of economic variables with an aim to highlight the cross-country variation of growth rates. In this analysis economic indicators are used in averaged form to capture the cross-country changes in growth rates. This relationship provides an average influence on economic growth. However, Arestis and Demetriades (1997) later on Neusser and Kugler (1998) were mainly criticized the cross country analysis because of ignorance within the large differences between countries. To control reverse causation, data frequency and missing variables issue many studies used Generalized Method of Moment (GMM) for panel-based analysis. For example, Beck et al. (2000) used data of 63 groups of economies for the period between 1960 and 1995 and analyzed the various channels through which impact of financial sector indicators[6] on growth performance. The regression findings postulated that total factor productivity is positively influenced by financial sector growth which accelerates economic growth. Aghion et al. (2010) claimed that bank credit to enterprise sector can stimulate economic activity in the long-run.

Chee-Keong and Chan (2011) tested hypothesis of finance-growth concept. These authors reliably concluded that economic activity is positively influenced by financial services in both long and short-run analysis. Moreover, financial growth is a vital indicator in defining economic growth in both advanced and low income countries. Alfara (2012) hypothesizes that economic activity is affected by different

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[5] i.e. liquid liabilities, deposit money bank assets to total assets, claims on non financial private sector and non -financial private sector credit to total credit.
[6]These indicators were: liquid liabilities, deposit money bank, domestic assets plus central bank domestic assets and credit issued to private enterprise to GDP.

financial indicators[7] in her thesis. This thesis concluded that macroeconomic growth of the economy is positively affected by bank credit but their relationship needs to develop strong mechanism in achieving economic growth. Medjahed and Eddine (2016) discussed the links between banking sector and economic growth for 11 MENA countries from the period 1980-2012. The findings indicated that financial sector has negative influence on real sector growth in both during long-run and short run aspect. Ekundayo et al. (2018) used financial institutions in estimating the manufacturing sector performance. The study used data for analysis from 1981 to 2015 for Nigeria. They used three manufacturing growth indicators[8] as dependent along with three financial measures (i.e. broad money, domestic credit by banks, and liquidity ratio) as independent variables were also used. The results indicated that in the short-run , credit to private sector and broad money have positive, but insignificant impact on capacity utilization and output, but negative impact on manufacturing sector growth. In contrast, in the long-run both credit to private sector and money supply have positive impact on manufacturing output. The study concludes that structural rigidities related to credit allocation should be removed in order to promote manufacturing sector.

Perera (2017) examined the credit-growth dynamics in Sri Lanka by using the quarterly data from 2003 to 2015 of various sectors[9].The author used impulse response function and causality analysis to examine the trend for causality between credit to private sector and real sectoral output. The results also found sectoral heterogeneity to credit impulses. Moreover, results also indicated that output of services sector respond quite quickly and very positively to credit impulse. However, output within sector linked with agriculture and fisheries showed more sensitivity to credit shocks, while, output industrial sector showed least sensitivity to credit shocks.

Ananzeh (2016) studied the behavior of sectoral bank credit in economic growth of Jordan over the period spanned between 1993 and 2014. The results strongly found a long-run association between bank credit to

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[7] These indicators were: bank credits, deposits, interest rate and number of bank branches.
[8] i.e. manufacturing capacity utilization, output and value added.
[9] Agriculture, industrial and services sectors and their sub-sectors.

sectors pertaining to agriculture, industry construction, tourism and economic growth. The causality analysis from economic growth to bank credit provided to agriculture and construction sector while the bi-directional causality also existed between growth performance and banking sector credit to construction sectors. The study concluded that credit facilities to different sectors could also enhance economic stability and growth.

3 Model, Methodology and Data Source

This study aims to highlight the precise importance of aggregated and sector-wise bank credit in the performance of aggregated and sector-wise economic growth of Pakistan. For the empirical analysis, the study examines whether sector-wise bank loans linked with sector wise economic growth *i.e.* agriculture, industrial, services, manufacturing, wholesale and retail trade, transport and communication and construction sectors. The study also attempts to adopt the model which had been previously used by some forerunners like Abubakar and Kassim (2016), Perera (2017) and Tang (2003). The modified model is based on the following equations:

$$Ln(GDP_t) = \beta_0 + \beta_1 Ln(PSC_t) + \beta_2 Ln(I_t) + \beta_3(TO_t) + \beta_4 Ln(G_t) + \beta_5(LIQ_t) + \beta_6(AS) + \beta_7 FL + \varepsilon_t \quad (3.1)$$

$$Ln(SGDP_{j_t}) = \alpha_0 + \alpha_1 Ln(SC_{j_t}) + \alpha_2 Ln(I_t) + \alpha_3(TO_t) + \alpha_4 Ln(G_t) + \alpha_5(LIQ_t) + \alpha_6(AS_t) + \alpha_7 FL + \mu_t \quad (3.2)$$

$$Ln(SSGDP_{m_t}) = \delta_0 + \delta_1 Ln(SSC_{m_t}) + \delta_2 Ln(I_t) + \delta_3(TO_t) + \delta_4 Ln(G_t) + \delta_5(LIQ_t) + \delta_6(AS_t) + \delta_7 FL + \omega_t \quad (3.3)$$

Where *(t)* indicates the annual time dimension whereas, *(S)* denotes sector and *(SS)* denotes sub-sector. In equation (3.1), $Ln(GDP_t)$ is dependent variable and measure the log of real GDP. $Ln(PSC_t)$ is the log of real private sector credit. Whereas, other control variables such as $Ln(G_t)$ represents log of general government expenditure, $Ln(I_t)$ shows the log of gross fixed capital formation, (TO_t) denotes trade openness, (LIQ_t) is the liquid liabilities as percentage of GDP, (AS_t) shows the ratio of deposit money bank assets to deposit money bank plus central bank asset. This indicator defines the role of commercial bank relative to central bank, *(FL)* shows dummy of financial liberalization and ε_t reflects the error term.

In equation (3.2), we estimated the influence of sector-wise bank credit on sectoral economic growth. Here, $Ln(SGDP_{mt})$ shows the vector of sectoral real GDP; with $Ln(INDGDP_t), Ln(SERGDP_t)$ and $Ln(AGGDP_t)$ for industrial, services and agriculture sector real GDP respectively, and these variables are used as depend variables in the estimation. Moreover, $Ln(SC_{mt})$ represents the vector of sectoral bank credit with $Ln(INDC_t)$, $Ln(SERC_t)$ and $Ln(AGC_t)$ for industrial sector, services sector and agriculture sector respectively. Other control variables in equation (3.2) have also been defined previously in equation (3.1).

In equation (3.3), we have estimated the adequate impact of sub-sector specific bank credit on sub-sector of economic growth. The dependent variables in this equation is the vector of $Ln(SSGDP_{jt})$ which shows the log of sub-sector real GDP; with $Ln(MANGDP_t), Ln(WGDP_t)$, $Ln(TCGDP_t)$ and $Ln(CONGDP_t)$ for the manufacturing, wholesale and retail trade, construction and transport and communication sectors, respectively. Whereas $Ln(SSC_{jt})$ is the vector of log of bank credit to sub-sectors represented by $Ln(MANC_t), Ln(WC_t), Ln(TC_t)$ and $Ln(CONC_t)$ for credit to manufacturing, transport and communication, wholesale and retail trade, and construction sectors respectively. All the other variables used in this equation are previously defined in equation (3.1).

Although various measures of economic growth had been used in the literature earlier, this study is an attempt to use aggregate, sectoral and sub-sectoral levels of economic growth as proxy by the natural logarithm of aggregated GDP, sectoral and sub-sectoral GDP. The aggregate level of real GDP, sectoral real GDP and sub-sectoral real GDP have been measured by nominal GDP divided by GDP deflator (2001=100). Moreover, credit to private sector used in this analysis which represents the depth of banking sector argued by Jalil and Feridun (2011). On the other hand, this study also used other financial indicators *i.e.* (Liquid liabilities as percentage of GDP and ratio of deposit money bank assets to deposit money bank plus central bank assets in %) which had been used earlier by Levin (2003). The liquid liabilities is used to be a more relevant proxy of financial development as suggested by (Levine et al., 2000 and Rousseau and Wachtel, 1998). It includes the central bank, depository banks and other financial institutions that highlight the overall size of the financial intermediary. Moreover, the ratio of deposit money bank assets to deposit money bank plus central bank assets (AS_t) measures the financial intermediaries function in transferring savings into new projects,

monitoring business, extending corporate governance besides controlling risk management activity as compare to central bank (Huang, 2005).

Besides banking sector credit, financial indicators and real sector growth, this study also used government expenditures as proxy of fiscal policy in the estimation of economic growth. This variable also used by King and Levine (1993). On the other hand, trade openness symbolize by (TO_t) is the ratio of trade to GDP. Moreover, $Ln(I_t)$ gross fixed capital formation is also used in this analysis. To capture more adequate impact of financial reforms, the study has included the dummy of financial liberalization *(FL)* in the estimation.

This study applied the Augmented Dickey-Fuller (1979) statistic test so as to find out the structural breaks from the observed series. Moreover, to examine long-run co-integration, the study used the test of Johansen (1988, 1990) which had been further extended by Johansen and Juselius (1991) towards the co-integration test. In contrast to single equation technique, Johansen (1988, 1991) and Johansen and Juselius (1990) estimates show multiple co-integration association with the model in the long-run. To further verify the co-integration results, the Fully Modified Ordinary Least Square (FMOLS) technique is also being applied to find out the long run coefficients.

3.1 Data Source

The data of the observable series are taken from different sources. The data of aggregated GDP, and sectoral GDP i.e. industrial, agriculture, services and sub-sectoral GDP such as wholesale and retail trade, construction, manufacturing, transport and communication. The gross fixed capital formation, government expenditure, credit to various sectors i.e. industry, agriculture, services, manufacturing, transport and communication, wholesale and retail trade and construction are taken from Hand Book of Statistic, and Statistical Bulletin from State Bank of Pakistan. The data of trade openness has been extracted from Economic Survey of Pakistan (various issues), whereas the data of liquid liabilities as percentage of GDP and the deposit money bank assets to (deposit money plus central) bank assets % are obtained from Financial Development and Structure Database. The entire data are evaluated in natural logarithm except trade openness, liquid liabilities as percentage of GDP and the deposit money bank assets to (deposit money plus

central) bank assets %. Moreover, data is deflated from GDP deflator (2001=100).

4 Empirical Analysis

4.1 Descriptive Findings

Table 4.1 shows descriptive analysis of various series. The current structure shows that the credit provided for industrial, agriculture and services represents on average 8.08%, 6.68%, and 5.42% respectively whereas credit to wholesale and retail trade, manufacturing, transport and communication and construction shows 6.11%, 7.96%, 4.91% and 4.83% respectively.

Table 4.1: Summary Statistics of Data

Variable	Mean	Std.dev.	Minimum	Maximum	Observations
Log Real GDP	10.438	0.565	9.475	11.302	36
Log Industrial Credit	8.080	0.649	6.715	8.963	36
Log Agriculture Credit	6.689	0.361	5.515	7.110	36
Log Services Credit	5.423	1.051	2.545	6.749	36
Log Government expenditure	8.323	0.468	7.310	9.181	36
Trade Openness	3.503	0.103	3.231	3.661	36
Log Investment	8.702	0.506	7.798	9.482	36
Deposit money bank assets to (deposit money + central) bank assets %	4.319	0.086	4.162	4.497	36
Liquid Liabilities % of GDP	3.601	0.101	3.384	3.768	36
Log Industrial GDP	8.966	0.522	7.973	9.647	36
Log Agriculture GDP	9.068	0.508	8.303	9.890	36
Log Services GDP	9.773	0.615	8.703	10.732	36
Log Wholesale and Retail trade GDP	8.694	0.658	7.586	9.657	36
Log transport and communication GDP	8.190	0.689	7.110	9.209	36
Log manufacturing GDP	8.571	0.505	7.587	9.244	36
Log whole sale and retail credit	6.114	0.553	5.041	7.176	36
Log Transport and communication credit	4.912	1.154	2.434	6.305	36
Log manufacturing credit	7.969	0.617	6.644	8.804	36
Log construction credit	4.835	0.646	3.498	6.105	36
Log construction GDP	6.924	0.302	6.342	7.523	36

Source: Authors' estimations

4.2   Results of Order of Integration Test

Before estimating the variables from the long-run aspect, it is required to confirm the stationary in all series. The order of integration test is applied on both at levels and first differences for all non-stationary series. The test is based on two models once with constant (c) which assumes no trends in the level of the data, while the second with constant (c) and linear trend (t) which is applied when linear trends in the levels are observed in series of the data.

The summary of stationary test is reported in Table 4.2, wherein the results imply that H_0 for unit root is accepted at the level except for *Ln(AGC).* After taking the first difference, null hypothesis is not accepted, yielding all the stationary series at the identical order [i.e. I (1)]. The results prove that variables in the estimation could be used to develop co-integration relation in the long-run.

Table 4.2: Results of Order of Integration Test

Variables	ADF test statistic p-value			
	I(0)		I(1)	
	C	C&T	C	C&T
Log Real GDP	0.781	0.500	0.000	0.000
Log Agriculture GDP	0.955	0.007	0.000	0.000
Log Agriculture credit	0.001	0.000	0.030	0.076
Log Industrial GDP	0.367	0.727	0.000	0.000
Log Industrial credit	0.200	0.382	0.003	0.011
Log services GDP	0.789	0.414	0.000	0.000
Log Services credit	0.066	0.274	0.000	0.000
Log Manufacturing GDP	0.352	0.546	0.000	0.000
Log Manufacturing credit	0.141	0.499	0.005	0.015
Log Wholesale and retail trade GDP	0.784	0.438	0.000	0.000
Log Wholesale and retail trade credit	0.271	0.423	0.000	0.000
Log Transport and communication GDP	0.859	0.551	0.000	0.000
Log Transport and communication credit	0.335	0.231	0.000	0.001
Log government expenditure	0.657	0.368	0.000	0.000
Log Construction GDP	0.726	0.007	0.014	0.062
Log Construction credit	0.176	0.162	0.000	0.005
Log Investment	0.703	0.490	0.000	0.001
Trade openness	0.605	0.342	0.000	0.000
Liquid liabilities % of GDP	0.087	0.346	0.000	0.000
Deposit money bank assets to deposit money plus central bank assets (%)	0.451	0.424	0.000	0.000

Source: Authors' estimations

4.3 Results of Johansen Co-integration

The study used a unique test of co-integration proposed by Johansen, (1988) and further explored by Johansen and Juselius (1990). Hence, Table 4.3 and Table 4.4 have shown Johansen and Juselius (1990) co-integration test findings.

Table:4.3 Test of Co-integration: Johansen and Juselius (By using Liquid Liabilities % of GDP and Financial Liberalization)

Dependent Variables	Null Hypothesis	Trace Statistics	5 percent critical values	Max Eigen Value Statistics	5 percent critical value
Aggregate Analysis					
Real GDP	None*	144.271*	125.615	65.225*	46.231
	At most one	79.046	95.753	28.313	40.077
Sectoral Analysis					
Real Industrial GDP	None*	139.966*	125.615	53.476*	46.231
	At most one	86.490	95.753	28.239	40.077
Real Services GDP	None*	147.634*	125.615	57.078*	46.231
	At most one	90.556	95.753	32.548	40.077
Real Agriculture GDP	None*	154.819*	125.615	69.317*	46.231
	At most one	85.501	95.753	34.518	40.077
Sub-Sectoral Analysis					
Real Manufacturing GDP	None*	159.371*	125.615	68.303*	46.231
	At most one	91.068	95.753	31.476	40.077
Real Wholesale & Retail trade GDP	None*	129.919*	125.615	52.479*	46.231
	At most one	77.440	95.753	31.621	40.077
Real Transport & Communication GDP	None*	148.047*	125.615	69.811*	46.231
	At most one	78.235	95.753	37.467	40.077
Real Construction GDP	None*	151.668*	125.615	50.087	46.231
	At most one	95.580	100.753	33.823	40.077

Source: Authors' estimations

Table: 4.4 Test of Co-integration: Johansen and Juselius
(By using Liquid Liabilities % of GDP, Deposit money bank assets to
(deposit money plus central bank assets %) and Financial Liberalization)

Dependent Variables	Null Hypothesis	Trace Statistics	5 percent critical values	Max Eigen Value Statistics	5 percent critical value
Aggregate Analysis					
Real GDP	None*	230.296*	159.529	70.374	52.362
	At most one*	159.922*	125.615	55.553	46.231
	At most two	104.368	105.753	36.310	40.077
Sectoral Analysis					
Real Industrial GDP	None*	228.401*	143.669	62.948*	48.877
	At most one*	159.800*	111.780	62.948*	42.772
	At most two	96.851	83.937	39.424	36.630
Real Services GDP	None*	239.227*	159.529	70.496*	52.362
	At most one*	168.731*	125.615	59.071*	46.231
	At most two	109.660	95.753	45.969	40.077
Real Agriculture GDP	None*	232.388*	159.529	73.525*	52.362
	At most one*	158.862*	125.615	54.257*	46.231
	At most two	104.605	95.753	38.614	40.077
Sub-Sectoral Analysis					
Real Manufacturing GDP	None*	223.499*	143.669	81.323*	48.877
	At most one*	142.176*	111.780	55.412*	42.772
	At most two	86.764	83.937	33.650	36.630
Real Wholesale & Retail trade GDP	None*	231.394*	159.529	78.899*	52.362
	At most one*	152.494*	125.615	54.752*	46.231
	At most two	97.742	95.753	36.813	40.077
Real Transport & Communication GDP	None*	223.882*	159.529	75.221*	52.362
	At most one*	148.661*	125.615	61.555*	46.231
	At most two	87.105	95.753	31.757	40.077
Real Construction GDP	None*	212.608*	159.529	53.551*	52.362
	At most one*	159.057*	125.615	47.277*	46.231
	At most two	111.779	95.753	35.109	40.077

Source: Authors' estimations

Table 4.3 represents the results of long-run relationship among variables. Trace statistic is more than 5% critical values in all the models. All equation's results entail at rank 1 by rejecting the null hypothesis of no co-integrating vector among the observable series. The results highlight that there is one co-integrating relationship with respect to the series identified in the models. Similarly, we do not accept the null hypothesis of non-co-integration vector at rank 0 for Maximum Eigen values test. Therefore, both tests appear to prove that the existence of one unique statistically significant co-integrating vector in the estimated series. Table 4.4 highlights that Trace statistic and Maximum Eigen values tests are at rank 1 critical values and both indicate the existence of co-integration among the series by rejecting the null hypothesis r=1 against the alternative r=2.

4.4 Results of FMOLS Test

In order to confirm the proper consistency of pervious estimated results, the study used Fully Modified Ordinary Least Square (FMOLS) technique to find out the coefficients of banking sector credit and growth performance in Pakistan during long-run. This test was originally developed by Phillips and Hansen (1990). FMOLS method provides reliable results for small sample size and it is used to obtain best estimates of co-integrating equations (Bakker and Felman, 2014). Furthermore, in order to achieve asymptotic efficiency, it also eliminates the effect of serial correlation and issues of endogeneity that are evolved from the existence of co-integrating relationship (Kalim and Shahbaz, 2009).

To examine in depth analysis of banking institutions credit to private sector on economic growth, the annual data is used from 1982 to 2017. However, credit to private sector is the focus explanatory variable in Table 4.5. The regression findings of private sector credit and economic growth are reported in Table 4.5. Alternatively, Table 4.6 shows empirical results regarding the effect of sectoral credit on sectoral economic growth. In Table 4.6, we analyzed the effect of credit to industrial sector, agriculture sector and services sector on their respective sectors growth (i.e. agriculture, industrial and services). The empirical results of sub-sector analysis are presented in Table 4.7. In this table we analyze the impact of credit to manufacturing sector, construction sector, transport and communication sector and wholesale and retail trade sector on their respective sectors growth.

The empirical results are based on three categories (i) aggregate analysis where aggregate real GDP is dependent variable, (ii) sectoral analysis where sector wise GDP i.e. industrial, agriculture and services are dependent vairables and (iii) sub-sectoral analysis where sub-sector wise GDP of manufacturing, construction , wholesale and retail trade, and transport and communication are dependent variables. While, credit to private sector, sectoral credit to industrial, services and agriculture sectors, and sub-sectoral credit to manufacturing, transport and communication, construction, and wholesale and retail trade are used as independent variables. The other control variables *i.e.* government expenditures, investment, trade openness, liquid liabilities, dummy of financial liberalization and ratio of deposit money bank assets to sum of deposit money bank and central bank assets are also included as independent variables in all three separate analysis.

Table: 4.5 Impact of Private Sector Credit on Aggregate level of Real GDP by using FMOLS Estimation Technique

Variables	(1)	(2)
Constant	7.491 (0.000)	5.075 (0.000)
Log Credit to private sector	0.256 (0.095)	0.166 (0.176)
Log Government expenditure	0.293*** (0.003)	0.342*** (0.000)
Log Gross fixed capital formation	0.385** (0.0384)	0.286* (0.060)
Trade openness	-0.697*** (0.001)	-0.585*** (0.001)
Liquid liabilities % of GDP	-0.781*** (0.002)	-0.926*** (0.000)
Dummy of financial liberalization	0.206*** (0.003)	0.240*** (0.000)
Deposit money bank assets to deposit money plus central bank assets (%)	-	0.869*** (0.003)
R²	0.978	0.984
Adj.-R²	0.973	0.979

Source: Author's estimation.
Note II:***, **,* stand for coefficients' significance at 1%, 5%, 10%, respectively.
The empirical results of equation (1) have shown in column (1) and (2) of Table 4.5. The first and second columns of Table 4.5 have reported the

finding of FMOLS regressions. The results postulate that in columns 1 and 2, the coefficient of private sector credit has shown positive, but insignificant influence in the estimation of economic growth. This result indicates that aggregate economic growth has not positively influenced by using aggregate measure of private sector credit. Moreover, government expenditure and investment have shown positive and significant role in enhancing real sector growth. On the other hand, ratio of liquid liabilities to GDP shows significant impact, however, relationship present negative signs with economic growth. The parameter of liquid liabilities to GDP signalizes that an increase in liquid liabilities to GDP ratio causes 0.500% decrease in economic growth. This finding is consistence with the results of Saci et al. (2009). The negativity of this parameter indicates that liquid liabilities may be insufficient transmission mechanism between real sector growth and financial intermediation. Furthermore, dummy of financial liberalization has positive and strongly significant influence on economic growth in both columns. In column (2) of Table 4.5, we incorporated the ratio of deposit money banks assets to the sum of deposit money bank and central bank assets. This indicator examines relative importance of commercial bank to the central bank in allocating domestic credit[10]. The results suggest that the commercial banks provide more sophisticated financial intermediary role in the estimation of economic growth and provide risk sharing and information services more efficiently than the central bank in Pakistan.

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[10]This variable does not explain to whom the financial market is allocating credit because government strongly influence on banks in many countries (King and Levine (1993).

Table: 4.6 Impact of Sectoral Bank Credit on Sectoral Level of Real GDP by
using FMOLS Estimation Technique

Variables	(3)	(4)	(5)	(6)	(7)	(8)
Constant	5.642 (0.000)	3.325 (0.000)	3.569 (0.071)	2.241 (0.150)	6.369 (0.000)	4.998 (0.000)
Log Credit to industrial sector	0.595*** (0.000)	0.465*** (0.000)	-	-	-	-
Log Credit to services sector	-	-	-0.092 (0.381)	-0.038 (0.637)	-	-
Log Credit to agriculture sector	-	-	-	-	-0.168*** (0.009)	-0.181*** (0.001)
Log Government expenditure	0.196*** (0.010)	0.237*** (0.000)	0.309*** (0.003)	0.345*** (0.000)	0.455*** (0.000)	0.485*** (0.000)
Log Gross fixed capital formation	-0.059 (0.641)	-0.091 (0.326)	0.895*** (0.000)	0.628*** (0.000)	0.403*** (0.000)	0.290*** (0.002)
Trade openness	-0.336** (0.036)	-0.270** (0.020)	-0.534** (0.034)	-0.522*** (0.008)	-0.638*** (0.001)	-0.574*** (0.000)
Liquid liabilities % of GDP	-0.438*** (0.011)	-0.631*** (0.000)	-0.497** (0.044)	-0.768*** (0.000)	-0.398* (0.067)	-0.506*** (0.010)
Dummy of financial liberalization	0.210*** (0.000)	0.254*** (0.000)	0.144** (0.054)	0.186*** (0.002)	0.256*** (0.000)	0.276*** (0.000)
Deposit money bank assets to deposit money plus central bank assets (%)	-	0.862*** (0.000)	-	0.903*** (0.001)	-	0.541** (0.040)
R²	0.976	0.982	0.980	0.986	0.976	0.979
Adj.-R²	0.971	0.978	0.976	0.982	0.970	0.973

Source: Author's estimation.
Note II:***, **,* stand for coefficients' significance at 1%, 5%, 10%, respectively.

Columns (3) and (4) of Table 4.6 statistically proven that the coefficient of industrial sector credit is positive driver for industrial sector growth. These regression findings indicate that a 1% increase in industrial sector credit causes 0.595% and 0.465% increase in industrial sector growth (see in columns (3) and (4) respectively). Similarly, Aiyedogbon and Anyanwu (2016) and Perera (2017) also found positive contribution of banking sector credit in industrial growth performance. These results suggest that flow of funds to the industrial sector is more important in stimulating long-run economic growth of Pakistan. Moreover, regression results strongly support the positive and significant behavior of government expenditure on industrial sector. On the other hand, the coefficient of investment has negative sign, but insignificant behavior on industrial sector growth. The findings suggest that industrial sector of Pakistan may need fund for working capital not for fixed investment; although a large chunk of bank credit is transmitted to industrial sector of Pakistan. The coefficient of trade openness has shown negative and significant impact in determining the industrial sector growth. This result supported by Hausmann et al. (2007) argued that the countries associated with low quality of production may involve negative relation of trade openness and economic growth. Moreover, liquid liabilities have negative impact on industrial sector growth. However, this result supported by Javed et al. (2014) they suggested that these liabilities are the bank's deposits which may haul out private investment; therefore, these deposits are directly channelized in to investment through financial institution or through providing loans to other segments of business. In column (4), we used the variable of relative contribution of commercial bank than central bank which shows positive and significant affect on industrial sector growth.

In column (5) and (6), the services sector credit has negative, but insignificant impact on services sector growth, which could be due to lower share of funds transmitted to this sector. Although this sector provides more contribution in overall economic growth than other sectors of the economy, but flow of funds from domestic banks are not very much supportive towards this sector. Abubakar and Kassim (2016) argued that the size of the enterprise (medium and small) of services sector may cause dire constraints and make their dependence more on banking sector credit only, therefore, bond markets would be more suitable for this segment. Moreover, government spending and investment both have positive sign

and significant impact on services sector growth, while trade openness and liquid liabilities tend to show negative sign and significant impact in this respect.

The coefficient of agriculture credit has negative influence and show significant affect in the growth of agriculture sector as seen apparently in column (7) and (8), which obviously support the result provided in the literature by Abbubakar and Kassim (2016). This indicates that there is some critical credit constraints involved in agriculture sector, e.g. even access to credit is not an easy task for small farmers in Pakistan. Moreover, the negativity of this indicator indicates that the small share of agriculture sector credit is not used for the development purpose of this sector. Moreover, investment and public spending have positive sign and significant impact on GDP in agriculture in both columns. Liquid liabilities have negative sign and show significant influence in column (7) and (8). Besides in column (8) the relative importance of commercial banks as compared to monetary authority has positive sign and hence, plays a vital role in the growth of agriculture sector.

Columns (9) and (10) of Table 4.7 show that coefficient of manufacturing sector credit has positive sign and statistically significant impact. This regression analysis indicates that when 1% increase in credit to manufacturing sector causes 0.49% and 0.39% increase the manufacturing sector GDP in column(9) and (10) respectively. This results support the study by Abbubakar and Kassim (2016). Moreover, government expenditure and investment show positive sign, but investment is insignificant in columns (9) while in column (10) it becomes significant. The liquid liabilities have negative sign and strongly significant impact in the estimation of manufacturing sector growth. This result suggests that role of banks as financial intermediary is not quite efficient in promoting manufacturing sector growth in Pakistan. Moreover, government expenditure has positive sign, but the role of investment is negative, but insignificant in manufacturing sector growth. The negative sign of investment shows that in manufacturing sector, credit is used for working capital but not for fixed investment.

Table 4.7: Impact of Sub-sectoral Bank Credit on Sub-sectoral Real GDP by using FMOLS estimation technique

Variables	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	4.165 (0.000)	1.861 (0.025)	2.161 (0.002)	3.015 (0.000)	9.492 (0.000)	5.694 (0.000)	0.426 (0.772)	-0.490 (0.685)
Log Credit to Manufacturing	0.537*** (0.000)	0.399*** (0.000)	-	-	-	-	-	-
Log Credit to Transport and Communication	-	-	-	-	0.186*** (0.000)	0.171*** (0.000)	-	-
Log Credit to Whole sale and retail trade	-	-	-	-	-	-	-0.158** (0.039)	-0.092 (0.131)
Log Credit to construction	-	-	0.094*** (0.000)	0.067*** (0.000)	-	-	-	-
Log Government expenditure	0.338*** (0.000)	0.354*** (0.000)	0.296*** (0.000)	0.283*** (0.000)	-0.145 (0.144)	-0.061 (0.214)	0.417*** (0.000)	0.446*** (0.000)
Log Gross fixed capital formation	-0.052 (0.674)	-0.075 (0.428)	0.149*** (0.003)	0.288*** (0.000)	0.774*** (0.000)	0.492*** (0.000)	0.999*** (0.000)	0.737*** (0.000)
Trade openness	-0.173 (0.238)	-0.123 (0.266)	-0.334*** (0.000)	-0.357*** (0.000)	-1.199*** (0.000)	-1.076*** (0.000)	0.066 (0.769)	-0.004 (0.979)
Liquid liabilities % of GDP	-0.484*** (0.003)	-0.665*** (0.000)	0.460*** (0.000)	0.625*** (0.000)	-1.046*** (0.000)	-1.351*** (0.000)	-0.904*** (0.000)	-1.147*** (0.000)
Dummy of financial liberalization	0.159*** (0.002)	0.211*** (0.000)	0.063** (0.047)	0.033 (0.116)	0.293*** (0.000)	0.330*** (0.000)	0.109* (0.096)	0.165*** (0.004)
Deposit money bank assets to deposit money plus central bank assets (%)	-	0.901*** (0.000)	-	0.535*** (0.000)	-	1.450*** (0.000)	-	0.842*** (0.001)
R²	0.972	0.979	0.977	0.985	0.978	0.989	0.982	0.987
Adj.-R²	0.966	0.974	0.972	0.982	0.973	0.986	0.979	0.983

Source: Author's estimation.
Note: II:***, **,* stand for coefficients' significance at 1%, 5%, 10%, respectively.

Columns (11) and (12) in Table 4.7 indicate that credit provided to the construction sector has positive sign and significant impact on real construction GDP. This result highlights that a 1% increase in credit to construction sector causes 0.094% and 0.067% increase in construction sector growth. These findings suggest that construction sector is relying more on banking sector loans (i.e. mortgage loans)[11], but bond market may also tend to be accordingly suitable for construction sector's financial needs in Pakistan. Similarly, government expenditure and investment both have positively related with construction sector growth. Moreover, liquid liabilities have shown positive and significant influence on the growth of construction sector. The result obviously tends to suggest that banking sector transmission mechanism performs quite efficiently in order to provide financial inter-mediation towards construction sector of Pakistan. Similarly, the importance of commercial bank is more appropriate in case of construction sector growth than central bank monetary authorities.

Moreover, empirical analysis of column (13) and (14) indicated that transport and communication sector growth has positively associated with bank credit provided to this sector. In contrast, government expenditure has negative sign, but insignificantly contributes in the promotion of transport and communication sector growth. However, coefficient of investment contributes a positive and significant role with respect of transport and communication sector growth, while coefficient of trade openness and liquid liabilities both have shown negative sign. Moreover, in column (14) the relative importance of commercial bank seems feasible in promoting the growth of transport and communication sector. Finally, the whole sale and retail trade sector growth is negatively associated with funds provided by scheduled banks in Pakistan. Both investment and government expenditure have positive signs and also show significant contribution in the growth of wholesale and retail trade. Moreover, liquid liabilities have negative sign and significant impressions therein. Finally, we also checked the estimated parameter's stability through CUSUM test which developed by Brown et al. (1975). On the whole, all the estimated coefficients show stability as shown in Appendix A.

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[11] These loans mostly consist of medium term and long term nature.

5 Conclusion

This study has analyzed the banking industry role in the growth performance of Pakistan. For this aim, the study used both aggregated and sector-specific bank credits to find their impact on aggregated, sectoral and sub-sectoral level of economic growth of Pakistan. By applying time series data from 1982 to 2017, the study used the Johansen co-integration test and Fully Modified Ordinary Least Square (FMOLS) test. Furthermore, the stability of estimated parameters is captured by the CUSUM test in this research. The empirical results postulated that magnitude of private sector credit has theoretically positive sign, but insignificant influence on aggregate level of economic growth. However, sectoral analysis showed that agriculture sector growth is not positively influenced by providing credit to agriculture sector. Similarly, banking industry credit to services sector has shown negative sign, but insignificant impact on growth in the services sector. Conversely, the regression findings indicate that industrial sector relies more on banking sector finance for their long lasting projects. Therefore, policymakers in Pakistan should encourage medium to long-term loans especially for the industrial sector, which would be beneficial for growth- supporting aspect from credit channels. Moreover, the manufacturing sector is highly dependent on bank credit, while, transport and communication and construction sectors are positively influenced by credit provided to these sectors. Therefore, careful attention should be given to these sectors to attain sustainable economic growth. Moreover, credit to wholesale and retail trade has shown negative and significant impact on its sector's growth. The coefficient of government spending has shown positive and significant impact on all sectors' growth except in the case of transport and communication sector growth. Similarly, investment also showed positive sign and significant impact in case of all analyses except industrial and manufacturing sector growth, which indicates that the demand for finance is mainly focused on working capital and not on fixed investment in case of these sectors. Furthermore, all the estimations are negatively influenced by liquid liabilities except for construction GDP. The coefficient of commercial bank relative to the importance of central bank shows positive sign and highly significant impact in all estimations.

Therefore, we concluded that agriculture sector need for reforms and other development initiatives, because without these initiatives the credit

by banking sector will not be useful in the growth of agriculture sector. Furthermore, policymakers should design appropriate credit policies in terms of medium to long-term loans provided to agriculture and industrial sub-sectors and ensure that, their impact efficiently transmitted to real economic growth. Moreover, other depository and financial institutions should design the credit policy in the context to promote credit to private sector enterprises.

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Appendix-A

CUSUM Test for Aggregate Analysis

Figure:4.1 CUSUM test of Private Sector Credit and Real GDP
(From column 1 estimation in Table 4.5)
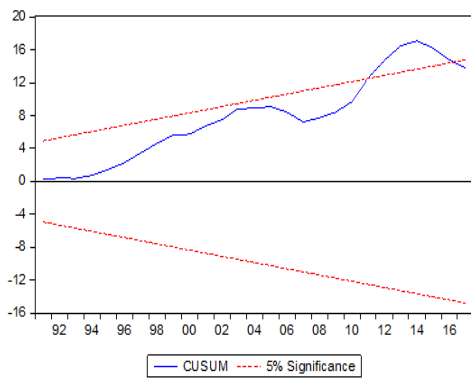
Figure: 4.2 CUSUM test of Private Sector Credit and Real GDP
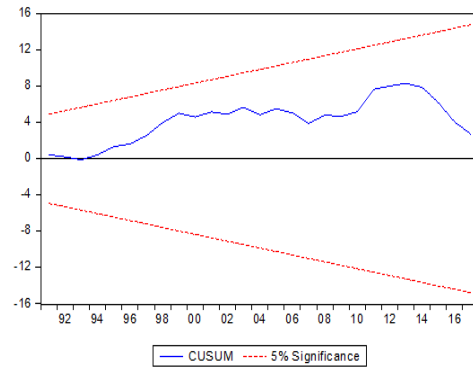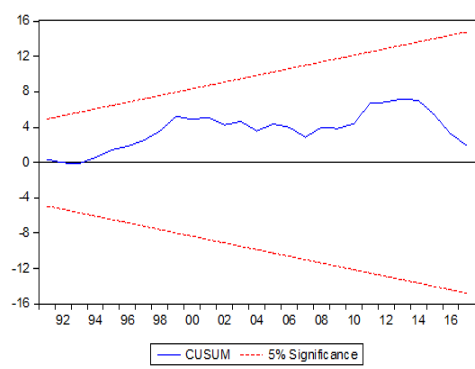(From column 2 estimation in Table 4.5)
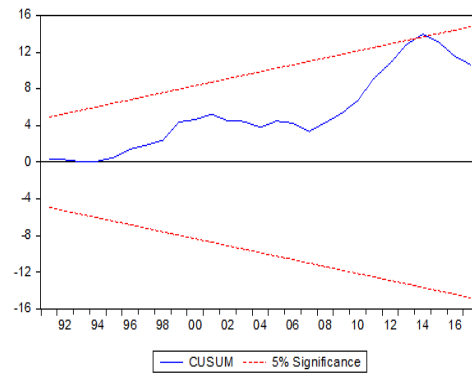
Note: The straight lines represent critical bounds at 5% significance.
Source: Authors' estimation.

CUSUM test for Sectoral Analysis

Figure:4.3 CUSUM test of Industrial Sector GDP and Credit
(From column 3 estimation in Table 4.6)
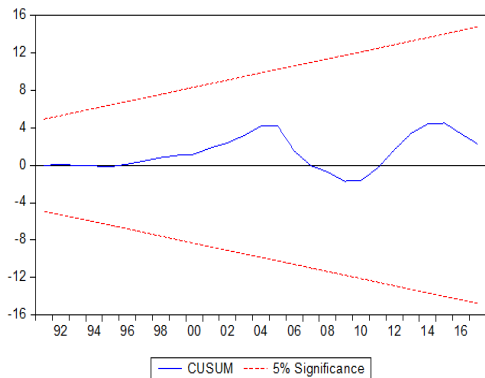
Figure: 4.4 CUSUM test of Industrial GDP and Credit
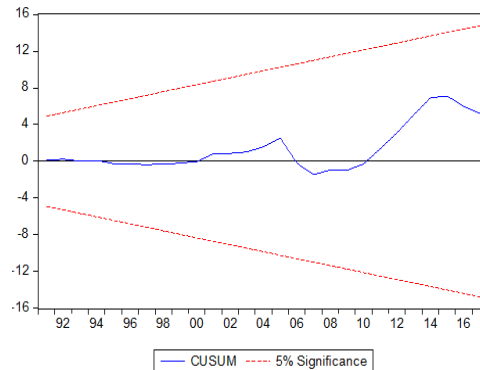(From column 4 estimation in Table 4.6)
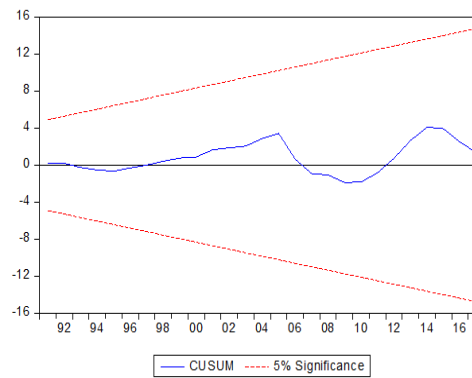
Figure:4.5 CUSUM test of Services Sector GDP
and Credit
(From column 5 estimation in Table 4.6)
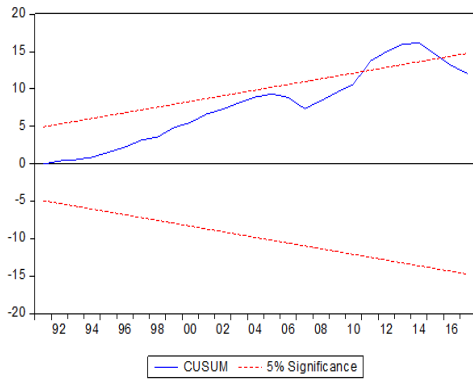
Figure: 4.6 CUSUM test of Services Sector GDP
and Credit
(From column 6 estimation in Table 4.6)
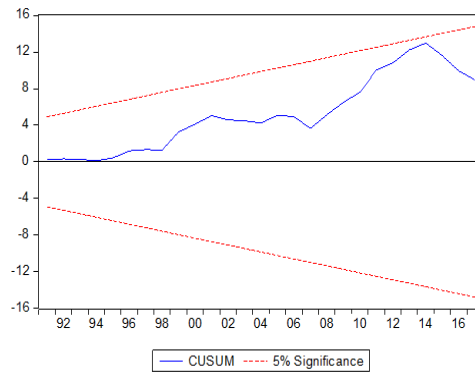
Figure:4.7 CUSUM test of Agriculture GDP and
Credit
(From column 7 estimation in Table 4.6)

Figure:4.8 CUSUM test of Agriculture GDP and
Credit
(From column 8 estimation in Table 4.6)

Note: The straight lines represent critical bounds at 5% significance.
Source: Authors' estimation.

CUSUM test for Sub-sectoral Analysis

Figure: 4.9 CUSUM test of Manufacturing GDP and Credit
(From column 9 estimation in Table 4.7)
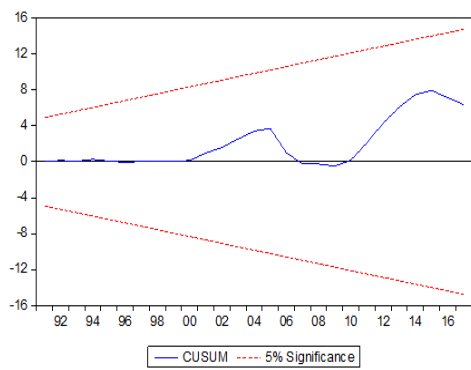
Figure: 4.10 CUSUM test of Manufacturing GDP and Credit
(From column 10 estimation in Table 4.7)

Figure: 4.11CUSUM test of Transport and Communication GDP and Credit
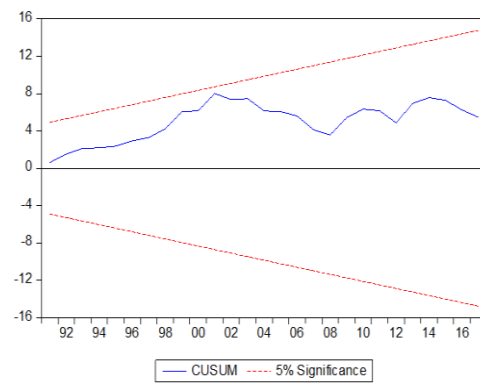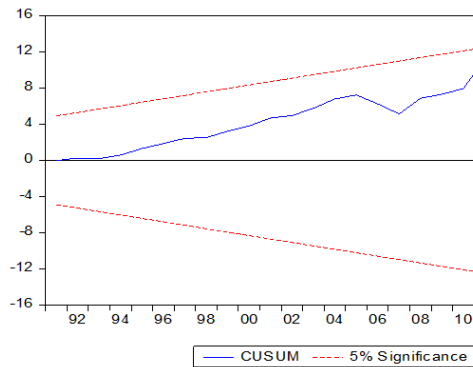(From column 11 estimation in Table 4.7)
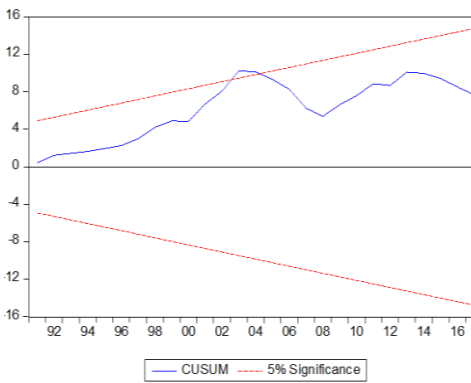
Figure: 4.12 CUSUM test of Transport and Communication GDP and Credit
(From column 12 estimation in Table 4.7)

Figure: 4.13 CUSUM test of Wholesale and
Retail trade GDP and Credit
(From column 13 estimation in Table 4.7)

Figure: 4.14 CUSUM test of Wholesale and
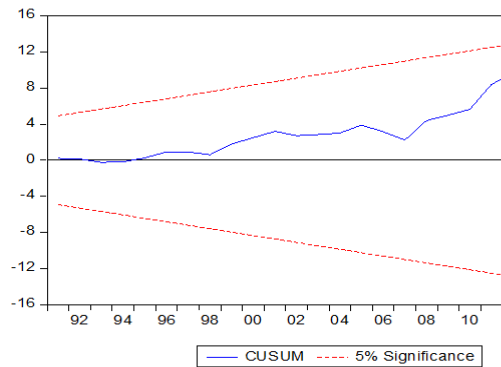Retail trade GDP and Credit
(From column 14 estimation in Table 4.7)

Figure: 4.15 CUSUM test of Construction
GDP and Credit
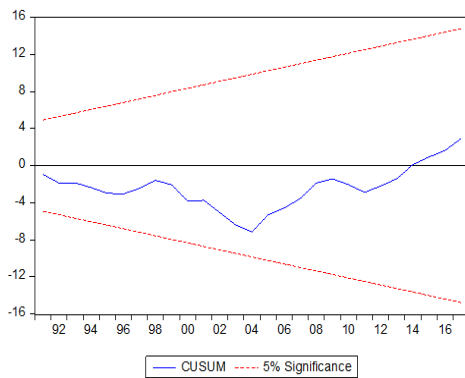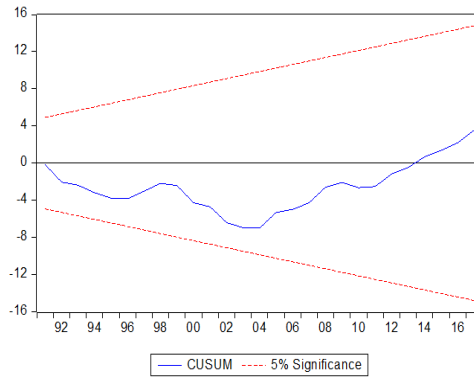(From column 15 estimation in Table 4.7)

Figure: 4.16 CUSUM test of Construction GDP
and Credit
(From column 16 estimation in Table 4.7)

Note: The straight lines represent critical bounds at 5% significance.
Source: Authors' estimation.