

# Determinants of Bank Lending in Nepal

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## Abstract

*Commercial banks constitute a major chunk of total assets in the banking system in Nepal and extension of credit is one of the major functions of banking institutions. If banks are not efficient in their lending behavior, it may not contribute to economic growth. On the other hand, their inefficient and imprudent banking practices may lead to riskier financial instability. The main objective of the study is to test and confirm the effectiveness of the determinants of commercial bank lending behavior in Nepal by using time series Ordinary Least Square regression approach for empirical analysis. The model involves Nepalese commercial banks' private sector credit (pvct) as dependent variable and other variables such as their volume of deposits (dep), interest rate (Ir), stipulated cash reserve requirements ratio (crr), their liquidity ratio (lr), inflation (inf), exchange rate (exr), and gross domestic product (gdp) as independent variables for the period; 1975 – 2014. From the regression analysis, it was found that Gross Domestic Product and liquidity ratio of banks have the greatest impacts on their lending behavior. Granger Causality Test shows the evidence of unidirectional casual relationship from GDP to private sector credit. The study implies that GDP is the barometer of the economy and commercial banks should pay their attention to the overall macro economic situation of the country, factors affecting the GDP in general and their liquidity ratio in particular while taking lending decision.*

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**Key Words:** Commercial Banks, Bank Lending, Economic Growth, Inflation, Deposits, Interest Rate

**JEL Classification:** E23, G21, E43, E64

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## I. INTRODUCTION

The role of credit is considered to be the key to economic growth and financial stability of the economy. Credit is the aggregate amount of funds provided by commercial banks to individuals, business organizations and government. Commercial banks perform the act of financial intermediation that collect money from the surplus sector in the form of deposits and lend it to various sectors of the economy. As Commercial banks constitute a major chunk of total assets in the banking system in Nepal and extension of credit is one of the major functions of banking institution, the study attempts to capture the determinants of lending behavior of commercial banks.

Credit usually represents the bulk of the institution's assets, while interest on the credit represents the major source of income. Loans involve a high degree of risk and have profound impact on the bank's profitability, liquidity and solvency. The quality of a bank's credit points to the soundness and stability of the bank and the risk borne by the depositors and creditors. Poor management of loan portfolio is the major cause of liquidity crises and bank's failures around the world. Although credit growth can spur investment and economic activity, an excessive growth in credit can impact the stability of the financial system by increasing prudential risks at the micro and macro levels (Igan and Pinheiro, 2011).

Lending behavior of bank generally depends on type of bank, the capital base, the deposit base, density of the deposit, interest rate, exchange rate, inflation, gross domestic product, investment portfolio, liquidity, monetary and fiscal phenomena, the credit guidelines issued from time to time by the regulatory authority and internal policies of the banks as well as other non-economic factors. There are supply side and demand side factors determining the banks' lending behavior. This study focuses on the supply side factors. For the banks to balance their main objectives of liquidity, profitability and solvency, credit must be handled efficiently. As credit constitutes a major chunk of bank's assets, the study of the determinants of lending behavior becomes necessary because commercial banks in Nepal need to understand how to manage these huge assets in terms of their loans and advances.

From monetary transmission point of view also, the role of banks' loan and advances is crucial because monetary policy operates through banking performance, especially lending. Excess reserves of commercial banks are taken as an operating target of monetary policy in many countries. Central banks operate Cash Reserve Ratio (CRR), bank rate, as well as Open Market Operations (OMOs) to affect banks' lending capacity. Therefore, central banker as well as policy makers should have adequate and deep understanding about banks' lending behavior and its determinants.

The main objective of the study is to test and confirm the effectiveness of the determinants of commercial bank lending in Nepal. Banks cannot be efficient in their performance just by considering a few factors. It needs an integrated approach including factors related to macro economic situation (including GDP), deposit mobilization, regulator's requirements such as CRR, liquidity ratio, capital adequacy ratio (CAR), Single Obligor Limit (SOL), borrowers' behavior, moral hazard, adverse selection,

international lending standards and credit risk limit. If banks are not efficient in their lending behavior, it may not contribute to economic growth. On the other hand, their inefficient and imprudent banking practices may lead to riskier financial instability.

The study has applied time series ordinary least square regression approach to empirically achieve the objective of the study. The model involves Nepalese commercial banks' private sector credit (pvct) as dependent variable and other variables such as their volume of deposits (dep), interest rate (Ir), stipulated cash reserve requirements ratio (crr), their liquidity ratio (lr), inflation (inf), exchange rate (exr), and gross domestic product (gdp) as independent variable for the period; 1975 – 2014. The model hypothesizes that there is functional relationship between the dependent variable and the specified independent variables.

This study is based on the premise that assessment of the effectiveness of common determinants of lending behavior of commercial banks is prerequisite for any efforts of improving the lending behavior of banks, either it is from central bank, government side or from the bank side. Ultimately they can be linked properly. Many studies (for example, Chodechai 2004, Olokoyo 2011, Olusanya 2012) regarding banks' lending behavior have been carried out in developed countries; however most of those studies do not have any significance in Nepalese context and cannot be applied. This type of study have not been carried out before by any researcher and academic institute of Nepal and thus expected to be the milestone in Nepalese banking academic work.

The study is organized as follows. With this introductory part, the second section presents literature review. The third section highlights the situation of bank lending and its proposed determinants. The fourth section discusses the methodology of the study. The fifth section presents the results while the last section draws a conclusion of the study.

## **II. LITERATURE REVIEW**

The literature has been reviewed to provide an overview of bank lending, lending behavior followed by an analysis of its determinants which directly or indirectly affect it.

Bank credit is the key to economic growth. According to Adedoyin and Sobodun (1991), “lending is undoubtedly the heart of banking business. Therefore, its administration requires considerable skill and dexterity on the part of the bank management”. As banks are responsible to pay interest on deposits, it should of course earn handsome earnings by lending it in various sectors of the economy. In this sense, while lending with the objectives of generating appropriate, sustainable profit, maintaining liquidity and ensuring safety, banks require a high degree of practical policy formulation and application.

The major function of commercial banks is to provide credit. Loan and advances constitute the highest portion of the total assets of banks. It is the main source for generating profit. In the view of Nwankwo (2000), “credit constitutes the largest single income-earning asset in the portfolio of most banks. This explains why banks spend enormous resources to estimate, monitor and manage credit quality”. Therefore the study

of the determinants of banks credit behavior is very crucial for banks to make more sustainable, reputable profit from the credit portfolio.

John (1998) commented that, the ability of commercial banks to promote growth and development depends on the extent to which financial transactions are carried out with trust and confidence and least risk. It means that bank should operate banking transactions in safe and sound manner. If they are involved in insecure and unsound banking practices, they may lose public confidence and trust. In this situation, banks' sustainability and overall financial stability will be at risk.

Ezirim (2005) further stressed that "bank lending decisions generally are fraught with a great deal of risks, which calls for a great deal of caution and tact in this aspect of banking operations. The success of every lending activity to a great extent therefore, hinges on the part of the credit analysts to carry out good credit analysis, presentation, structuring and reporting." Major risk of the banking business lies in the credit function, as there is high possibility of default. Further, there is also regulatory risk. The eye of regulator and supervisor is on credit performance of banks as they deal with public money. Therefore, they should be very careful, clever and ethical in performing lending behavior.

Osayameh (1991), supported this view by stressing that "the days of armchair banking are over and that the increasing trend in bad debts and absence of basic business/corporate advisory services in most Nigerian commercial banks, shows

An apparent lack of use of effective lending and credit administration techniques in these banks." It pointed out that, banking business is not so easy. It requires high degree of knowledge and advisory services with regard to the determinants of lending practices.

Chizea (1994) asserted that "there are certain aspects of fiscal and monetary policies which could affect the decision of the discerning and informed public to patronize the bank and the lending behavior of commercial banks. Paramount amongst these measures is what could be called the interest rate disincentive. Interest rates have been so low in the country that they are negative in real terms". Easy monetary and loose fiscal policy lead to an increase in inflation that reduces the purchasing power of money put in deposit accounts reduces. On the other hand, increase in interest rates would increase inflation rates which discourage the investment. Fiscal policy has also an impact on banks' lending behavior. Increase in government expenditure leads to the increase in bank lending, through its impact on deposits as well as capital expenditure. Government commitment to improve peace and security as well as to encourage the industry, commerce contributes to increase in bank lending. Moreover, tax incentives to banks encourage bank lending.

"Commercial banks are the most important savings mobilization and financial resources allocation institution. Eventually, those roles make them an important phenomenon in economic growth and development. In order for them to perform these roles, it must be realized that banks have the potential, scope and prospects of financial intermediation" (Olokoyo 2011). Therefore banks should pay great attention on some basic principles of credit portfolio management such as liquidity, profitability, security, diversity, spread,

marketability, purpose, need, national priority. In this light, it crucial for banks to assess the effectiveness of various determinants of the commercial bank lending behavior.

The determinants of lending behavior include: the Volume of deposits (Vd) their Investment portfolio (Ip), the presiding interest (lending) rate (Ir), Cash reserve requirement ratio (Rr), and Liquidity ratio (Lr) (Olokoyo 2011). Banks' lending is of course dependent on volume of deposits. Main source of fund for lending in banks is deposits. In Nepal, around 94 percent of sources of fund is mobilized from public and corporate deposits and remaining 6 percent from the shareholders equity. Therefore, deposits have great to play in lending operation in banks. Interest rate especially on lending poses significant impact on lending. Increase in interest rate causes reduction in loan demand and vice versa. Commercial banks have to keep certain percent of their deposit liabilities with central bank in cash form. This is called Cash Reserve Requirement (CRR). Cash in vault is also counted in this. Reserve requirement is one of the most well known and commonly used monetary instruments in the world. The main objective of CRR is to maintain banks' prudential liquidity to meet deposit withdrawal as well as to operate monetary policy efficiently. CRR is fixed by the central bank. In Nepal, CRR for commercial bank is 6 percent for 2014-15.

Ituwe (1983) asserted "A banks ability to grant further advances is checked by the availability of cash in its vault". It also pointed out CRR is the crucial determinant of bank lending.

Alger (1999) emphasized that, a bank should choose not to invest all its available funds in (typically long-term) loans; indeed, it should keep some of the funds in cash (or reserves at the central bank) and/or invest in marketable securities such as Treasury bills and bonds. Goldfeld & Chandler. (1980) (1980) claimed that "commercial banks must pay more attention to liquidity than many other types of financial institutions such as life insurance companies. This results from the high turnover of their debt liabilities. A large part of the gross out payments by a bank is met from current gross receipt of funds in the normal course of business." Liquidity is the main foundation of commercial banking. Commercial banks are just like custodian of public deposits. They have to return back that money upon depositors' request immediately. For that reason, it is necessary for banks to remain adequately liquid. Central bank/regulatory authority usually fixes the liquid assets/deposit ratio for this.

Besides the above mentioned variables, commercial bank lending is largely determined by the economic growth of the country. Economic growth is a positive change in the national income or the level of production of goods and services in a country over a certain period of time. Though private sector credit is said to have great impact on economic growth, several literatures found the positive impact of economic growth and development on bank lending. Some literatures found bidirectional causality between them and some others found unidirectional causality from economic growth to bank lending. Anyway, it can be said that economic growth is considered as one of the major determinants of bank credit. Oluitan, R.(2012) claimed that real output causes financial development, but not vice versa. Increase in gross domestic product means rise in agricultural, industrial, hydro electricity, infrastructure and several other economic

activities which need increase in bank credit on the one hand. On the other hand, increase in national income leads to increase in deposits. Therefore economic growth impacts positively the bank credit. Odedokun (1989) finds the case of unidirectional causality from the real sector to the financial sector. Timsina, N. (2014) shows the evidence of unidirectional casual relationship from GDP to private sector credit.

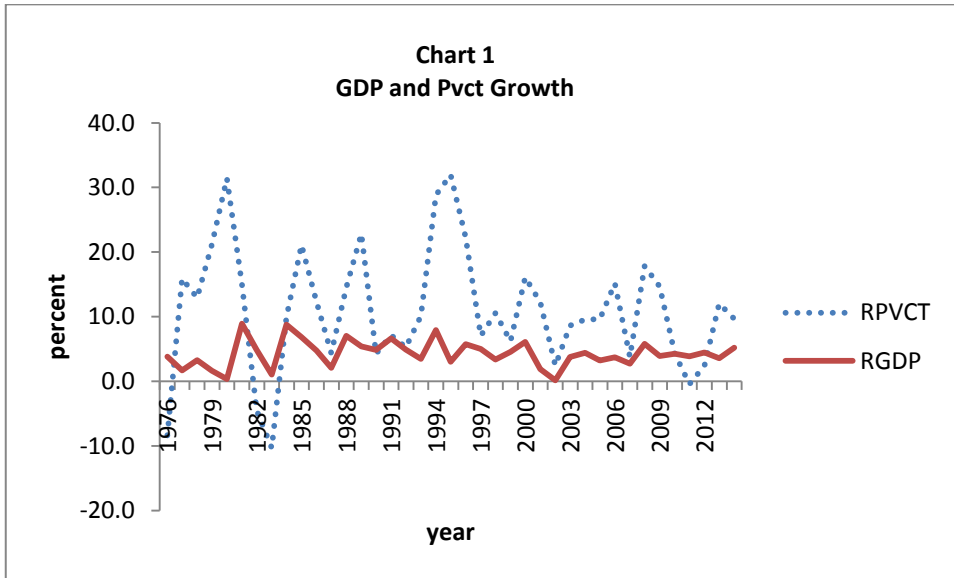
Inflation is another determinant of private sector credit of banks. There are various views expressed in the literature regarding the impact of inflation on real private sector credit. Some authors argue that inflation has negative impact on bank credit where as some advocate in favor of positive impact of inflation. Increase in inflation leads to an increase in nominal interest rate and credit rationing by bank resulting a reduction in investment. Boid, Levine and Smith (2001) claimed that higher inflation implies less long-run financial activity. In economies with high inflation, intermediaries will lend less and allocate capital less effectively. Higher long-run inflation implies lower long-run levels of real activity and/or slower long-run growth rates. The evidence indicates that there is a significant, and economically important, negative relationship between inflation and both banking sector development. As inflation rises, the marginal impact of inflation on banking lending activity and stock market development diminishes rapidly. By studying around 100 countries from 1960 to 1990, Barrow (1995) published his findings that inflation and economic growth were negatively related—higher inflation was associated with lower economic growth.

But there is something strange about the effect of inflation on the banking sector. The effects depend upon important thresholds. Only when inflation rises above some critical level then rationing does occur. At very low rates of inflation, inflation does not cause credit rationing, reduction in investment. This implies that up to some threshold, higher inflation might actually lead to increased real economic activity.

### **III. SITUATION OF BANK LENDING AND ITS DETERMINANTS IN NEPAL**

#### ***Economic Growth***

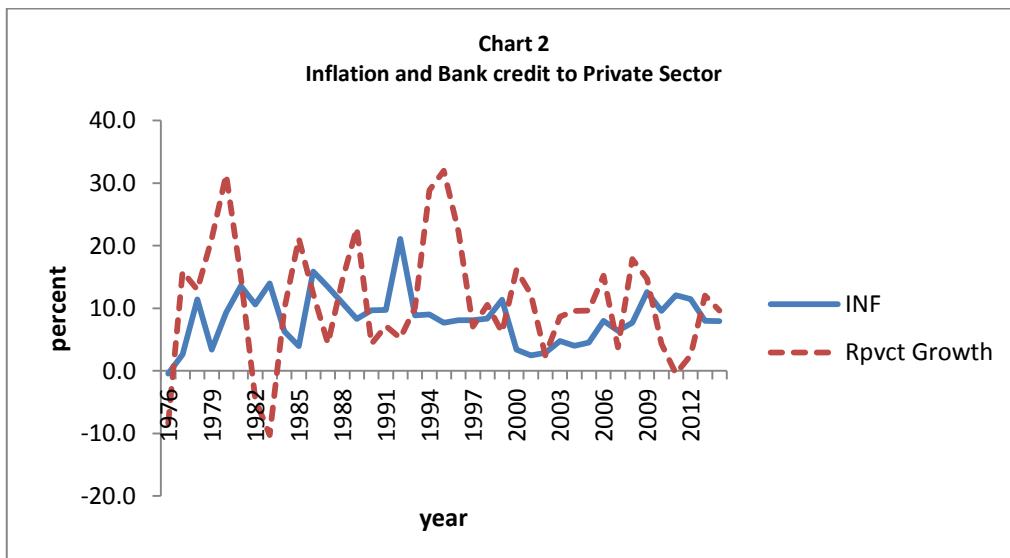
Economic growth has great implication on monetary policy actions and bank lending behavior. As economic growth increases in the country remarkably, investment in industry, agriculture and service sector increases which leads to an increase in private sector credit. Chart 1 shows positive relationship between real GDP growth and private sector credit growth except some years.



Source: Nepal Rastra Bank and author's calculation.

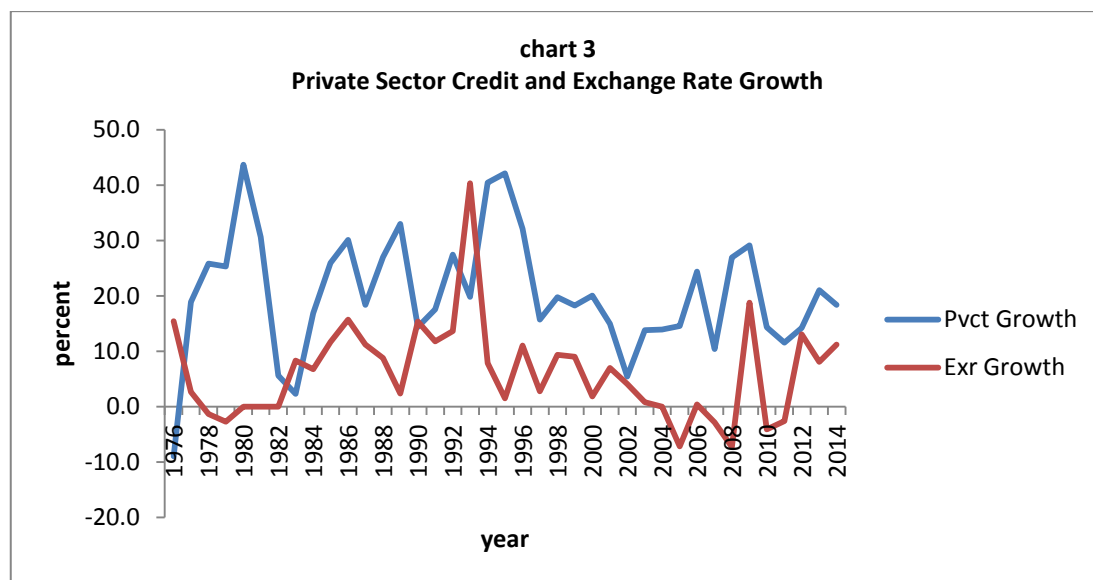
### ***Inflation***

Inflation is another economic variable. Inflation is an increase in the general price level which is typically expressed as an annual percentage rate of change. Generally Inflation has negative impact on private sector credit and economic growth as postulated by theory (up to certain lower rate of inflation, the impact may not be negative). In chart 2 the relationship between inflation and real private sector credit growth has been shown. Except some years, the relationship looks negative.



Source: Nepal Rastra Bank and author's calculation.

### *Exchange Rate*



*Source: Nepal Rastra Bank and author's calculation.*

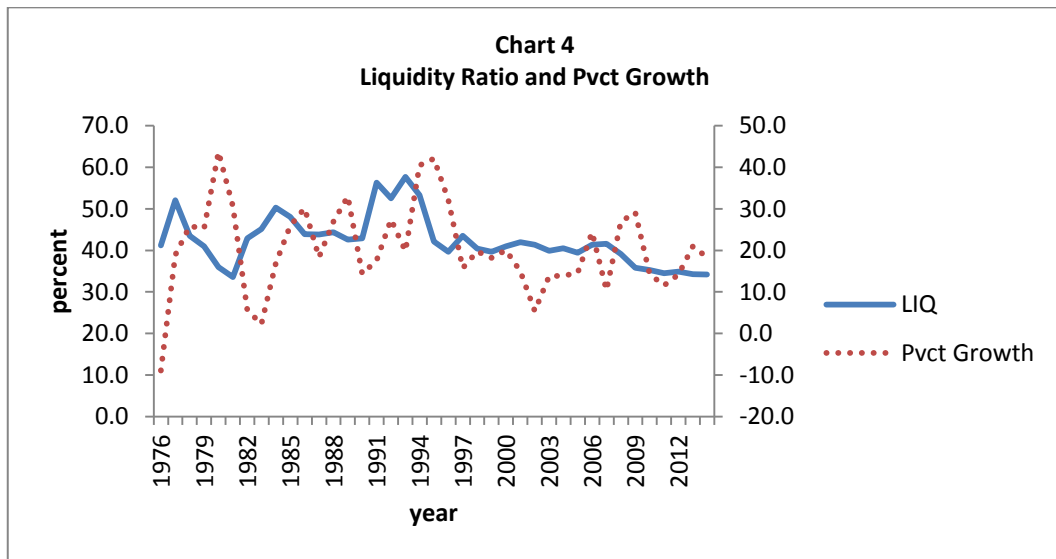
Exchange rate is considered as one of the determinants of banks' lending behavior. Increase in exchange rate means depreciation of Nepalese currency and exchange rate depreciation makes export demand higher and thereby production in the country. On the other hand, remittance inflows increase which results in increase in bank deposit and lending also. In Nepal, in 1975, exchange rate of Nepalese currency per US\$ was Rs 10.6 which increased to Rs 88.6 in 2013 and to Rs 98.2 in 2014. On average, Nepalese currency was depreciated by 6.09 percent against the US\$. Chart 3 shows that except some years, the relationship between exchange rate growth and private sector credit growth is positive.

### *Liquidity*

Liquidity for a bank means the ability to meet its financial obligations as they come due. For this banks should be ready with adequate liquidity with them. Banks should be very careful in their assets liability management to become liquid forever. Liquidity is the base of confidence in the banking business and it has great implication on analyzing bank lending behavior towards monetary policy action. There is inverse relationship between bank liquidity and bank credit, as they have to hold certain portion of their reserves to meet the financial obligation and cannot lend up to this amount.

Major liquidity indicators for the bank are cash reserve ratio, current assets ratio, quick assets ratio, liquid assets to deposit ratio. However, in this study, liquid assets to deposit ratio is taken as the liquidity related indicator.



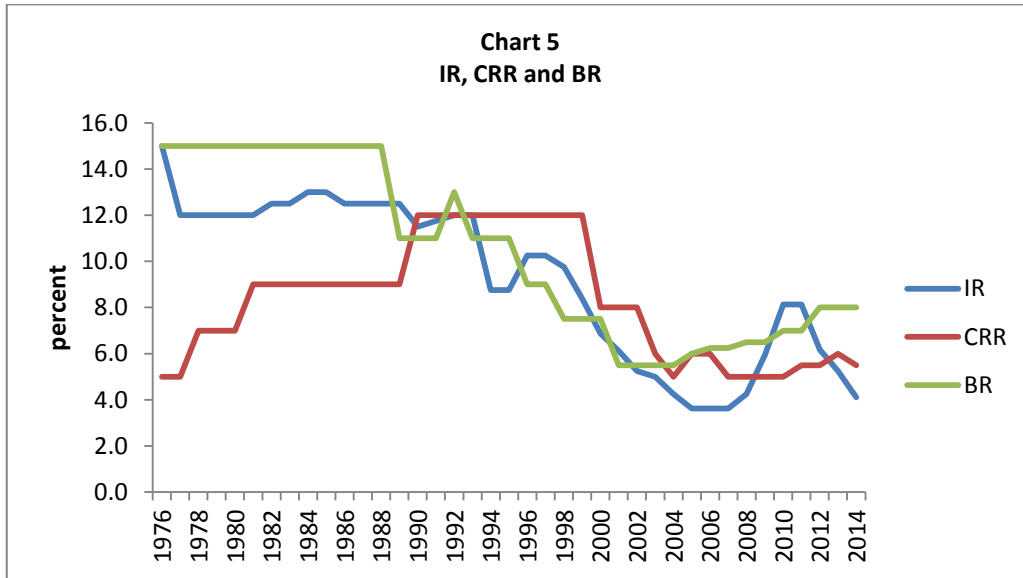


Source: Nepal Rastra Bank and author's calculation.

The chart shows that there is inverse relationship between liquidity ratio and private sector credit growth except some years.

### Cash Reserve Ratio (CRR)

Cash reserve ratio is a monetary policy instrument which is fixed by the central bank to affect the loanable reserves of commercial banks and there by their lending behavior. CRR was 5 percent in 1975 which increased to 7 percent, 9 percent, 12 percent on 1978, 1981 and 1990 respectively. To support relax monetary policy stance to support growth, it decreased to 8 percent, 6 percent and 5 percent in 2000, 2003 and 2004 respectively. To mop up the excess liquidity of the banking sector and to contain the inflation, it increased to 6 percent in 2005. Conversely, to fight liquidity crunch, it declined to 5.5 percent in 2011. However, in 2013, liquidity situation of the banking sector became comfortable and it increased to 6 percent. In 2014, it again declined to 5.5 percent to encourage private sector credit. Therefore, it can be said that CRR is the reflection of commercial bank's excess liquidity position. But it is not changed by the central bank frequently. It is not short term measure. Sometimes, according to the nature of the excess liquidity, the central bank uses to adopt other measures of monetary policy to achieve its objectives.

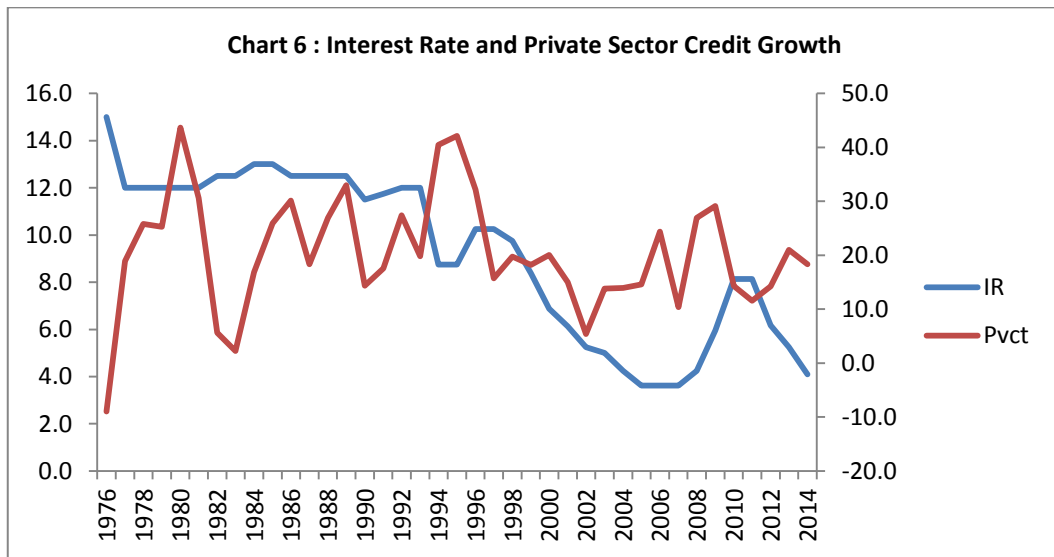


Source: Nepal Rastra Bank and author's calculation.

### ***Saving Interest Rate (IR)***

1 year saving interest rate is taken as the interest rate here in the study. Interest rate was determined by the central bank before the financial liberalization. Commercial banks has no autonomy to decide the interest rate at that period. After the financial liberalization commercial banks were given autonomy in this regard. 1 year saving interest rate depends upon the liquidity of the banking sector. It should depend upon the CRR and Bank Rate (BR) also. However, in reality CRR and BR are effective only if banks depend upon NRB to meet their fund needs. Therefore, IR does not seem to depend fully on the trend of CRR and BR in this figure. However, its after 1995 it seems to follow the trend of CRR and BR to some extent.

Saving interest rate was 15 percent in 1975. Gradually it declined. In 1980, it was 12 percent. In 1985, it was 13 percent. In 1995, it declined to 8.8 percent. In 2005, because of high liquidity in the banking sector, IR declined to 3.6 percent. As IR mostly depends on liquidity situation, as a result of liquidity crunch, interest rate increased to 8.1 percent in 2010 and 2011. Also the CRR increased to 5.5 percent in 2011 from 5 percent from 2010. In 2013, it increased to 6 percent. But in 2014, it declined to 5.5 percent. Also the IR declined to 4.1 percent in 2014. Therefore, IR more or less depends on the CRR. That means commercial banks' lending behavior more or less depends upon monetary policy instrument.

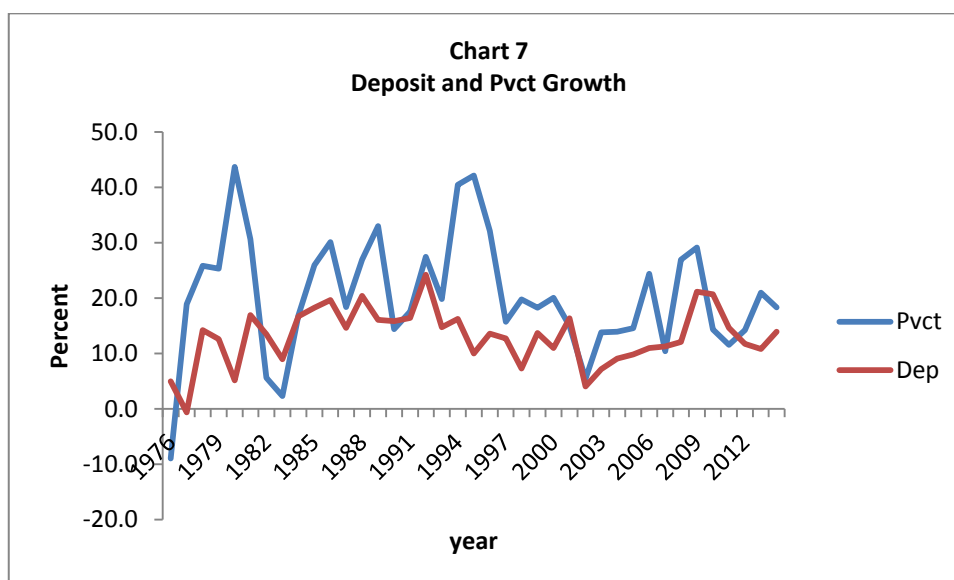


Source: Nepal Rastra Bank and author's calculation.

Generally there is inverse relationship between the private sector credit and interest rate. Chart 6 shows inverse relationship between those two variables only in some years.

### Deposit

Commercial bank's deposit shows a fluctuating growth trend over the study period. In 1976 its growth rate was 36.7 percent which declines to 14.7 percent in 1980. In 1985 deposit increased by 20.7 percent while in 1990, it declined to 15.4 percent. In 1993, it increased to 30 percent while in 2000 it declined to 21.9 percent. In 2009, deposit growth was 30.5 percent. In 2012, deposit increased only by 3 percent. It rose by 16.9 percent in 2013. Growth of deposit mobilization depends mainly upon economic growth, interest rate, inflation, remittance inflows, currency in circulation.



Source: Nepal Rastra Bank and author's calculation.

Deposit is the foundation of the private sector credit. Chart 7 shows the positive relationship between them.

Though there are other determinants of bank lending such as regulations of government and central banks in general and credit to deposit ratio, capital adequacy ratio, single obligor limit, loan to value ratio, level of nonperforming loan etc in particular they are not included in this study due to the lack of time series data.

#### IV. RESEARCH METHODOLOGY

Secondary data that captures the whole population of all commercial banks in Nepal for the period 1975 –2014 are used in the study. Secondary data are gathered from various sources such as Banking and Financial Statistics of NRB, Economic Survey (Ministry of Finance), Quarterly Economic Bulletin (NRB), Commercial Banks' individual website, Annual Bank Supervision Report (NRB), Quarterly Financial Indicators (NRB).

##### *Empirical Model*

The study has applied time series regression (ordinary least square) approach for the empirical measurement of the relationship between the private sector credit and each of the other explanatory variables that have been identified through literature and theory i.e. volume of deposits, interest rate, cash reserve requirement, liquidity ratio, exchange rate, inflation and gross domestic product. Other factors not explicitly included in the model are policy instruments for regulation of banks operation like government policy, monetary authorities' guidelines and past relationship with customers. These are captured by the error term in the model. Further, unit root test for stationary test and co-integration test for long run relationship have been performed.

The model is specified implicitly below:

$$Pvct = f(\text{Dep}, \text{Rgdp}, \text{Liq}, \text{Ir}, \text{Crr}, \text{Inf}, \text{Exr}, u)$$

Where  $u$  contains other variables not explicitly included in the model.

The explicit form of equation above is represented as follows:

$$rpvct_t = \alpha_0 + \alpha_1 \text{Dep}_t - \alpha_2 \text{Ir}_t - \alpha_3 \text{Crr}_t - \alpha_4 \text{Liq}_t + \alpha_5 \text{Exr}_t + \alpha_6 \text{Rgdp}_t - \alpha_7 \text{inf}_t + \mu$$

Where

- $rpvct_t$  : Private Sector Credit at real term
- $\text{Dep}_t$  : Volume of Deposits
- $\text{Rgdp}_t$  : Gross Domestic Product at real term
- $\text{Ir}_t$  : Interest Rate
- $\text{Crr}_t$  : Cash Reserve Ratio
- $\text{Liq}_t$  : Liquidity Ratio
- $\text{Exr}_t$  : Annual Average Official Exchange Rate of the Rupee vis-à-vis the United State's Dollar.
- $\text{Inf}_t$  : Inflation
- $\mu$  : error term controlling for unit-specific residual in the model
- $\alpha_0$  : intercept of the regression line variables.

### ***Unit Root Tests***

As most macroeconomic time series are not stationary at levels (Engle and Granger, 1987), the second step in seeking a methodology for modeling any economic relationship is to ascertain the stationary nature of the variables under scrutiny, otherwise regression results would be spurious (nonsense). Table 1 shows the Augmented Dickey Fuller (ADF) test for all variables under the study.

**Table 1**  
**ADF Test Results (Unit Root Tests)**

Variables	Intercept				Intercept and Trend			
	Level		First Difference		Level		First Difference	
	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
lnrgdp	-0.2191	0.9275	-6.2461	0.0000	--1.5065	0.8103	-6.1634	0.0000
lnrvpct	-0.5403	0.8722	-4.6902	0.0005	-3.0366	0.1361	-4.738	0.0026
lnrdep	-2.985	0.0451	-5.307	0.0001	-2.605	0.2803	-5.507	0.0030
lninf	-0.979	0.7511	-4.731	0.0005	-1.521	0.8046	-4.719	0.0027
lnexr	-0.931	0.768	-4.616	0.0007	-0.765	0.960	-4.531	0.0045
ir	-1.3167	0.6119	-4.6169	0.0006	-2.7912	0.2091	-4.5509	0.0043
crr	-1.271	0.633	-6.642	0.0000	-2.856	0.1873	-6.615	0.0000
liq	-2.327	0.169	-6.642	0.0000	-2.856	0.1873	-6.615	0.0000

Note: A variable is stationary when ADF values exceed the critical values.

Mackinnon critical values for rejection of null hypothesis of a unit root are:

1 % critical value = -3.689

5% critical value = -2.972

10% critical value = -2.625

The figures shown are 't' ratios for which a suggested significance value in the ADF test is -3.0 or below (Dickey and Fuller, 1979, 1981).

ADF statistics in the above table shows that all the variables included found to be I(1) with one variable lnrdep having deterministic trend. Hence, although it can be modeled at first difference with OLS and extracting trend and cycles for trend-stationary variables, this is possible only if variables are not co-integrated. The Johansen co-integration test has been carried out as follows to identify whether there exists a co-integrated relationships.

### ***Cointegration Test***

When a linear combination of variables that are I (1) produces a stationary series, then the variables may need to be cointegrated. This means that long run relationship may exist among them, which connotes that they may wander from one another in the short run but in the long run they will move together. To establish whether long run relationship exists among the variables or not, co integration test using Johansen's multivariate method has been carried out and reported in Table 2.

**Table2**  
**Johansen's Cointegration Test (LNRPVCT LNRGDP LNDEP  
 LNINF LNEXR IR CRR LIQ)**

Hypothesized No. of CE(s)	Trace Statistics			Maximum Eigenvalue		
	Trace Statistic	0.05 Critical Value	P-value	Max-Eigen Statistic	0.05 Critical Value	P-value
None*	154.7028	125.6154	0.0003	50.1485	46.2314	0.0182
At most 1*	104.5544	95.7536	0.0108	33.7002	40.0775	0.2189
At most 2*	70.8541	69.8189	0.0413	25.0962	33.8768	0.3785
At most 3	45.7579	47.8561	0.0777	20.9319	27.5843	0.2804
At most 4	24.8259	29.7971	0.1677	14.7933	21.13162	0.3036
At most 5	10.0327	15.4947	0.2782	9.8426	14.2646	0.2225
At most 6	0.1901	3.8415	0.6629	0.1901	3.8415	0.6629

\* denotes the rejection of null hypothesis at 5 percent level of significance. Trace test indicates 3 cointegrating equations at 0.05 level whereas maximum Eigen Value test indicates 1 cointegrating equation at 0.05 level.

The Johansson cointegration tests for cointegration shows conflicting results with trace test and maximum eigenvalues test. The trace test indicates a 3 cointegration relation, however, eigenvalue shows only one. Hence it is desired to run OLS at first difference.

### ***Granger Causality Test***

A number of studies have been carried out to examine the direction of causality between economic growth and bank lending. Mishra et al (2010) examined the direction of causality between credit market development and economic growth in India through the application of Granger Causality Test and found that credit market development spurs economic growth. Mukhokadhya and Pradhan (2010) assessed the causal relationship between financial development and economic growth of seven Asian developing countries and concluded that no general consensus can be drawn about finance growth relationship in developing countries. Odedokun (1989) found the case of unidirectional causality from the real sector to the financial sector.

Here in the study, Granger Causality Test has been conducted to find out the direction of causality between the private sector credit and variables of interests. The results of Granger Causality Test has been shown in annex 5.

## V. ANALYSIS OF RESULTS

### *Estimation Result*

Our equation

$$d(\lnrpvct_t) = \alpha_0 + \alpha_1 d(\lnrdep_t) - \alpha_2 d(ir_t) - \alpha_3 d(crr_t) - \alpha_4 d(liq_t) + \alpha_5 d(exr_t) + \alpha_6 d(\lnrgdp_t) - \alpha_7 d(\lninf_t) + \mu \quad \dots\dots\dots (1)$$

Results as per the equation

$$d(\lnrpvct_t) = 0.06654 + 0.1159 d(\lnrdep_t) - 0.009 d(ir_t) - 0.006 d(crr_t) - 0.0095 d(liq_t) + 0.0007 d(exr_t) + 1.122 d(\lnrgdp_t) - 0.3591 d(\lninf_t)$$

(0.1473)    (0.5700)            (0.4724)    (0.6716)            (0.0023)

(0.8430)            (0.0980)            (0.4021)

Adjusted R-squared = 0.33 and DW=1.77

Figures in brackets below the coefficients are P-values.

The estimation results of the benchmark specification show that coefficients of real GDP and Liquidity ratio are significant with expected signs with probability of 0.0980 and 0.0023 respectively. There is positive relationship between the real GDP and private sector credit of the banking sector. This means as GDP increases, it leads to an increase in private sector credit also. As GDP is the barometer of the economy and every commercial bank should pay its attention to the overall macro economic situation of the country as well as the factors affecting the GDP. If economy is in boom and GDP growth is impressive, banks can lend more money to private sector without any hesitation and vice versa.

With regard to liquidity ratio, increase in such ratio would lead to a decline in private sector credit but by only nominal ratio. All other independent variables - deposit, CRR, IR, exchange rate and inflation seem to have expected sign. Results show that increase in domestic deposit leads to an increase in real private sector credit. However the coefficient is not significant. Increase in CRR and IR leads to a decline in private sector credit, which is theoretically also correct. However their coefficients are also not significant. It means that bank lending in Nepal is not much sensitive to cash reserve ratio and interest rate. It is because of interest insensitive investment pattern and provision of banks' liquid assets to deposit ratio also. Inflation has negative impact on real private sector credit as per the results and it is theoretically also correct. However, inflation coefficient is not significant. Exchange rate appears to have positive impact on private sector credit which is theoretically correct but with insignificant coefficient.

Durbin Watson is 1.77 which is considered quite good in the test. From the results, it can be said that the major determinant of bank lending in Nepal is economic growth (real GDP growth). Second important determinant is liquidity ratio to be maintained by the commercial banks. Inverse relationship between bank's liquid assets to deposit ratio and private sector credit is found. If regulatory authority increases liquid assets to deposit



ratio, then banks' credit capacity squeezes. Banks in this situation should pay more attention on limiting the private sector credit to maintain the liquidity on the one hand and on inventing the areas of lending if liquidity ratio is high on the other.

R squared (0.30) is not so high in this model. The dominance of informal sector credit even up to now, low banking practices in rural agricultural areas, interest insensitive investment pattern in Nepal, political instability, lack of investment friendly environment and various other non-economic factors may play role for this low R squared ratio.

### ***Results of Granger Causality Test***

The Granger Causality Test shows the evidence of unidirectional casual relationship from GDP to private sector credit but bi-directional casual relationship between private sector credit and liquidity (annex 5).

With lag structure at 2 lags, the estimated F-stat strongly suggests that real GDP does Granger causes the bank lending to private sector but the other way is not true. Hence, the preliminary relationship is in line as expected.

## **VI. CONCLUSION AND RECOMMENDATIONS**

The role of credit is considered to be the key to economic growth especially in developing countries as it lubricates the economy. As Commercial banks constitute a major chunk of total assets and total deposits in the banking system in Nepal and extension of credit is one of the major functions of banking institution, the study attempts to capture the determinants of lending behavior of commercial banks. The study applied time series ordinary least square regression model for empirical analysis.

Study shows that commercial banks' lending is mostly determined by the gross domestic product of the country and liquidity ratio to be maintained by the commercial banks. As there is significant positive relationship between GDP and private sector credit of commercial banks, they should take in to account the overall macroeconomic situation and factors affecting the GDP in general and their liquidity ratio in particular while taking lending decision. If macro economic situation is conducive and supportive, banking performance is enhanced and good lending behavior guaranteed.

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**Annex 1: Major Monetary, Banking and Economic Variables**

Year	GDP	Deposit	Interest Rate %	Inflation Index	Liquidity %	CRR %	Exchange Rate (Nrs per US\$)	Pvct
1975	16571.0	1174.0	15.0	11.2	42.3	5.0	10.6	761.8
1976	17394.0	1605.2	15.0	11.2	41.2	5.0	12.2	693.6
1977	17280.0	2146.8	12.0	11.4	52.1	5.0	12.5	824.7
1978	19732.0	2528.5	12.0	12.7	43.5	7.0	12.3	1037.6
1979	22215.0	2920.9	12.0	13.2	41.0	7.0	12.0	1299.9
1980	23351.0	3351.6	12.0	14.4	36.0	7.0	12.0	1867.6
1981	27307.0	4160.2	12.0	16.4	33.6	9.0	12.0	2439.3
1982	30988.0	4935.4	12.5	18.1	42.9	9.0	12.0	2576.3
1983	33761.0	6308.4	12.5	20.6	45.1	9.0	13.0	2634.8
1984	39390.0	7091.2	13.0	21.9	50.3	9.0	13.9	3079.2
1985	46587.0	8560.1	13.0	22.8	48.1	9.0	15.5	3877.3
1986	55734.0	10315.4	12.5	26.4	43.9	9.0	17.9	5044.9
1987	63864.0	11900.5	12.5	30.0	43.8	9.0	19.9	5970.7
1988	76906.0	14996.2	12.5	33.2	44.4	9.0	21.7	7579.6
1989	89270.0	19008.6	12.5	36.0	42.6	9.0	22.2	10079.8
1990	103416.0	21942.5	11.5	39.5	42.9	12.0	25.6	11527.2
1991	120370.0	26804.9	11.8	43.3	56.3	12.0	28.6	13553.1
1992	149487.0	33686.1	12.0	52.4	52.5	12.0	32.5	17269.3
1993	171474.0	43777.9	12.0	57.1	57.7	12.0	45.7	20694.7
1994	199272.0	52304.8	8.8	62.2	53.3	12.0	49.3	29067.6
1995	219175.0	61164.1	8.8	67.0	42.1	12.0	50.0	41309.2
1996	248913.0	71346.2	10.3	72.4	39.7	12.0	55.5	54584.8
1997	280513.0	81660.6	10.3	78.3	43.5	12.0	57.0	63169.7
1998	300845.0	102543.6	9.8	84.8	40.4	12.0	62.3	75643.9
1999	342036.0	127062.9	8.4	94.4	39.7	12.0	67.9	89433.1
2000	379488.0	154940.8	6.9	97.6	41.0	8.0	69.2	107343.1
2001	441519.0	181674.9	6.1	100.0	42.0	8.0	74.0	123417.4
2002	459443.0	184331.1	5.3	102.9	41.4	8.0	77.0	130088.4
2003	492231.0	203296.9	5.0	107.8	39.9	7.0	77.7	148073.2
2004	536749.0	233292.8	4.3	112.1	40.5	7.0	77.7	168692.8
2005	589412.0	251008.0	3.6	117.2	39.4	6.0	72.1	193270.0
2006	654084.0	290557.9	3.6	126.5	41.4	6.0	72.4	240631.9
2007	727827.0	336792.7	3.6	134.6	41.6	5.0	70.3	265360.6
2008	815658.0	423488.4	4.3	145.0	39.1	5.0	65.2	336781.0
2009	988272.0	552856.9	6.0	163.2	35.8	5.0	77.4	434912.7
2010	1192774.0	617466.3	8.1	178.9	35.3	5.0	74.2	497139.8
2011	1366954.0	676442.1	8.1	200.5	34.5	5.5	72.3	554589.0
2012	1527344.0	696946.4	6.2	223.5	34.9	5.5	81.7	63360.8
2013	1692643.0	815037.4	5.3	241.3	34.3	6.0	88.3	766327.2
2014	1928517.0	898256.6	4.1	260.5	34.2	5.5	98.2	906852

**Annex 2: Ordinary Least Square Results**

Dependent Variable: D(LNRPVCT)

Method: Least Squares

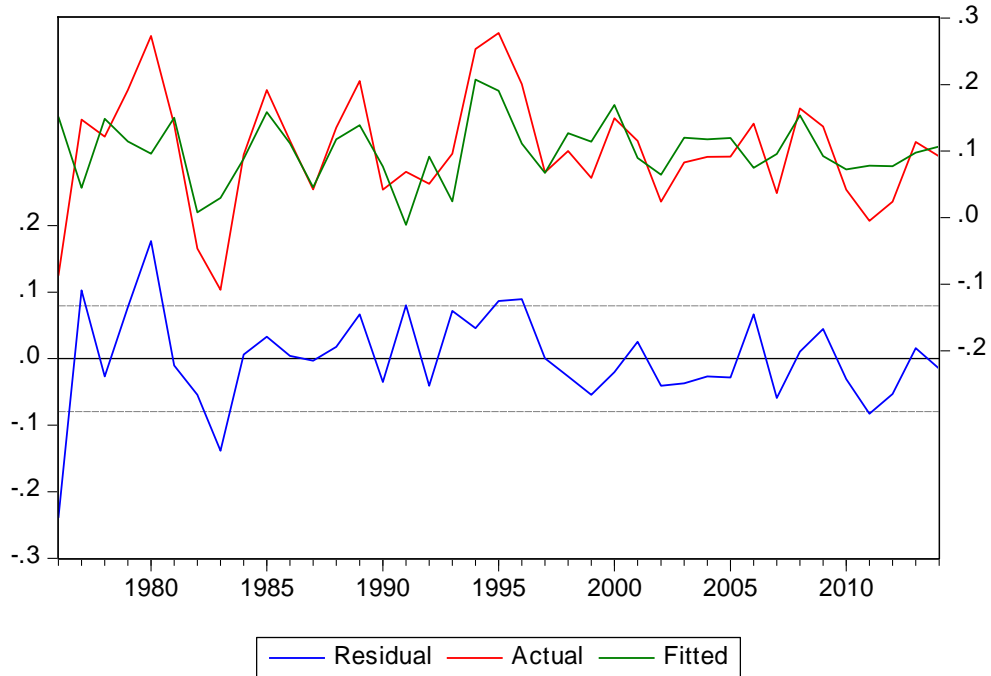
Date: 10/31/14 Time: 13:00

Sample (adjusted): 1976 2014

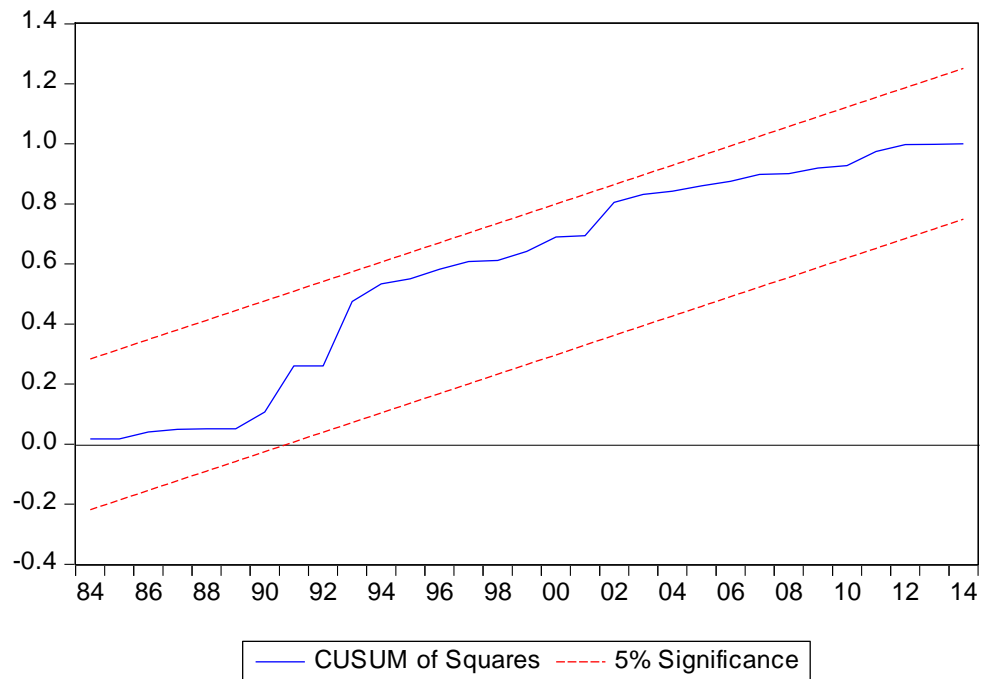
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.066542	0.049147	1.353931	0.1473
D(LNRGDP)	1.122624	0.675665	1.661509	0.0980
D(LNINF)	-0.359052	0.422671	-0.849483	0.4021
D(IR)	-0.009496	0.013053	-0.727519	0.4724
D(EXR)	0.000670	0.003353	0.199768	0.8430
D(LIQ)	-0.009532	0.002940	-3.242102	0.0023
D(CRR)	-0.006000	0.014019	-0.427963	0.6716
D(LNRDEP)	0.115888	0.201814	0.574230	0.5700
R-squared	0.298819	Mean dependent var		0.100965
Adjusted R-squared	0.186787	S.D. dependent var		0.086136
S.E. of regression	0.079857	Akaike info criterion		-2.036487
Sum squared resid	0.197689	Schwarz criterion		-1.695243
Log likelihood	47.71149	Hannan-Quinn criter.		-1.914052
F-statistic	1.887300	Durbin-Watson stat		1.770991
Prob(F-statistic)	0.105738			

### Annex 3: Residual Test



### annex 4: Stability Test



**Annex 5: Granger Causality Test Results**

Pairwise Granger Causality Tests

Date: 10/31/14 Time: 13:11

Sample: 1975 2014

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNRDEP does not Granger Cause LNRGDP	38	0.38360	0.6844
LNRGDP does not Granger Cause LNRDEP		3.60847	0.0383
LNINF does not Granger Cause LNRGDP	38	7.05263	0.0028
LNRGDP does not Granger Cause LNINF		1.12418	0.3370
LNRPVCT does not Granger Cause LNRGDP	38	0.01003	0.9900
LNRGDP does not Granger Cause LNRPVCT		7.56887	0.0020
LIQ does not Granger Cause LNRGDP	38	0.13987	0.8700
LNRGDP does not Granger Cause LIQ		1.96204	0.1566
IR does not Granger Cause LNRGDP	38	1.44771	0.2497
LNRGDP does not Granger Cause IR		4.26202	0.0226
CRR does not Granger Cause LNRGDP	38	1.87931	0.1687
LNRGDP does not Granger Cause CRR		2.73648	0.0795
EXR does not Granger Cause LNRGDP	38	3.05532	0.0606
LNRGDP does not Granger Cause EXR		3.84204	0.0316
LNINF does not Granger Cause LNRDEP	38	2.72455	0.0803
LNRDEP does not Granger Cause LNINF		0.56896	0.5716
LNRPVCT does not Granger Cause LNRDEP	38	2.08607	0.1402
LNRDEP does not Granger Cause LNRPVCT		2.64236	0.0862
LIQ does not Granger Cause LNRDEP	38	0.25411	0.7771
LNRDEP does not Granger Cause LIQ		1.83254	0.1759
IR does not Granger Cause LNRDEP	38	0.25106	0.7795
LNRDEP does not Granger Cause IR		3.57315	0.0394
CRR does not Granger Cause LNRDEP	38	1.09436	0.3466
LNRDEP does not Granger Cause CRR		2.74954	0.0786
EXR does not Granger Cause LNRDEP	38	0.67151	0.5178
LNRDEP does not Granger Cause EXR		1.43934	0.2516
LNRPVCT does not Granger Cause LNINF	38	1.01446	0.3736
LNINF does not Granger Cause LNRPVCT		7.28688	0.0024

Null Hypothesis:	Obs	F-Statistic	Prob.
LIQ does not Granger Cause LNINF LNINF does not Granger Cause LIQ	38	1.85237 2.49348	0.1728 0.0981
IR does not Granger Cause LNINF LNINF does not Granger Cause IR	38	1.00487 8.91713	0.3770 0.0008
CRR does not Granger Cause LNINF LNINF does not Granger Cause CRR	38	0.05602 2.71034	0.9456 0.0813
EXR does not Granger Cause LNINF LNINF does not Granger Cause EXR	38	5.78770 4.93292	0.0070 0.0134
LIQ does not Granger Cause LNRPVCT LNRPVCT does not Granger Cause LIQ	38	5.88248 10.1033	0.0065 0.0004
IR does not Granger Cause LNRPVCT LNRPVCT does not Granger Cause IR	38	1.60395 5.03631	0.2164 0.0123
CRR does not Granger Cause LNRPVCT LNRPVCT does not Granger Cause CRR	38	0.66180 5.39568	0.5226 0.0094
EXR does not Granger Cause LNRPVCT LNRPVCT does not Granger Cause EXR	38	2.47267 1.65318	0.0999 0.2069
IR does not Granger Cause LIQ LIQ does not Granger Cause IR	38	3.14599 0.57317	0.0562 0.5692
CRR does not Granger Cause LIQ LIQ does not Granger Cause CRR	38	3.36748 1.04230	0.0467 0.3640
EXR does not Granger Cause LIQ LIQ does not Granger Cause EXR	38	2.50330 0.39930	0.0972 0.6740
CRR does not Granger Cause IR IR does not Granger Cause CRR	38	0.39645 4.34112	0.6759 0.0212
EXR does not Granger Cause IR IR does not Granger Cause EXR	38	9.75752 2.67991	0.0005 0.0835
EXR does not Granger Cause CRR CRR does not Granger Cause EXR	38	4.29350 1.24969	0.0220 0.2998