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Economic Growth and Banking Credit in India

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Abstract

The interdependence between credit expansion and economic growth has been a subject of some debate. While some economists contest that the development of the financial system is a byproduct of economic growth others assert that credit expansion is critical for growth itself. India's impetus on expanding its banking reach and recent changes in the way transactions are being done begs the question whether such changes directly affect the growth trajectory. This paper aims to examine and understand the relationship between credit and growth in India in the last few decades. Different metrics for credit and output is used to test the relationship at an overall as well as sectoral level. The findings indicate a strong relationship between the two variables.

Key words: bank credit, granger causality, co-integration, credit and economic growth

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An inquiry into the importance of credit in an economy and the role it plays in driving growth has been often pursued. Those who assert that credit influences growth stress that the financial system, especially banking, facilitates efficient allocation of resources from savers to borrowers with productive investment opportunity, thereby promoting economic growth. Also by providing financial intermediation, accepting and deploying large amounts of public funds, and creating money supply, banks act as an important channel of monetary policy transmission. Those who disagree point out that economic growth depends on utilization of physical resources and real growth is affected by only real variables. The expansion of economic activities, however, may generate credit and influence it.

Several approaches have so far been used to study the relationship, utilizing a variety of econometric techniques to study this complex relationship between credit and economic growth. While all these methodologies carry their own merits, the results of these studies have been mixed. Studies implying causality in both directions have been well documented in literature.

In India, credit has been expanding. The capital markets such as the debt and equity markets have gained significance in recent times and the reach of the banking system has been enhanced by policies such as the Jan Dhan Yojana. The use of credit cards for making consumption based transactions is on the rise. Thus the study of the relationship between bank credit and economic growth holds not just a pedagogic interest, but is also of practical significance in policy making.

The plan of the paper is as follows. Following the introduction, Section II gives a brief review of existing literature on the study of financial systems and credit and their relationship with GDP. Section III discusses the relationship in the Indian context, particularly highlighting the important role that banks play in the credit intermediation system in India. Section IV discusses the methodology used to study the causality relationship among the different credit and GDP variables. Section V explains the variables used in the study and the relationships being studied. Section VI presents the key findings with regard to the relationship between bank credit and GDP in India. Section VII draws conclusions from the findings.

Section II: Brief Review of Literature

The study of Credit and GDP and the relationship between the two has been the subject of much research. There are two views on the relationship between finance and growth. According to one view prevalent in 19th century, enterprise leads and finance follows implying that banks do not have a leading role in growth. The other view stresses complementarities between development and capital accumulation. So banks could finance investment in physical capital and growth in a proactive manner.

Schumpeter (1934), highlighted the importance of financial intermediaries in mobilizing savings, evaluating projects, diversifying risks, monitoring management of firms in debt, and facilitating transactions which are essential for innovation and economic growth. He argued that bank credit acts as money-capital, and thus, constitutes the necessary premise for realization of innovative processes planned by entrepreneurs. Schumpeter (1970) discusses the role of banks as "social accountants" – needed for the constrained realization of individual choices and to make those choices mutually compatible.

Economic models based on the neo-classical traditions of Harrod-Domar and Robert Solow that emerged after World War II ignored the significance of the financial sector. As described in Rajan and Zingales (2001), economists, at best held the view that when opportunities arise in an economy that require financing, the economy will develop the necessary markets and institutions to finance these opportunities, i.e. as Robinson (1952) states "where enterprise leads, finance follows".

Tobin (1965) explored the growth models of neo-classical economics and considered the possibility of monetary assets as an alternative way of accumulating wealth rather than productive capital. He found that development strategies, after World War II were driven predominantly through direct government intervention to promote accumulation of physical capital. This resulted in a repression of financial markets and curtailed their contribution to economic growth.

These views and policies were eventually challenged when McKinnon (1973) stressed that in the developing world complementarities between financial development and capital accumulation may be more important than idle money-physical capital substitution. Shaw (1973) emphasized the growth-enhancing attributes of financial capital deepening through its impact on market integration. Both Shaw and McKinnon incorporated money and finance in models relevant for developing countries, highlighting the growth reducing and distorting effects of financial repression. Their work influenced the financial policy reforms of the following two decades.

Minsky (1992) posited that the proper role of the financial system was to promote the "capital development" of the economy. In times of high credit growth, in exuberance, quality standards could get compromised, which are seeds to a crisis that follows thereafter. This culminates in a "Minsky Point" or a "Minsky Moment", which is the starting phase of a financial crisis where the supply of credit dries up, causing a panic in the financial system.

Patrick (1966) identifies two possible causal relationships between financial development and economic growth. According to the "demand-following" view, as the real economy grows, demand for financial services grows. According to the "supply-leading" view, financial institutions and services are created in advance of the demand for them. According to him, in the initial stages of growth, supply-leading view becomes important. As sustained macroeconomic growth gets underway, the demand-following response becomes more dominant. Jung (1986) studied the

causality relationship between financial development and economic growth for 56 countries using Granger Causality tests. He found some evidence that less developed countries (LDCs) predominantly have a supply-leading causality pattern while developed countries (DCs) have the reverse causal direction. Levine et al. (2000), Calderon and Liu (2002) and Hassan et al. (2011) utilize panel data to study the link between financial development and growth across multiple countries. Although specific conclusions on the directionality of causation and the proxy variables for financial development vary, these studies conclude the existence of a strong relationship between financial development and growth. Demetriades and Hussein (1996) separately study the direction of causality between financial development and growth for 16 countries and find little evidence of finance being the leading sector of economic development.

The relationship between financial development and economic growth in the Indian context has been studied from multiple perspectives. Bell and Rousseau (2001) studied post-independence India and the role that financial system played in industrialization. Using a set of Vector Autoregressive (VAR) and Vector Error Correction Models (VECM), they conclude that the financial sector was instrumental in not only promoting aggregate investment and output but also enabled the steady shift towards industry. Several studies including those by Pradhan (2009), Chakraborty (2010), Singh (2011), Ray (2013) and Mahajan and Verma (2014) among others have utilized various econometric methods and a multitude of proxies for financial development to study the impact it has on the economic growth of India. The results of these studies in terms of direction of causality between financial development and growth have been mixed.

Das and Khasnobis (2007) studied the transmission mechanism from the degree of financial intermediation to economic growth through the perpetuation of short term and long term credit. They have found two long term co-integrating relationships – one linking financial development and the allocation of credit to various purposes and the other linking economic growth to short term and long term credit, i.e. the transmission mechanism through the credit market. Pradhan et al. (2014) have studied the nexus between trade openness and Indian economic growth. Utilizing an ARDL approach to co-integration and Granger causality, they conclude that trade openness and financial development in the form of banking sector and stock market depth are co-integrated with economic growth. The causality between variables is bi-directional. Katircioglu and Benar (2007) studied the triangular relationship between finance, trade and economic growth for the case of India. Their study indicates a unidirectional causation from real income growth to growth in trade and a bi-directional causation between financial sector development and economic growth. Sehrawat and Giri (2015) has studied the impact of financial development on growth of the 28 Indian states during the period 1993 – 2012. Utilizing a panel co-integration and panel causality approach, the study concludes that there is causality from per capita credit as well as per capita deposits to economic growth. Furthermore, there is a bi-directional relationship between per capita credit and deposits.

A key factor to note in the GDP growth history of India is that the Indian economy had experienced a turnaround in growth in the early 1990s. In the context of this study it is important to separate the change in GDP caused because of structural reasons. However, there has been a lot of debate on the specific years which define a structural break in India's growth story.

Wallack (2003) analyzed GDP growth and its components for a structural break in the early to mid-1980s. She utilized a novel approach of carrying out F-tests for all possible years and selecting the most statistically significant year as a break date. She arrives at a break date of 1980 using this method. Rodrik and Subramanian (2004) analyze Indian growth data for structural breaks in the 1970s-80s. They studied the variables GDP/Capita, GDP/Worker and Total Factor Productivity (TFP) using the methodology of Bai and Perron (1998, 2003) and identify a single breakpoint at 1979. Hatekar and Dogre (2005) establish that when the entire 20th century is taken, structural break occurs around the year 1950. Balakrishnan and Parameswaran (2007) utilize an exponential function for growth rate and identify a single structural break in the GDP data at 1978-79.

Panagariya (2004) argued that the growth in the 1980s was higher than the preceding periods but was fragile and culminated in a crisis in 1991. Furthermore, he attributes the high growth during the 1980s to the growth during the period 1988-91, excluding which, the average growth of the 1980s would be much lower than 1990s. He further argues that the reforms in the 1990s were more systematic and gave rise to sustainable growth from 1992 onwards.

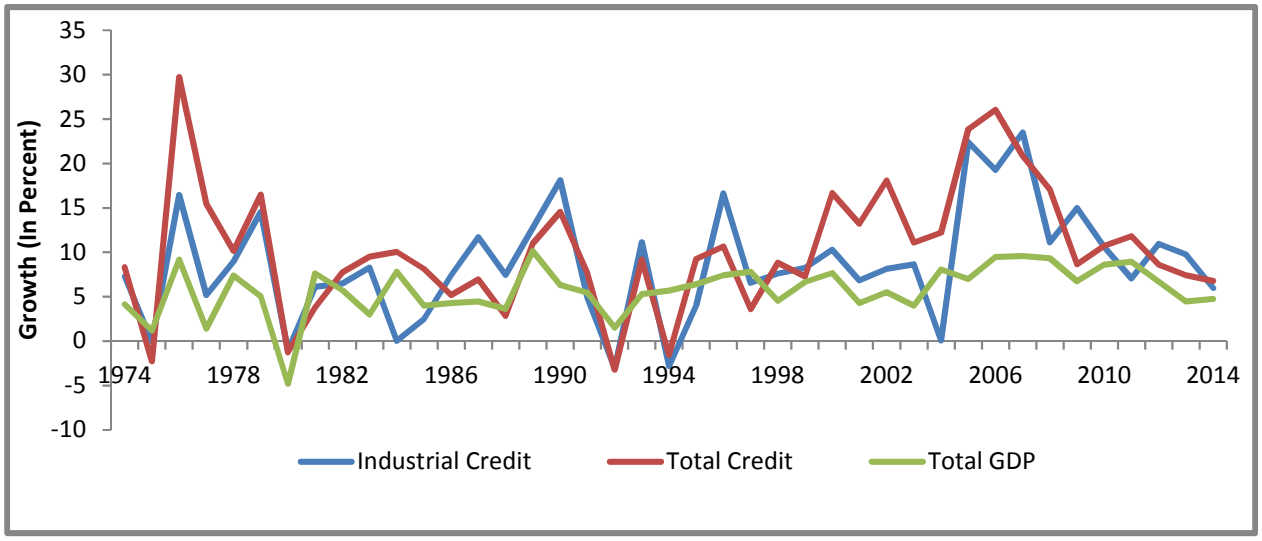
Singh (2005) also argues that despite a shift in growth to a higher level during the 1980s, a comparison with the shift since 1991 may not be appropriate. He discusses an aspect of political economy that played a role in bringing about a structural change. Following the emergency of 1975-77 a succession of non-congress governments followed introducing a new paradigm for the economy. Changes such as a focus on the rural sector, decentralization of power, growth of co-operatives and priority sector lending were initiated. In the 1980s as well the governments changed multiple times and selective liberalization was carried out resulting in a shortage of power and infrastructure, uneven capacity buildup in industry and high fiscal and current account deficits with exchange controls. This culminated in a crisis in 1991. Only after the structural reforms of 1991, had the economy recorded consistently high growth rates since 1992. In the context of this study the year 1992 is considered as the structural break point for GDP growth.

Section III: The Relationship between Banking Credit and Growth in India

Banks in India have traditionally been the main source of credit for various sectors of the economy and their lending operations have evolved in response to needs of the economy. In India, savings rate has been in the range of 30-35 per cent and banks mobilize such resources. The financial savings, which have a potential to enhance growth, is encouraged. The recent schemes of Financial Inclusion, for instance, aim at tapping savings of rural and suburban areas as well as converting

unproductive physical savings into financial savings. Banking credit has also evolved over time, with the emergence of credit cards and securitisation which have a positive impact on credit growth. The relationship between credit and GDP growth in India is illustrated below (Graph 1).

Graph 1: Relationship of Bank Credit Growth Rate with GDP Growth Rate



Source: Basic Statistical Returns of Scheduled Commercial Banks in India, Various Issues; Economic Survey 2015-16

Section IV: Methodology

The authors attempt to study the relationship between credit growth and GDP growth in different sectors of the Indian economy. This has been achieved through the use of Co-integration and Granger Causality tests. The natural logarithm of the level series has been used for the current study.

Unit Root Test

The stationarity of the credit and GDP time series has been tested using Augmented Dickey Fuller (ADF) test, Phillips Perron (PP) unit root test and supported through the use of Kwiatkowski–Phillips–Schmidt–Shin (KPSS) unit root test.

The ADF test carries out the following regression for the time series: $\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{j=1}^{p} \delta_j \Delta y_{t-j} + \varepsilon_t$. The variables α and β are to account for the possibility of a drift and a stochastic trend in the time series. The additional lags in the regression are to allow for the existence of higher order autoregressive processes. The test for unit root is conducted on γ the coefficient of y_{t-1}. The null hypothesis H_0 tests for $\gamma = 0$ versus the alternate hypothesis of H_1, $\gamma < 0$. Rejection of the null hypothesis implies that the series does not have a unit root. In case the

null hypothesis is not rejected, the series is further differenced and the ADF test conducted until the null hypothesis is rejected. In case the series has an AR structure, then the higher order lag variables capture the AR structure. If the series has an MA structure however, the ADF regression falls short in modeling the MA structure and is an approximation at best. In such a scenario, the Phillips Perron (PP) Unit root test offers an alternative. The PP test unlike the ADF test does not consider lagged difference variables to account for autocorrelation but uses a non-parametric correction for any serial correlation and heteroskedasticity in the error terms. However, the PP test has the drawback that it works well only for large samples. Therefore, additional support for the existence or absence of unit roots is achieved through the KPSS test. The KPSS test is used to complement other unit root tests since it evaluates the null hypothesis of a trend stationary process against an alternative hypothesis of a unit root process. Thus rejection of null in the KPSS test is a strong indicator of the existence of a unit root and complements the ADF test and PP test which are based on non-rejection of null hypothesis for the existence of unit root.

Co-integration Test

When two or more variables follow a first order integrated or I(1) process, if a linear combination of these variables exist such that the residual is I(0) (stationary), then the variables are said to be co-integrated. Co-integration analysis tests for a long run relationship among variables and is necessary to avoid the risk of spurious regression. There are two main procedures for conducting co-integration tests.

Engle and Granger (1987) formulated one of the first tests for co-integration. They suggest a test which consists of estimating the co-integrating regression by Ordinary Least Squares (OLS), estimating the residuals $\hat{u}_t$ and testing the residuals $\hat{u}_t$ for a unit root. The other test, formulated by Johansen (1988, 1991) utilizes the maximum likelihood procedure to determine the presence of co-integrated vectors in non-stationary time series. The null hypothesis H_0 is of no co-integration against the alternative H_1 of existence of co-integration. For the purpose of the current study, the Johansen test of co-integration has been employed. In order to test the time series for co-integration, it is necessary that they all be integrated of first order, i.e. I(1).

Granger Causality

A time series $\{X_t\}$ is said to Granger cause another time series $\{Y_t\}$ if the present value Y_t can be better predicted using lagged values of X_t in addition to lagged values of Y than not doing so. The direction of causality is determined according to whether lagged X variables can better predict Y or vice versa. Instantaneous causality is said to exist in the system when current value of time series X is used to predict current value of Y and not just lagged values of X. There are several tests that are employed to test for Granger causality in econometric series. The current study uses

the methodology suggested by Granger (1969). The test is based on the procedure that is implicitly contained in Granger (1969).

Section V: Variables

Credit

The annual data for credit at a sectoral level, namely, agriculture and allied activities, industry and services has been used for the analysis. Industrial credit has been further broken down into mining and quarrying, manufacturing and others. As credit data at a sectoral level is available only for the period 1973 to 2014, the study has been limited to this time period. The study period for overall bank credit is 1951 to 2014. As credit is in nominal terms, it has been converted to real terms by adjusting it using GDP deflator. Utilizing a methodology similar to Levine et al. (2000), the credit over years 't' and 't-1' has been averaged and expressed as a fraction of real GDP. The natural logarithm of this variable has then been used for further study.
The GDP deflator is calculated for each year using GDP at constant 2004-05 prices to deflate the nominal GDP at current prices. This GDP deflator is subsequently used to deflate the nominal credit data to obtain real credit.

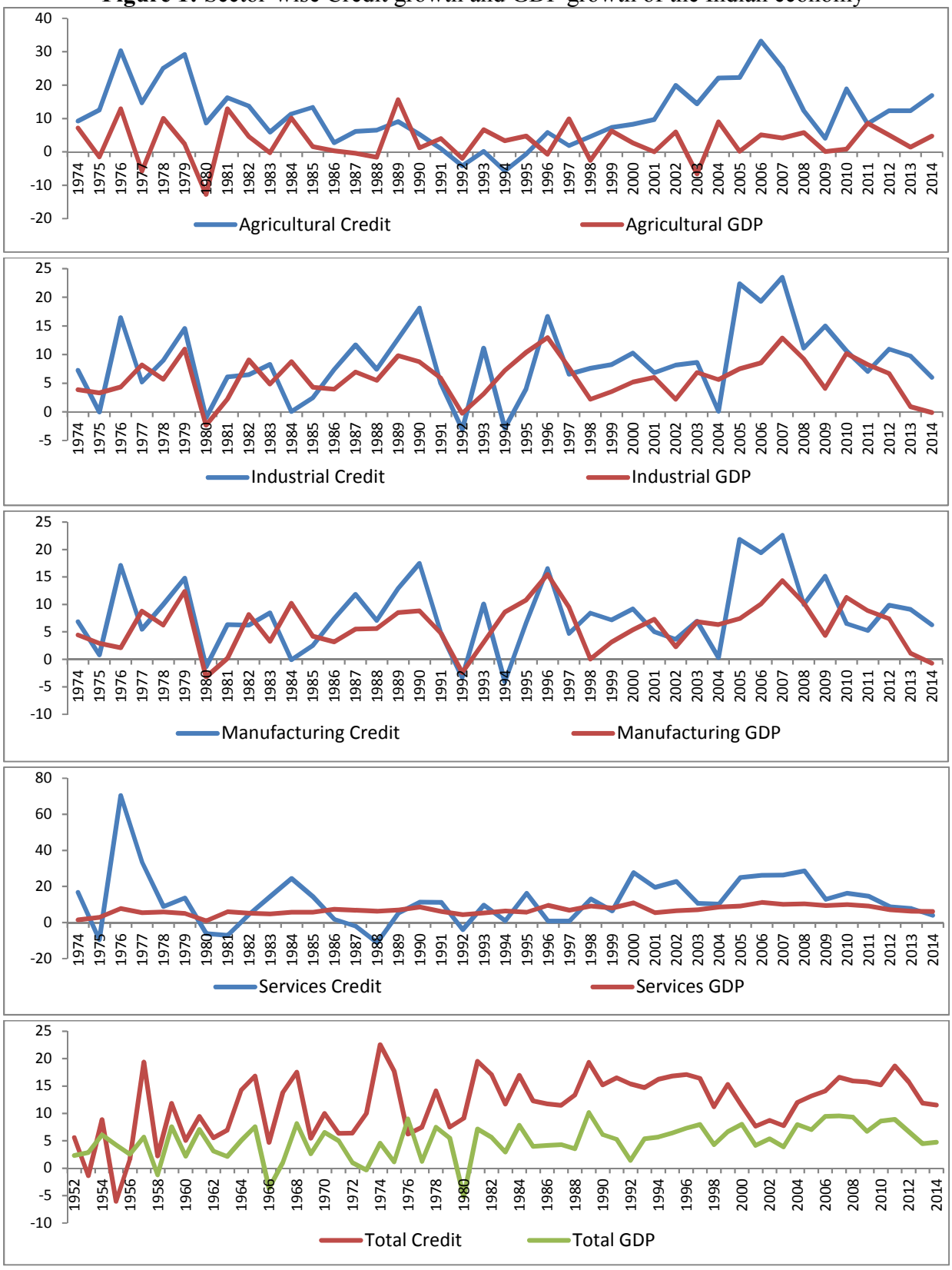
GDP

The annual overall and sectoral data for GDP is based on GDP at factor cost/GVA at basic prices at 2004-05 prices. Despite the base year being revised to 2011-12, the 2004-05 base year data has been considered for this study due to the inherent structural break in the revised base year time series of GDP. For the purpose of sectoral analysis, data from 1973 to 2014 has been captured. For the study at a macro-level, overall GDP data has been used from 1951 to 2014.

Relationship between variables

As Figure 1 indicates, Credit Growth and GDP Growth exhibit a strong correlation across sectors. Both series move together with a reasonable alignment of turning points between Credit growth and GDP growth. The direction of causality however, is not apparent upon a first glance. Econometric analysis of the data using Granger Causality test provides further insight into the relationship. It can also be observed from the figure that the growth of total credit experiences a slowdown and contraction in the early 1990s and really begins to take off in the mid to late 1990s. The economic boom following the liberalization, privatization and globalization policies of the late 1980s to early 1990s may have largely been responsible for this surge in credit. The variables considered for subsequent analysis are tabulated in Table 1.

Figure 1: Sector-wise Credit growth and GDP growth of the Indian economy



Source: Annual Economic Survey; RBI: Basic Statistical Returns relating to banks in India

Table 1: List of variables and their descriptions

Variable Name	Description
LTOTC, LTOTGVA	Log of total credit, total GVA
LAGC, LAGGVA	Log of agricultural credit, agricultural GVA
LSERC, LSERGVA	Log of services credit, services GVA
LINC, LINGVA	Log of industrial credit, Industrial GVA
LMANC, LMANGVA	Log of manufacturing credit, manufacturing GVA
D(Variable name)	First difference of variable under study
DD(Variable name)	Second difference of variable under study

Section VI: Results and Findings

Sectoral Study:

Stationary Tests

The credit growth and GDP growth variables are tested for stationarity using ADF test, PP test and KPSS test. The results of the tests are shown (Table 2).

Table 2: Stationarity tests for variables under consideration

Variable	ADF			PP Test	KPSS Test	
	C	CT	NC		Level	Trend
LAGC	0.8465	0.8017	0.0169**	0.8483	0.01***	0.01***
DLAGC	0.312	0.5782	0.1525	0.01***	0.1	0.01***
DDLAGC(*)	0.01***	0.01***	0.01***	0.01***	0.1	0.1
LAGGVA	0.9591	0.0409**	0.99	0.01***	0.01***	0.1
DLAGGVA(*)	0.01***	0.01***	0.01***	0.01***	0.1	0.1
LINC	0.99	0.9602	0.1132	0.9875	0.01***	0.01***
DLINC(*)	0.0187**	0.0185**	0.0109**	0.0193**	0.0481**	0.1
LINGVA	0.9292	0.1093	0.99	0.367	0.01***	0.01***
DLINGVA(*)	0.01***	0.0152**	0.1221	0.01***	0.1	0.1
LMANC	0.9031	0.366	0.0782*	0.6013	0.01***	0.0158**
DLMANC(*)	0.01***	0.0172**	0.01***	0.0235**	0.1	0.1
LMANGVA	0.9661	0.3397	0.99	0.6259	0.01***	0.01***
DLMANGVA(*)	0.01***	0.01***	0.0742*	0.01***	0.1	0.1
LSERC	0.4205	0.3509	0.1202	0.8413	0.01***	0.01***
DLSERC(*)	0.01***	0.01***	0.01***	0.0933*	0.1	0.0389**
LSERGVA	0.99	0.8892	0.99	0.9628	0.01***	0.01***
DLSERGVA	0.3021	0.2692	0.4513	0.01***	0.01***	0.1
DDLSERGVA(*)	0.01***	0.01***	0.01***	0.01***	0.1	0.1

(*) – Stationary Variables; Level of Significance: *** - 1%, ** - 5%, * - 10%

ADF test and PP test are simultaneously used to determine the level of differencing required to make a series stationary. If there is a conflict between the two tests than KPSS test is used to reach a conclusion. In the case of agricultural variables, conflict arises and it is found that the credit and GVA variables attain stationarity at different levels of differencing. As testing for causality and co-integration between variables having different order of integration involves techniques which are beyond the scope of this paper, the remaining paper focuses on the analysis of the relationship between total credit and GDP, industrial credit and industrial GVA, manufacturing credit and manufacturing GVA.

Johansen Co-integration Test

Johansen test is used to establish the long run relationship between variables. For Johansen tests, it is required that the series be integrated of order 1, that is all the series must be I(1). The levels of the series for industry and manufacturing sectors are considered for the Johansen test as they are both I(1). The results of the co-integration test are shown in Table 3. The results show that the variables for manufacturing credit and manufacturing growth have a long run relationship but industrial variables are not co-integrated.

Table 3: Results of Johansen co-integration tests

Null Hypothesis: No co-integration, r=0

Level of Significance if test statistic is greater than critical value

	10 % LoS	5% LoS	1% LoS	Conclusion
LMANC – LMANGVA	Rejected	Rejected	Not Rejected	Co-integrated 5%
LINC – LINGVA	Not Rejected	Not Rejected	Not Rejected	No Co-integration

Granger Causality Test

Granger Causality test is used to establish the short-run causal relationship between variables. For Granger Causality tests, it is required that the series be trend and zero mean stationary. The series are first made stationary and the mean value of the stationary series is deducted from the series to make it zero mean stationary. The number of lags for Granger Test is selected based on the FPE and AIC criteria given by Akaike (1969, 1974). Table 4 lists the number of lags used for the Granger test. Table 5 lists the results of the Granger causality tests performed on the trend and zero mean stationary variables.

Table 4: Number of Lags used for Granger Causality Test

Variables	Number of Lags	
	AIC	FPE
DLINGVA ⇔ DLINC	2	2
DLMANGVA ⇔ DLMANC	2	2

Table 5: p-value for Directional Granger Causality Test

Variables	P-Value (AIC Lags)	P-Value (FPE Lags)
DLINGVA ➔ DLINC	0.0193**	0.0193**
DLMANGVA ➔ DLMANC	0.0267**	0.0267**
DLINGVA ← DLINC	0.9668	0.9668
DLMANGVA ← DLMANC	0.8782	0.8782

Level of Significance: *** - 1%, ** - 5%, * - 10%

Total Credit and Total GDP Study:

The total GDP data shows a significant change in terms of average growth rate during the 80s-90s. For this study the year 1992 has been chosen as a potential break point. Evidence in support of the choice has been further obtained through a dummy regression of the difference in log levels (growth) of the GDP data at the potential breakpoint. As Table 6 indicates, the dummy is statistically significant at the 1% confidence level.

Table 6: Results of regression of total GDP against a dummy variable

$DLTOTGVA = C_0 + C_1 * D_0$

(D_0 = Dummy variable ➔ 0 for years 1952-1992, 1 for years 1993-2014)

	Estimate	Std. Error	t-value	P-value
Intercept (C_0)	0.0391	0.0044	8.914	1.38×10^{-12}***
Dummy Coefficient (C_1)	0.0261	0.0074	3.549	0.0008***

Data has been split at breakpoint into two series as given below:

Variable	Years
LTOTGVA – Series 1	1952 – 1992
LTOTGVA – Series 2	1993 – 2014
LTOTC – Series 1	1952 – 1992
LTOTC – Series 2	1993 – 2014

Stationary Tests

The credit growth and GDP growth variables are tested for stationarity using ADF test, PP test and KPSS test. The results of the tests are shown (Table 7).

Table 7: Stationarity tests for the variables under consideration

Series 1 – 1952 to 1992

Variable	**ADF**			**PP Test**	**KPSS Test**	
	C	CT	NC		Level	Trend
LTOTC	0.6681	0.2977	0.01***	0.4294	0.01***	0.0619*
DLTOTC(*)	0.01***	0.01***	0.01***	0.01***	0.1	0.1
LTOTGVA	0.99	0.7775	0.99	0.3714	0.01***	0.01***
DLTOTGVA(*)	0.01***	0.01***	0.0447**	0.01***	0.1	0.1

(*) – Stationary Variables; Level of Significance: *** - 1%, ** - 5%, * - 10%

Series 2 – 1993 to 2014

Variable	**ADF**			**PP Test**	**KPSS Test**	
	C	CT	NC		Level	Trend
LTOTC	0.704	0.4387	0.0516*	0.7273	0.01***	0.0237**
DLTOTC	0.2736	0.6875	0.2795	0.7745	0.1	0.01***
DDLTOTC(*)	0.043**	0.1211	0.01***	0.0186**	0.1	0.1
LTOTGVA	0.9371	0.6367	0.99	0.803	0.01***	0.01***
DLTOTGVA	0.322	0.6698	0.4205	0.2542	0.1	0.1
DDLTOTGVA(*)	0.0116**	0.0432**	0.01***	0.01***	0.1	0.1

(*) – Stationary Variables; Level of Significance: *** - 1%, ** - 5%, * - 10%

Johansen Co-integration Test

The results of the co-integration test are shown in Table 8. The results indicate that though there was a long run relationship between overall credit and overall growth from 1952-1992, this does not exist post 1992.

Table 8: Results of Johansen's co-integration test

Null Hypothesis: No co-integration, r=0

Level of Significance if test statistic is greater than critical value; Series 1 – 1952 to 1992

	10 % LoS	5% LoS	1% LoS	Conclusion
LTOTC – LTOTGVA	Rejected	Rejected	Rejected	Co-integrated

Null Hypothesis: No co-integration, r=0

Level of Significance if test statistic is greater than critical value; Series 2 – 1993 – 2014

	10 % LoS	5% LoS	1% LoS	Conclusion
DLTOTC –D LTOTGVA	Not Rejected	Not Rejected	Not Rejected	Not Co-integrated

Granger Causality Test

Table 9 lists the number of lags used for the Granger test. Table 10 lists the results of the Granger causality tests performed on the trend and zero mean stationary variables.

Table 9: Number of Lags used for Granger Causality Test; Series 1 – 1952 to 1992

Variables	Number of Lags	
	AIC	FPE
DLTOTGVA ⇔ DLTOTC	2	2

Number of Lags used for Granger Causality Test; Series 2 – 1993 – 2014

Variables	Number of Lags	
	AIC	FPE
DDLTOTGVA ⇔ DDLTOTC	1	1

Table 10: p-value for Directional Granger Causality Test; Series 1 – 1952 to 1992

Variables	P-Value (AIC Lags)	P-Value (FPE Lags)
DLTOTGVA ➔ DLTOTC	$2.209x10^{-5}$***	$2.209x10^{-5}$***
DLTOTGVA ← DLTOTC	0.3232	0.3232

Level of Significance: *** - 1%, ** - 5%, * - 10%

p-value for Directional Granger Causality Test; Series 2 – 1993 – 2014

Variables	P-Value (AIC Lags)	P-Value (FPE Lags)
DDLTOTGVA ➔ DDLTOTC	0.0413**	0.0413**
DDLTOTGVA ← DDLTOTC	0.497	0.497

Level of Significance: *** - 1%, ** - 5%, * - 10%

Analysis

1. Manufacturing credit and manufacturing GDP have a long term co-integration relationship. This relationship is significant at the 5% level. Broader variables of industrial credit and industrial GDP however are not co-integrated.
2. GDP leads credit for the industrial and manufacturing sectors as per Granger causality test.
3. The overall GDP data at a macro-level exhibits a structural break at 1992. The credit and GDP data has been split into two series – Series 1 (1951-1992) and Series 2 (1993-2014)
    a. Series 1 exhibits a long term co-integration relationship between credit and GDP, while Series 2 exhibits no co-integration
    b. For both Series 1 and Series 2, GDP granger causes credit according to the directional Granger causality tests.

A summary of the results are presented in Table 11.

Table 11: Summary of Conclusions: Test for Granger Causality				
No.	Null Hypothesis	Annual : 1973-2014		
		Lags	p-value	Conclusion
1	DLINGVA ➔ DLINC	2	0.0193**	Yes
2	DLINGVA ← DLINC	2	0.9668	No
3	DLMANGVA ➔ DLMANC	2	0.0267**	Yes
4	DLMANGVA ← DLMANC	2	0.8782	No
		Annual : 1952 – 1992		
5	DLTOTGVA ➔ DLTOTC	2	$2.209x10^{-5}$***	Yes
6	DLTOTGVA ← DLTOTC	2	0.3232	No
		Annual : 1993 - 2014		
7	DLTOTGVA ➔ DLTOTC	1	0.0413**	Yes
8	DLTOTGVA ← DLTOTC	1	0.497	No

Section VII: Conclusion

The study investigates the relationship between credit and GDP for different sectors of the Indian economy. An attempt has been made to estimate whether a long term co-integration relationship exists between credit and GDP. The study also attempts to identify if a causal relationship exists between credit and GDP and the direction of the causality. Johansen test and Granger causality test was used to study the relationship between the variables. The empirical findings suggest that a long term co-integration relationship exists in the manufacturing sector between credit and GDP. Furthermore, this co-integration relationship is also exhibited in the overall GDP and credit data during the initial period of Indian economic growth. This long term relationship breaks down post 1992. However, a short term causal relationship with GDP leading credit exists for the sectoral as well as overall data.

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