ESTIMATING PRODUCTION FUNCTION USING TIME-SERIES ANALYSIS IN NEPAL

A Thesis

Submitted to the Central Department of Economics,

Faculty of Humanities and Social Sciences,

Tribhuvan University, Nepal,

in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF ARTS

in

ECONOMICS

By

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February, 2023

DECLARATION

I, BigyanChapagain, author of this proposed thesis, declare that this thesis entitled ESTIMATING PRODUCTION FUNCTION USING TIME-SERIES ANALYSIS IN NEPALsubmitted to Central Department of Economics is my own original workunless otherwise indicated or acknowledged in the thesis.The thesis does not contain materials which has been accepted or submitted for any other degree at the University or other institution. All sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

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LETTER OF RECOMMENDATION

This thesis entitled ESTIMATING PRODUCTION FUNCTION USING TIME-SERIES ANALYSIS IN NEPAL has been prepared by Mr. BigyanChapagain under my guidance and supervision. I, hereby, recommend it in partial fulfilment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS for final examination.

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APPROVAL SHEET

We certify that this thesis entitled ESTIMATING PRODUCTION FUNCTION USING TIME-SERIES ANALYSIS IN NEPALsubmitted by BigyanChapagain to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfilment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Thus, we accept this thesis as a part of the said degree.

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ACKNOWLEDGEMENT

The past years in Central Department of Economics, Tribhuvan University has been quite a ride for me since it has taught me how to think out of the box rather than being confined to few textbooks. The master's program at Central Department of Economics, Tribhuvan University has not only been about teaching the textbooks and preparing students like us for the exams, but also about involving students in discussions, seminars and research studies which are beyond the syllabus. I take this opportunity to express my sincere gratitude towards the entire faculties and staffs at CEDECON, TU who have always worked hard in favor of students for our own growth. I would like to express my deepest gratitude towards my mentor and supervisor Dr. Nirmal Kumar Raut, Central Department of Economics, Tribhuvan University towards whom I am very much indebted. Lastly, I would also like to thank my family members, friends and all my professional acquaintances who have pushed me in this journeyI would like to thank my friends Anup Acharya, Hemant Panthi, Mohan Khanal, Sanjeet Thapa, Shreezal G.C, Sandeep Sharma, Manab Prakash, who have helped me through this. Last but not the least I would like to thank Deepti Poudel as well.

ABSTRACT

Examining the long-run equilibrium of a country along with identification of significant policy instruments is essential for a developing country like Nepal which has struggled to utilize its production and export potential. A country requires different fiscal and monetary instruments so that long-run equilibrium can be maintained in an economy. Since a growth model includes all the necessary inputs that is required to maintain a long-term growth, this study utilizes an endogenous growth model so that the long-run equilibrium can be assessed and significant determinants of national output can be pointed out. We incorporate time series dataset from 1975 to 2018 obtained from the quarterly bulletin of Nepal Rastra Bank except for export and net import which were taken from Ministry of Finance's macroeconomic dashboard. We find stable long run equilibrium explaining the economic growth in Nepal. We also find that gross fixed capital formation, export and domestic credit increases national output in the long-run. Thus, it is necessary for a low-income country like Nepal to utilize its investment and production potential in economic growth. Moreover, domestic credit plays an instrumental role to increase the production in Nepal. Even though export accounts for just 3.3% of the GDP as compared to imports (36% of GDP), our results are robust to explain that export is one of the major policy determinants to expand the national output.

TABLE OF CONTENTS

DECLARATION i

ACKNOWLEDGEMENT iv

ABSTRACT v

LIST OF TABLES ix

LIST OF FIGURES x

LIST OF ABBREVIATIONS xi

CHAPTER I 1

INTRODUCTION 1

1.1 Background 1

1.1.1 History of Nepalese financial system 2

1.2 Statement of the problem 3

1.3 Objective of the study 4

1.4. Hypothesis of the Study 5

1.5 Significance of the study 5

1.6 Limitation of the study 5

CHAPTER II 7

LITERATURE REVIEW 7

2.1 Theoretical review 7

2.1.1 Harrod- Domar growth theory 7

2.1.2 Solow growth theory 8

2.1.3 Endogenous Growth Theories 9

2.1.4 Methodological review 9

2.2 Review of international empirical studies 10

2.3 Review of national empirical studies 14

2.5 Research gap 18

CHAPTER III 19
METHODOLOGY 19
3.1 Theoretical Framework 19
3.2 Analytical framework 20
3.3 Econometric framework 21
3.4 Empirical Strategy 23
3.4.1 Unit Root Tests 24
3.4.2 Lag length criteria 26
3.4.3 ARDL Model 26
3.4.4 Bounds test for cointegration 27
3.4.5 Diagnostic test 27
3.4.6 Toda-Yamamoto Granger causality test 27
3.5 Data and variables 28
3.5.1 Definitions of variables 28
CHAPTER IV 29
RESULTS AND DISCUSSION 29
4.1 Time series graph 29
4.2 Descriptive statistics 30
4.3 VAR Lag Length Criteria 31
4.4 Unit root test 32
4.5 Zivot-Andrews Structural Break Unit Root Test 34
4.6 Bounds Test for cointegration 35
4.7 ARDL Long run coefficients 35
4.8 ARDL Short run coefficients 36
4.9 Diagnostic Tests 37
4.10 CUSUM and CUSUM Square plots 37
4.11 Toda Yamamoto Granger causality test 38

CHAPTER V. 40
SUMMARY, CONCLUSION AND POLICY IMPLICATIONS 40
5.1 Summary 40
5.2 Conclusion 41
5.3 Policy Recommendations 43
REFERENCES 44
ANNEX 48

LIST OF TABLES

Table 3.1: Variables definition 28
Table 4.1: Descriptive Statistics 31
Table 4.2: Lag Length Selection Criterion 31
Table 4.3: Unit Root Test.....32
Table 4.4: Phillips-Perron Test 33
Table 4.5: KPSS Test.....33
Table 4.6: Structural Break Unit Root Test 34
Table 4.7: Cointegration Bound Test.....35
Table 4.8: ARDL (1,0,0,0,1) Long run coefficients 35
Table 4.9: ARDL (1,0,0,0,1) Short Run Coefficients.....36
Table 4.10: Diagnostic Tests.....37

LIST OF FIGURES

Figure 1.1: Time series graph of GDP and domestic credit(% of GDP)..…….4
Figure 3.1: Analytical Framework.....19
Figure 4.1: Time series graph 28
Figure 4.2: CUSUM and CUSUMQ.....38

LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ARDL	Auto-Regressive Distribution Lag
AIC	Akaike information criteria
C-D	Cobb Douglas
DOMCRE	Domestic Credit
ECM	Error Correction model
ECT	Error Correction Term
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GDS	Gross Domestic Saving
GFCF	Gross Fixed Capital Formation
HQ	Hannan-Quinn
KPSS	Kwiatkowski–Phillips–Schmidt–Shin
LM	Lagrange Multiplier
MoF	Ministry of Finance
NPC	National Planning Commission
NRB	Nepal Rastra Bank
OLS	Ordinary Least Squares
PoP	Population
PP	Phillips-Perron
SBC/SC	Schwarz Bayesian Criterion
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
ZA	Zivot-Andrews

CHAPTER I

INTRODUCTION

1.1 Background

The growth of a nation's economy can be driven by financial development and trade liberalization, which are seen as major factors in increasing production of goods and services over time. Exogenous growth theories, which do not consider total factor productivity, have been unable to fully explain the acceleration of economic growth. In response, Romer (1986) and Lucas Jr (1988)developed the endogenous growth theory, which highlights the role of human capital, through learning and education, and technological advancements as endogenous factors that contribute to economic growth. Financial development, capital investment, and technological innovations all play a direct or indirect role in driving economic growth. Additionally, financial development and trade liberalization facilitate the smooth flow of goods and services, as well as the transfer of technology and knowledge.

Credit is a key tool used by individuals, businesses, and governments for a variety of purposes. Individuals may use credit for both consumption and investment, while organizations and firms may use credit to expand production, invest in machinery and technology, and increase productivity. Governments also borrow loans for both capital and recurring expenses. Credit is the act of a lender providing a loan to a borrower, which must be repaid at a later time. The economic activity of a nation is impacted by production, consumption, and capital formation, and credit helps to finance these activities and maintain a smooth flow of economic activity. To promote economic growth, it is important to channel available credit towards the investment sector.

The capital market and credit market both affect economic growth, but the credit market has a more significant impact on the growth of the real sector(Durusu-Ciftci et al., 2017). The current financial market in Nepal includes banks and non-banking financial institutions, the credit market, and the insurance sector. However, the capital market has not had a significant impact in the financial market as it is still in its early stages, having only begun operating in 1994 (Bist&Bista, 2018). Nepal's economy is

largely bank-based, with banks and financial institutions being the dominant players in financial activities. According to the Financial Access Report published by Nepal Rastra Bank in 2021 shows that out of total popolatio almost 67.3% people have atleast one unique account. In this study, the availability of domestic credit is used as a proxy for financial development. Other studies have also used credit as a proxy for financial development (Bist&Bista, 2018; de Gregorio &Guidotti, 1995; Panthi, 2021a; Yakubu &Affoi, 2014a).Khan &Senhadji, (2000) consider narrow (M1) and broad (M2) money to be poor proxies for financial development. Similarly, other studies argued that credit to the private sector is a better representation of financial development, as it shows the movement of funds from savers to borrowers(Beck et al., 2000; Levine et al., 2000).

Domestic credit and financial development are closely linked, as the availability of domestic credit can significantly impact the growth and development of a nation's economy. (Begum & Aziz, 2019; M. A. Khan, 2008; Mishra et al., 2009). Financial development refers to the expansion and growth of a country's financial system, including the growth of financial markets and intermediaries such as banks and other lenders, as well as the increase in the availability of financial products and services. Domestic credit can contribute to financial development in several ways. An increase in domestic credit can help fund necessary investment and drive economic growth by providing households and businesses with the financial resources they need to make purchases, invest in new ventures, and expand their operations. This can increase the availability of credit and facilitate the flow of financial resources within the economy (Gautam, 2014; Panthi, 2021; Pradhan, 2009).

1.1.1 History of Nepalese financial system

The modern financial sector in Nepal began to develop in the mid-20th century with the establishment of the Nepal Bank Limited in 1937, which was the country's first bank. Along with the establishment of the Nepal Rastra Bank (NRB) in 1956 as the central bank, responsible for regulating and supervising the banking sector and issuing currency, Nepal saw significant economic reforms in the 1980s and 1990s, including the liberalization of the financial sector. This led to the establishment of more commercial banks and the development of non-bank financial institutions such as microfinance institutions and insurance companies. The government also introduced various plans and policies to advance the financial development of the country,

including the establishment of the Nepal Industrial Development Corporation in 1959, the Rastriya Banijya Bank in 1966, and the Agriculture Development Bank in 1968. The first joint-venture bank, the Nepal Arab Bank Limited, was established in 1984.

In its early stages, the central bank in Nepal did not have much authority to govern financial institutions(Acharya, 2003). However, there were some limitations on the central bank's control. The first act of the Nepal Rastra Bank, known as the NRB Act 1955, did not provide the central bank with much authority to control and govern financial institutions. However, the NRB Act 2002 was later enacted, replacing the previous NRB Act 1955, and gave the central bank more autonomy in making decisions related to the formulation of monetary and foreign exchange policy. Since then, the Nepal Rastra bank has been responsible for monitoring and regulating banking and financial institutions throughout the country to ensure their smooth and efficient operation.

To improve the financial system within the country, the Company Act 1964, Finance Company Act 1985, and Development Bank Act 1996 were enacted to facilitate the establishment of newer financial institutions such as development banks, finance companies, microcredit development banks, saving and credit cooperatives, and NGOs with limited banking transactions. The second and third joint venture banks in Nepal, Nepal Indosuez Bank (later named Nepal Investment Bank) and Grindlays Bank (now Standard Chartered Bank), were established in 1986 and 1987, respectively. Since then, various reforms and policies have been implemented to allow for the entry of more financial institutions into the market. However, this led to an increase in the number of financial institutions without an improvement in efficiency. To address this, the central bank recently enacted the Merger and Acquisition Act 2011, which required financial institutions to merge or be acquired in order to increase their paid-up capital. The Merger and Acquisition Act 2016 was then introduced to replace the previous act and ensure that companies with low capital either merge or are acquired by other financial institutions in order to meet the capital requirements set by the central bank.

1.2 Statement of the problem

Nepal aims to reach average economic growth rate at 9.6%(NPC/GoN, 2020). In order to reach the set target there is a need for sustained growth in all primary,

secondary and tertiary sector. It is only possible to achieve sustained growth through proper allocation of finance in all sector. Nepal Rastra Bank has been playing a significant role in determining the impact of credit on economic growth in Nepal through the allocation of bank loans and advances to productive sectors such as agriculture, energy, tourism, and industry to stimulate economic growth.

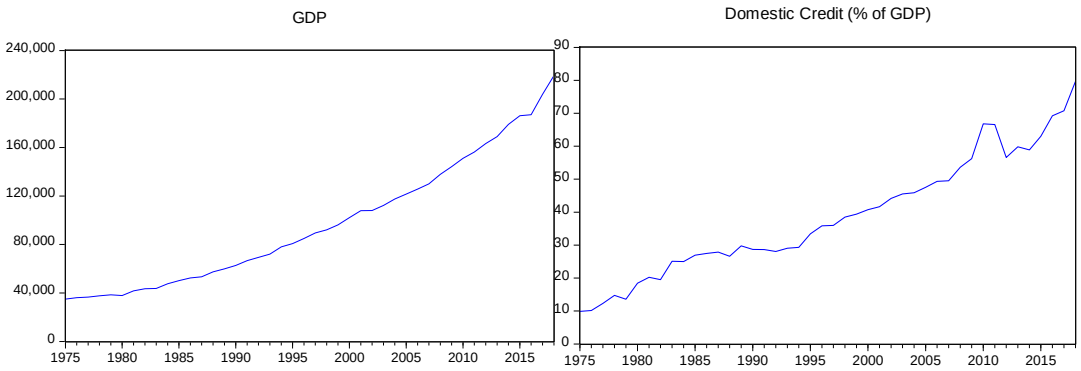


Figure 1.1 Time series graph of GDP and domestic credit

Figure 1.1 shows the time series graph of all GDP and domestic credit (% of GDP). The above figure shows that both GDP and domestic credit are increasing over the time indicating there might be some causation among the time series.

This effort of central bank and government through various policies and programs regarding the use domestic credit to stimulate economic growth seems to promote all the sectors. It is necessary to measure the impact of such credit in economic growth to assess the effectiveness of such programs. This study aims to find the relationship between domestic credit and overall economic growth. This study tries to answer the following two questions:

i. Whether or not there is long run relationship between economic growth and domestic credit?
ii. What causal relationship exists between the economic growth and domestic credit?

1.3 Objective of the study

This paper tries to find out the causal relationship between the macroeconomic variables and along with that this paper examines the long run relationship between economic growth and domestic credit. Based on the above research question objectives of the study are:

i. To determine long run relationship between economic growth and domestic credit and;

ii. To find if there is any causal relationship between GDP and domestic credit.

1.4. Hypothesis of the Study

The following hypothesis has been tested to analyze the relationship between domestic credit and economic growth:

H_0: There exists no relationship between domestic credit and economic growth in Nepal.

H_0: There exists a causal relationship between domestic credit and economic growth in Nepal.

1.5 Significance of the study

The main goal of macroeconomic policy focuses on achieving macroeconomic stability and economic growth. Economic growth enables stability in the macroeconomic environment through employment generation, increase investment, rise in income and social safety.

Credit in form of loans and advances plays a vital role in providing firms with the required capital, thereby ensuring a smooth and enhanced productivity thus promoting economic growth. This study tries to see the casual relationship between the macroeconomic variables and along with that this paper examines the long run relationship between economic growth and domestic credit.

The findings will inform policymakers and national planners on the long-run effect of the domestic credit on economic growth. This can inform their future policy and decision making on matters relating to the monetary policy. Similarly, this study contributes by adding knowledge on the nexus between economic growth and domestic credit.

1.6 Limitation of the study

The study is conducted using total population as a proxy of population rather than the total working labor force and the study is conducted using time series data, but would have been better if done using panel data. The study has incorporated only

domestic credit as an indicator to measure financial development, the study would have been better if other indicators of financial development were also incorporated. Due to lack of availability of data the study is limited to observe certain things only and has a limited objective.

CHAPTER II

LITERATURE REVIEW

This chapter presents the review of studies that have taken place in the past to examine the relationship between domestic credit and economic growth. Starting with an overview of theoretical concept of economic growth, this chapter reviews methodological and empirical research as well. This chapter ends with identification of research gap focusing on the significance for this study.

2.1 Theoretical review

In this section we start with the review of Harrod, and Domar and continue to review growth theories of Solow Swan, and endogenous growth theories. This section reviews the mechanism through which economy grows.

2.1.1 Harrod- Domargrowth theory

Different exogenous growth theories attempt to explain economic growth by considering only the inputs of labor and capital. Harrod (1939) and Domar (1946)focus on the role of capital in economic growth. According to these theories, capital plays a crucial role in achieving steady state growth by ensuring that the demand for capital is equal to the supply of capital. Capital has two main effects on economic growth: it increases income through the multiplier effect and it increases productivity through investment. Harrod's theory is based on the assumption of full employment, a closed economy, and no time lags in the adjustment of variables. He also assumes that saving is immediately turned into investment, and that the average propensity to save and the marginal propensity to save are constant. The capital-output ratio is also assumed to be constant. Harrod's theory aims to explain how steady growth can be achieved with fixed saving-income and capital-output ratios, and how the growth rate can be maintained once it has been achieved. Finally, the theory addresses the impact of natural factors on the growth rate. To answer these questions, Harrod proposed the concepts of the actual growth rate, the warranted growth rate, and the natural growth rate. The warranted growth rate is determined by the dynamic equilibrium of saving and investment, where output grows at an

exponential rate $\frac{s}{v}$, where s represents the marginal propensity to save and v represents the accelerator.

Similarly,Domar (1946)tried to explain growth using both demand side and supply side. He stated that investment has dual effects in the economy; income generating effects and capacity generating effects. Assuming that the amount of output that an economy can produce is proportional to the size of stock of capital and with constant saving and capital output ratio, Domar explained that at what rate investment must grow so that the economy can maintain the full employment level. So, along with these assumptions and other assumptions as that of Harrod model, Domar tried to explain growth in different way. He stated that to achieve and maintain full employment level, investment must grow at an exponential rate i.e.,$\sigma * \alpha$wheresigma is the capital coefficient and alpha is the marginal propensity to save. However, he also arrived to the same conclusion as that of Harrod. This equilibrium rate of growth as stated by him is same as that of Harrod's warranted growth rate.

2.1.2 Solowgrowth theory

According to Harrod and Domar, the equilibrium state of an economy is highly unstable, a phenomenon known as "razor-edge equilibrium." This instability is due to the assumption of a fixed production function in which labor and capital are not substitutable. The main problems with the Harrod-Domar model are macroeconomic stability, or the balance between actual and warranted growth rates, and the balance between the warranted growth rate and the natural growth rate. Solow (1956) attempted to address the issue of macroeconomic stability by assuming that planned investment always equals planned saving. He argued that the problem of Razor-edge equilibrium could be solved by considering changes in the capital-labor ratio. Solow assumed that the labor force grows at a constant, exponential rate n and, using the saving-investment relationship and other assumptions from the Harrod-Domar model; derived a fundamental equation comprising two components: capital widening and capital deepening. Capital widening refers to the amount of capital required to keep the total capital constant as the labor force grows, while capital deepening refers to the increase in output through capital accumulation that is needed to increase capital per worker. Solow's theory suggests that in order to achieve steady state equilibrium, all factors that affect growth, including labor, capital, investment, and output, must grow at a constant and identical rate of n.

2.1.3 Endogenous Growth Theories

In the past, exogenous growth theorist like Harrod, Domar, and Solow didn't account technological factor to describe the growth process. They assumed the technological factor or total factor productivity to be exogenous in their model and thus couldn't be explained within growth model. This unexplained portion was referred to as the Solow residual. The endogenous growth theory represents an improvement upon the neo-classical theory, which simply assumed that the marginal productivities of capital and labor were diminishing. One major limitation of the Solow (1956) model was its inability to explain how technological progress occurs in an economy; it was simply assumed to be exogenous to the model. However, recent studies, such as the work of, Romer (1986)and Lucas Jr, (1988)emphasized on technological advancement and investment in human capital, innovations and knowledge are some factors that has significant contribution to achieve economic growth. They have emphasized the role of human capital, through "learning-by-doing" or schooling, as technological factors that can be used to endogenously explain the growth of an economy.

2.1.4 Methodological review

To examine the correlations between the relevant variables, various econometric models have been utilized. These include the Ordinary Least Squares (OLS) model, Vector Autoregressive (VAR) model, Granger Cointegration test, Johansen Cointegration test, Auto-Regressive Distribution lag (ARDL) approach to bound test, and the Granger Causality test model, which are among the most commonly used linear econometric models for analyzing the relationship between time series variables. However, it is important to note that each of these models has its own limitations.

The Ordinary Least Squares (OLS) and Vector Autoregressive (VAR) models can only be used with stationary time series, which means that the series must have an integration order of zero(Brooks, 2014). If we try to make a series stationary through first or second-order differencing, we may lose important long-term information contained in the series and also risk encountering under-differencing or over-differencing problems(Maddala & Kim, 1998). Using these models on non-stationary time series can lead to invalid or "spurious" regression results(Granger & Newbold, 1974). To address this issue, Engle and Granger introduced two-step cointegration

tests in 1987, but with the limitation that all variables must be of first order integration(Das, 2019). The coefficients in the Engle and Granger cointegration model are estimated using the OLS method. Johansen and Juselius developed a new approach to cointegration testing in 1990, with the limitation that all variables must have the same order of integration, i.e., first order (Johansen &Juselius, 1990). The Johansen-Juselius cointegration model is based on maximum likelihood methods and is more appropriate for large sample sizes. However, the use of tabulated critical values may not be appropriate when applied to sample sizes of 100 or smaller(Maddala & Kim, 1998).

Autoregressive Distribution Lag (ARDL) approach to cointegration as an alternative to the Johansen-Juselius cointegration model relaxes some of the limitations found in the Granger and Johansen cointegration tests. While previous cointegration models required that all variables have an integrated order of one, the ARDL approach allows for variables that are integrated at orders of zero, one, or a combination of both(Pesaran et al., 2001). However, it is not applicable to variables that are integrated at order two, i.e. I(2)(Nkoro&Uko, 2016). The ARDL approach to bound testing is reliable for small sample sizes(Narayan, 2004).

The ADF, KPSS, and PP tests are statistical tests used to determine whether a time series is stationary or non-stationary. A stationary time series is one in which the mean, variance, and autocorrelations are constant over time, while a non-stationary time series is one in which these properties change over time. The ADF test checks for the presence of a unit root, which is a feature of non-stationary time series, and if the null hypothesis is rejected, the time series is considered stationary (Dickey & Fuller, 1979). The KPSS test checks for the absence of a unit root, and if the null hypothesis is rejected, the time series is considered non-stationary(Kwiatkowski et al., 1992) . The PP test also checks for the presence of a unit root, and if the null hypothesis is rejected, the time series is considered stationary (Phillips & Perron, 1988). These tests are all used to analyze time series data and determine its stationarity.

2.2Review of international empirical studies

Gregorio &Guidotti (1995) using panel data from twelve Latin American countries from the time period 1950 to 1985 used the ratio of bank credit to private

sector to GDP as an indicator of financial development found negative impact of credit in economic growth. The study not only examined the relationship among the variables but also tried to examine how both volume of investment and its efficiency affects the growth positively. The study concluded that the effect of financial development on economic growth is mainly due to the efficiency of investment rather than its volume. Volume of investment only has certain impact on economic growth; growth is mainly affected by the improved efficiency of investment rather than its volume. The study found that nearly one third of effect of credit on growth is due to volume of investment, while the remaining third fourth effect of credit on economic growth depends upon the efficient use of investment.

M. A. Khan (2008) investigated the relationship between financial development and economic growth in Pakistan using time series data from 1961 to 2005. The study used domestic credit, investment (represented by Gross Fixed Capital Formation), and real deposit rate as explanatory variables, and measured economic growth through real GDP. The ARDL approach to co-integration was applied to analyze the long-term relationship between the variables. The stationary of the variables was analyzed using the ADF unit root test, which revealed a mixed order of integration, with some being I(0) and others being I(1). The results indicated a long-term relationship between the variables, with all variables except real deposit rate being statistically significant. The coefficient for financial development indicated that a 1% increase in domestic credit leads to a 4.48% increase in economic growth, while a 1% increase in investment leads to a 4.62% increase in economic growth. The study emphasized the importance of financial development and investment in economic growth and recommended that policy makers focus on long-term policies, such as the creation of advanced financial institutions and the development of the stock market, as well as implementing financial reforms, in order to achieve higher economic growth and maintain stability.

Pradhan (2009) analyzed the connection between financial development and economic growth in India using monthly data from 1993 to 2008. The study used the Index of Industrial Production as a proxy for economic growth due to the lack of monthly GDP data. Financial development was measured using variables such as domestic credit, market capitalization, broad money supply, and foreign trade. The ADF and P-P tests were conducted to determine the stationary of the variables. The

study first applied the Johansen Maximum Likelihood test to examine the long-term relationship between the variables and then used the Granger Causality test to determine the direction of causation. The results showed a long-term relationship between financial development and economic growth, and revealed bi-directional causality between domestic credit and economic growth, and between broad money supply and economic growth. Additionally, market capitalization and foreign trade were found to cause each other. The study concluded that to achieve sustainable development, the government should implement policies that promote financial integration, establish modern financial institutions, reduce government intervention in the financial system, and improve the status of the financial sector.

Mishra et al. (2009) , recognizing the significance of the credit market and its role in efficiently allocating resources for higher economic growth, examined the existence of a long-term relationship and the direction of causation between the credit market and economic growth in India using time series data from 1980 to 2008. The study first applied the Johansen co-integration approach to determine the presence of a long-term relationship and found that the variables were co-integrated. The Granger Causality test was also conducted to determine the direction of causation, which revealed a unidirectional causality running from economic growth to the credit market.

Al-Malkawi et al. (2012) to investigate the relationship between financial development and economic growth, used the money supply to GDP ratio and Domestic credit to GDP ratio as indicators of financial development, and GDP as a measure of economic growth. The study also included control variables such as the inflation rate, trade openness, and government expenditure to analyze their impact on economic growth. The study presented two models: the first equation used domestic credit and other control variables to examine the relationship, while the second equation used money supply (another indicator of financial development) and other control variables such as inflation, domestic credit, and trade openness. The study found that when using domestic credit as an indicator of financial development, the calculated F-statistic was less than the lower bound critical value, indicating no cointegration among the explanatory variables. However, the bound test revealed a long-term relationship between money supply (an indicator of financial development) and GDP. Money supply was found to have a negative impact on economic growth.

The study also conducted a Granger causality test based on VECM to determine the direction of causation and found significant negative short-term bidirectional causation between money supply and economic growth.

Yakubu &Affoi (2014) examined the effect of commercial banks' credit on economic growth in Nigeria using time series data from 1992 to 2012 and the Ordinary Least Squares method to estimate the relationship between the variables. The results showed that the model was statistically significant, indicating a significant impact of commercial banks' credit on growth. The study found that credit can have a better impact on growth if it is controlled and directed towards productive sectors such as agriculture and manufacturing, rather than the unproductive sector.

Begum & Aziz (2019) examined the effect of domestic credit to the private sector on real GDP growth in Bangladesh using time series data from 1983 to 2017. The data was collected from the Bangladesh Economic Review by the Ministry of Finance and the World Development Indicators published by the World Bank. The study used real GDP as a proxy for economic growth and conducted the ADF test to determine the stationary of the variables, which were found to be stationary at their first difference. The Johansen's Co-integration test was applied to analyze the long-term relationship between the variables and found that there was no long-term relationship. Therefore, the study used Vector Autoregressive analysis and found a long-term relationship, but with a negative impact of domestic credit to the private sector on economic growth. The coefficients revealed that a 1% increase in domestic credit leads to a 0.01% decrease in economic growth. The Granger causality test was also conducted to determine the direction of causation and found a unidirectional causation running from domestic credit to economic growth.

Kumar &Paramanik (2020) examined the relationship between financial development and economic growth in India using time series data from Q1 :1996 to Q4 :2018. The study used the ratio of broad money to GDP as a measure of financial development and real GDP as a proxy for economic growth. Other variables included in the study were government expenditure, trade openness, and exchange rate. The ARDL bound test was performed to determine the presence of a long-term relationship between the variables, which showed the existence of a long-term relationship. The results indicated that financial development and exchange rate had a positive impact on economic growth, with the coefficients for financial development

and exchange rate being statistically significant. 1% increase in financial development was found to boost the economy by 0.09%. The coefficients for government expenditure and trade openness were found to be statistically insignificant.

Pham & Nguyen (2020) estimated the short-term and long-term relationship between domestic credit and economic growth in Vietnam using time series data from 2005: Q1 to 2017: Q4 and the ARDL model. The Augmented Dickey-Fuller test was conducted to determine the stationary of the variables. The study used domestic credit and money supply as indicators of financial development and Gross Domestic credit as the dependent variable to measure economic growth, and analyzed the direction of causality between domestic credit and GDP using theapproach developed by Toda & Yamamoto (1995). The results showed a bi-directional causality between the variables. The study found a negative relationship between credit and GDP in Vietnam, which is consistent with the findings ofArcand et al. (2015). The results indicated that a 1% increase in credit leads to a 0.4% decline in economic growth. The credit-to-GDP ratio has exceeded 100% in many periods and is currently around 120% in the last quarter of 2017, which suggests that an increase in credit may have an adverse effect on economic growth in Vietnam.

2.3Review of national empirical studies

Bhetuwal (2007) conducted a study on financial liberalization and financial development in Nepal, arguing that an efficient financial system can effectively mobilize and allocate resources, leading to stronger economic growth. Financial liberalization improves the functioning of the financial system by increasing the availability of funds and allowing for risk diversification and increased investment. Using indices for financial liberalization and financial development generated through the principal component method, the study examined the effectiveness of financial liberalization and financial sector development in Nepal. The study found a continuous and gradual process of financial liberalization and suggested the presence of a bidirectional causal relationship between the liberalization of the financial sector and the level of financial development in Nepal.

Likewise, Budha (2012) examined the relationship between Nepal's Gross Domestic Product (GDP), Gross Domestic Saving (GDS), and Gross Fixed Capital

Formation (GFCF) using annual time series data from 1975 to 2010. The study used the Autoregressive Distributed Lag (ARDL) approach to cointegration to determine if there was a long-term relationship between the variables. The Augmented Dickey Fuller (ADF) test was conducted to determine if the data was stationary, and it was found that GDP and GFCF were stationary after the first difference was taken, while GDS was stationary at its level. This indicates that the variables have a mix of orders of integration, i.e. I(0) and I(1). The results of the long-term ARDL coefficients showed that both GDS and GFCF affect long-term growth, but only the coefficient of GFCF was statistically significant. Although the coefficient of GFCF is statistically significant, its impact on growth is low as the long-term multiplier is less than one.

Kharel&Pokhrel (2012) investigated the role of financial structure in the economic growth of Nepal from 1994 to 2011 using Johansen's cointegrating vector error correction model. They argued that the banking sector plays a more important role in promoting economic growth in Nepal than the capital market. They recommended that policies focusing on the development of the banking sector by improving its quality and outreach in order to promote economic growth in Nepal.

Timsina (2014) examined the impact of private sector credit on economic growth in Nepal using time series data from 1975 to 2013. Bank credit to the private sector was used as a measure of financial development, and economic growth was measured in terms of real GDP. Government expenditure and interest rates were used as control variables. The study used the Johansen cointegration test to evaluate the short-term and long-term relationship between the variables. The findings showed that there was a long-term relationship between bank credit to the private sector and economic growth. The results indicated that a 1% increase in credit leads to a 0.4% increase in Nepal's GDP. Based on these findings, the study concluded that policies and programs should be developed by concerned authorities to expand the modern banking sector, build infrastructure, improve the efficiency of financial markets, and increase credit to the productive sector in order to promote long-term economic growth in Nepal.

Gautam (2014) also examined the relationship between financial development and economic growth using the time series data from 1975 to 2012. The study used three indicators - domestic credit, broad money, and private sector credit - to represent financial development. The Johansen cointegration approach was applied to study the

short-term and long-term relationship between the variables. The findings showed that financial development had a positive and significant impact on economic growth in Nepal.

Bist&Bista (2018) using the time series data from Nepal from the year1982 to 2014 to analyze the relationship between financial development and economic growth and found a stable long-term relationship between economic growth, financial development, gross domestic saving (GDS), inflation, and trade openness. The bounds test from the ARDL model indicated a long-term relationship between economic growth and the financial sector of Nepal. The results showed that financial development had a positive and significant effect on economic growth in both the long term and short term. However, GDS and trade openness were found to have a negative impact on economic growth in the long term. The authors argued that the lack of mobilization of savings to the productive sector and Nepal's dependency on imports have increased the trade deficit, leading to the negative impact of GDS and trade openness on economic growth.

Paudel& Acharya (2020) analyzed the relationship between financial development and economic growth in Nepal utilizing the time-series from 1965 to 2018. The study used five different indicators - broad money, domestic credit by the banking sector, domestic credit to the private sector, foreign direct investment, and gross capital formation - to measure financial development. Per capita GDP growth was used as the dependent variable to represent economic growth, and trade openness and the working-age population were used as control variables. All of the variables used in the study were expressed as a percentage of GDP. The Autoregressive Distributed Lag (ARDL) model was used to estimate the long-term coefficients. The results showed that all four indicators - broad money, domestic credit by the banking sector, domestic credit to the private sector, and gross capital formation - had a positive relationship with economic growth. However, the impact of foreign direct investment on economic growth was found to be statistically insignificant, despite having the correct sign and a larger coefficient and standard error. Additionally, the study found that the growth of the labor force had a negative impact on the country's economic growth. The study concluded that political instability, brain drain, and heavy outmigration may be responsible for the negative impact of labor force growth on Nepalese economic growth.

G.C. (2020), using endogenous growth model has used ARDL model to examine the existence of long-run relationship among the variables using time-series dataset from 1980 to 2018. While analyzing the relationship between economic growth and capital, population, FDI, financial development and trade openness, the study found that gross fixed capital formation, population, and financial development were highly significant for influencing the economic growth of Nepal in long run. The study conducted ADF, P-P, and KPSS tests to check the stationary of the data, and found out that the variables are stationary at either level or first difference. The study found that financial development has a positive impact in the economic growth of Nepal, whereas trade openness was found to be insignificant. The long run coefficients of the variables gross fixed capital formation, population, financial development is significant in affecting the growth. Whereas, FDI is found to have negative impact on economic growth. The study concluded that political instability, poor infrastructure, and Nepal being import dependent country as the reason behind negatively insignificant relationship among economic growth and trade openness. Similarly, the country hasn't been able to attract FDI and use it to enhance the growth, so better infrastructures, reduction of taxes and tariffs which help MNCs to operate smoothly should be adopted by the nation which leads to more flow of FDI and help in economic growth.

Panthi (2021) applied the Autoregressive Distributed Lag (ARDL) bound test approach, to estimate the long-term relationship between financial development and economic growth in Nepal. The study used four proxies to represent financial development: domestic credit to private sectors, domestic credit to private sectors by banks, broad money (M2), and net domestic credit. The findings showed that all of these proxies had a positive impact on Nepal's economic growth. The study used annual time series data from 1985 to 2016.

Khanal (2021) also analyzed the relationship between economic growth, GFCF, labor force growth, financial development, and trade openness in Nepal. The study used annual time series data from 1991 to 2018, with broad money (M2) serving as a proxy for financial development and exports as a proxy for trade. The Autoregressive Distributed Lag (ARDL) approach was used to determine the presence of a long-term relationship between economic growth and the other independent variables. The Augmented Dickey Fuller (ADF) and the Kwiatkowski-Phillips-

Schmidt-Shin (KPSS) tests were conducted to determine if the data was stationary at the level or after the first difference was taken. The results of the unit root tests indicated that some variables were stationary at the level and some were stationary after the first difference was taken, indicating a mixed order of integration I(0) and I(1). The findings showed that GFCF had a positive impact on economic growth, while labor force growth had a negative impact. The study also found that exports had a positive impact on growth. The coefficient of GFCF was 3.316, indicating that a 1% increase in GFCF leads to a 3.316% increase in economic growth.

2.5 Research gap

While there has been lots of studies showing long run relationship between financial development and economic growth (Bist&Bista, 2018; Panthi, 2021; Timsina, 2014), the dataset they have used does not cover the recent periods. Policy makers cannot rely on past estimates to address current economic problem. It is important to know multiplier effect of domestic credit in economic growth for proper policy. Earlier studies conducted in Nepal analyzed the impact of domestic credit on economic growth but has overshadowed the direction of causation among economic growth and domestic credit. Nepal faced a devastating earthquake followed by an economic blockade which further leads to revision on monetary policies including domestic credit benchmarks. Moreover, the earthquake followed by Indian blockade led to Nepal's economic downturn which slowed down all the economic activities related to production, consumption and distribution. In terms of trade balance, Nepal has a significant share in imports compared to exports. Knowing the effect of export on economic growth is essential for an economy that has competitive advantages on herbs, carpets, tourism, agricultural and natural products.

This paper attempts to explore whether there is a long-run stable equilibrium in the economy using an endogenous growth model and significant policy levels that can help to increase growth. This study contributes the existing literature by including the recent dataset and furthermore, this study has analyzed the direction of causation among the variables through Toda-Yamamoto granger causality test.

CHAPTER III

METHODOLOGY

3.1 Theoretical Framework

Cobb Douglas production function developed by Cobb & Douglas (1928), stated that total production is the result of amount of labor and physical capital invested, or in other words Cobb-Douglas production function shows the relationship between factor inputs (capital, labor) and output produced. The original version of the C-D production function is presented as $U = C.a^{\lambda}.K^{i}$ where U = Total output, C = constant, a = labor input, λ = elasticity of output with respect to labor, K = capital and i = elasticity of output with respect to the capital. Later on, Paul Douglas transformed the production function into$P = a.L^{\alpha}.C^{\beta}$ where P = Output, a = constant, L = labor, α = elasticity of output with respect to labor, C = capital and β = elasticity of output with respect to the capital. Such a production function is homogeneous to the degree $(\alpha + \beta)$which indicates the increasing, decreasing or constant returns to scale. So, from the Cobb Douglas production function we derive an aggregate production function where output is the function of total factor productivity, capital, and labor inputs. So, the general form of aggregate production function is given as $Y_t = A_t K_t^{\alpha} L_t^{\beta}$ where Y_t represents the total aggregate production of the economy at time$t$,similarly$A_t$represents the total factor productivity at time t, $K_t$and $L_t$denotes the capital inputs and labor inputs respectively. The $\alpha \; and \; \beta$ denote the output elasticity for capital and labor respectively.

Now we use an augmented form of C-D production function where we use GFCF as the proxy of capital and POP as the proxy of labor. So, the augmented form of C-D production function is given as

$$GDP_t = A_t GFCF_t^{\alpha} POP_t^{\beta} \quad \ldots\ldots\ldots\ldots (1)$$

Where GDP_t denotes real GDP, A_t is the total factor productivity which includes technological enhancement not only due to trade liberalization but also due to financial development, $GFCG_t$ andPOP_t represent the proxy variables for capital and labor at t time period respectively. Similarly,α and β are the coefficients of factor inputs (capital, labor).

3.2 Analytical framework

This research uses a descriptive and analytical research design. The goal of the study is to examine the relationship between economic growth and domestic credit, with population, gross fixed capital formation, and export serving as supportive variables. The dependent variable in the analysis is economic growth, while domestic credit is treated as the independent variable. The data for the relevant variables was obtained from secondary sources. The researcher first analyzed the trend and pattern of the variables.

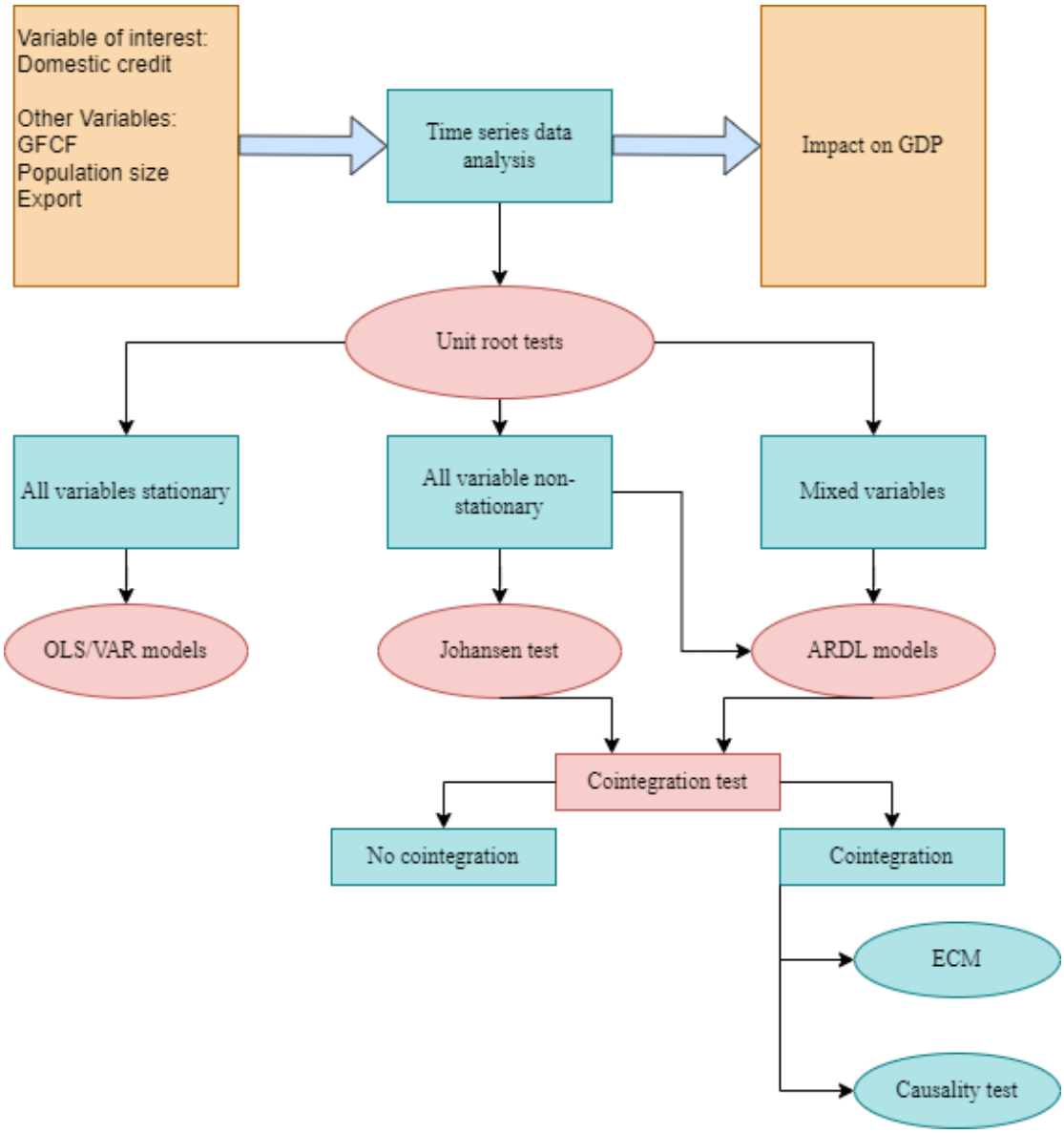


Figure 3.1: Analytical framework

Figure 3.1 shows the analytical framework of the research. Variables used in this study has been selected by reviewing literature. GDP has been used as a proxy of

economic growth which is the dependent variable of the study and the impact of domestic credit along with other variables like population, GFCF and export has been used to find out how these independent variables impact on economic growth. So, for that analysis, we used time series analysis. In order to conduct the time series analysis firstly the stationarity of variables has to be checked so we performed various unit root tests to find out whether the variables are stationary at their level or whether they are stationary after their first difference or presence of mixed order of integration is examined. So, if all the variables were found to be stationary at their level, then simple OLS or VAR model could have been deployed, or if the variables were found to be non-stationary, then, Johansen test would have been applied. But if the variables were found to be mixed order of integration, then ARDL model would be applied. To examine the presence of both long run as well as short run relationship co-integration test is done which shows whether there exists long run relationship among the variables or not. Then after that Granger causality test is to be carried out in order to see what causal relationship exists among the variables.

3.3 Econometric framework

Studies in literature has used several parameters representing A. In this study, domestic credit and export are incorporated as the function of total factor productivity.

$$A_t = f(DOMCRE_t^{\theta}, EXPORT_t^{\phi}) \ldots\ldots\ldots\ldots\ldots (2)$$

Where $\theta \; and \; \phi$ are the output elasticity coefficients of domestic credit and export respectively.

So,using equation 1 and 2 we derive an aggregate production function,which is as follows:

$$GDP_t = f(GFCF_t^{\alpha}, POP_t^{\beta}, DOMCRE_t^{\theta}, EXPORT_t^{\phi}) \ldots\ldots. (3)$$

Where $\alpha, \beta, \theta, and \; \phi$are the coefficients of GFCF, POP, DOMCRE, and EXPORT respectively.

Now we take natural logarithm of the equation (3). The log transformation of the equation is given as:

$$lnGDP_t = c + \alpha lnGFCF_t + \beta lnPOP_t + \theta DOMCRE_t + \phi Export_t + \epsilon_t \ldots\ldots\ldots\ldots (4)$$

Where, c is constant, α *and* β are output elasticity coefficients of gross fixed capital formation and population. Similarly, theta and phi represent percentage change in per capita GDP due to one percent change in domestic credit and export respectively. In other words, theta and phi when multiplied by 100% represent the percentage change in real GDP due to 1 % change in domestic credit and export.

Now equation (4), gives us the relationship between economic growth measured by real GDP and all other explanatory variables. However, it is necessary to determine the stationarity of the time series before we can estimate this model. Therefore, Augmented Dickey-Fuller test, Phillips-Perron test, and Kwiatkowski–Phillips–Schmidt–Shin (1992) are practiced in this research to point out the order of integration of all the time series variables.

In order to establish a long run co-integrating relationship among the variables, we used ARDL bound test approach developed by(Pesaran et al., 2001). ARDL approach has been considered to have several advantages over the (Granger, 1981)and (Engle & Granger, 1987)co-integration test, and Johansen co-integration approach. Firstly, ARDL approach can be applied in the presence of mixed order of integration. However, ARDL approach requires the variables to be either I(0), and I(1), but the procedure will crash in the presence of I(2) series. Similarly, ARDL approach is better as it estimates more than one co-integrating relationship. (Nkoro&Uko, 2016)considered ARDL approach to depict suitable and more robust results in smaller sample sizes. Thus, the study used ARDL model (p, q1,q2,q3,q4) as follows:

$$\Delta lnGDP_t =$$

$$\alpha_0 + \sum_{i=0}^{p} \lambda_{1i} \Delta lnGDP_{t-1} + \sum_{i=0}^{q^1} \alpha_{2i}\, \Delta lnGFCF_{t-1} + \sum_{i=0}^{q^2} \beta_{3i} \Delta lnPOP_{t-1} +$$

$$\sum_{i=0}^{q^3} \theta_{4i} \Delta DOMCRE_{t-1} + \sum_{i=0}^{q^4} \phi_{5i} \Delta EXPORT_{t-1} + \gamma_1 \mathrm{lnGDP}_{t-1} + \gamma_2 \mathrm{lnGFCF}_{t-1} +$$

$$\gamma_3 \mathrm{lnPOP}_{t-1} + \gamma_4 DOMCRE_{t-1} + \gamma_5 EXPORT_{t-1} + \upsilon_t \ldots\ldots\ldots..(5)$$

Based under the Schwarz Bayesian Criterion (SBC), we have selected the order of lags for the above model.

The null hypothesis of the study which states there is no long run relationship between domestic credit and economic growth is shown as $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$ and alternative hypothesis stating existence of long run relationship is shown as $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq 0$.

*T*he F-statistic is calculated and then compared to the critical values provided by Pesaran et al. (2001) at different significance levels. If the calculated F-statistic is lower than the lower bound critical value, the null hypothesis cannot be rejected. However, if the F-statistic is higher than the upper bound critical value, the null hypothesis is rejected. If the value falls between the upper and lower bounds, the result is inconclusive. Once cointegration is established, the conditional autoregressive distributed lag (ARDL) model (p, q1, q2, q3, q4,) is used to estimate long-run coefficients using the following equation:

$$lnGDP_t = a_1 + \sum_{i=1}^{p} \lambda_{1i} lnGDP_{t-1} + \sum_{i=0}^{q^1} \alpha_{2i} lnGFCF_{t-1} + \sum_{i=0}^{q^2} \beta_{3i} lnPOP_{t-1} + \sum_{i=0}^{q^3} \theta_{4i} DOMCRE_{t-1} + \sum_{i=0}^{q^4} \phi_{5i} EXPORT_{t-1} + \epsilon_t \ldots\ldots (6)$$

After establishing cointegration, an error correction model (ECM) is used to estimate short-term dynamic parameters based on the research of Odhiambo (2007), which establishes a relationship between economic growth and energy consumption. The error correction term is estimated from the long-run model and its lagged value is included in the error correction model. The ECM can be expressed as follows:

$$\Delta lnGDP = a_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta lnGDP_{t-1} + \sum_{i=0}^{q^1} \alpha_{2i} \Delta lnGFCF_{t-1} + \sum_{i=0}^{q^2} \beta_{3i} \Delta lnPOP_{t-1} + \sum_{i=0}^{q^3} \theta_{4i} \Delta DOMCRE_{t-1} + \sum_{i=0}^{q^4} \phi_{5i} \Delta EXPORT_{t-1} + \delta ECT_{t-1} + \epsilon_t \ldots\ldots (7)$$

The error correction term (ECT) is used to represent the speed at which a system adjusts to equilibrium after experiencing a shock. When the ECT has a negative sign, it indicates that the system is converging towards long-run equilibrium. On the other hand, if the ECT has a positive sign, it indicates that the system is diverging from long-run equilibrium.

3.4 Empirical Strategy

This sectiontalks about the various tests performed in this study. Firstly, unit root tests are performed to run ARDL model and the maximum order of lag is selected through VAR lag length criteria. And bounds test for co-integration is to be performed to check whether long-run relationship exists or not. Furthermore, this section lastly talks about the various tests that are performed to check the stability and robustness of the model.

3.4.1 Unit Root Tests

Unit root test is an econometric tool that tests whether the mean and variance of the time series change overtime after accounting for the time-series properties. A unit-root test determines the stationarity of time series using an Auto-Regressive (AR) model.

Augmented Dickey-Fuller (ADF) Test. The ADF test, also known as the Augmented Dickey-Fuller test, is a statistical test used to test for stationarity in time series data. It is a type of unit root test, which is used to determine whether a time series is stationary or non-stationary. A stationary time series is one in which the mean, variance, and autocorrelations are constant over time, while a non-stationary time series is one in which these properties change over time. The ADF test is used to determine whether a time series is stationary by testing for the presence of a unit root, which is a feature of non-stationary time series. If the ADF test rejects the null hypothesis that a unit root is present, then the time series is considered stationaryDickey & Fuller (1979). The ADF model test unit root as follows:

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \, \Delta y_{t-1} + \epsilon_t$$

where,

$\delta = \alpha - 1$

$\alpha = coefficient\ of\ y_{t-1}$

$\Delta y_t = first\ difference\ of\ y_t, i.e. y_t - y_{t-1}$

The null hypothesis of ADF test is $\delta = 0$ against the alternative hypothesis of $\delta < 0$. If we do not reject the null hypothesis, the series is non-stationary whereas rejection means the series is stationary.

Phillips-Perron (PP) test. The PP test, also known as the Phillips-Perron test, is a statistical test used to test for unit roots in time series data. It is a type of unit root test, which is used to determine whether a time series is stationary or non-stationary. A stationary time series is one in which the mean, variance, and autocorrelations are constant over time, while a non-stationary time series is one in which these properties change over time. The PP test is used to determine whether a time series is stationary by testing for the presence of a unit root, which is a feature of non-stationary time

series. If the PP test rejects the null hypothesis that a unit root is present, then the time series is considered stationaryPhillips & Perron (1988). The PP model test the unit root as follows:

$\Delta y_t = \pi y_{t-1} + \beta_i D_{t-1} + \epsilon_t$

Where,

$\epsilon_t$is a I(0) with zero mean and D_{t-1} is a deterministic trend component.

The PP test is used to test a hypothesis where $\pi = 0$. The main difference between these two tests is that the PP test is a non-parametric test, which means it does not require a specific assumption about the form of the serial correlation of Δy_t under the null hypothesis As, a result, the calculation of the t-ratio to determine the value of $\pi$is different in the PP test. Additionally, the PP test takes into account autocorrelation and heteroskedasticity in its calculations. Both tests follow a similar procedure for hypothesis testing.

Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test. The KPSS test, also known as the Kwiatkowski-Phillips-Schmidt-Shin test, is a statistical test used to test for stationarity in time series data. It is a type of unit root test, which is used to determine whether a time series is stationary or non-stationary. A stationary time series is one in which the mean, variance, and autocorrelations are constant over time, while a non-stationary time series is one in which these properties change over time. The KPSS test is used to determine whether a time series is stationary by testing for the absence of a unit root, which is a feature of stationary time series.The classical testing framework is sometimes criticized for having a bias towards accepting the null hypothesis (H0) of stationarity. As a result, Kwiatkowski et al. (1992) developed an alternative method for testing stationarity. The KPSS test is designed such that the null hypothesis is stationary, while the alternative hypothesis is non-stationary. The KPSS test model is as follows:

$Y_t = X_t + \epsilon_t,$

$X_t = X_{t-1} + u_t$

Here, we test the hypothesis foru_t, and we derive the critical reported values of the KPSS test from Lagrange Multiplier (LM) test statistics.

Firstly, we conduct unit root tests to test the time series properties of data. The presence of unit root in non-stationary data leads to spurious result. So, to avoid the spurious regression we conduct different types of unit root tests. The study uses Augmented Dickey-Fuller(ADF) test, Phillips-Perron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS)to examine the presence of unit root in the time series data. The null hypothesis for ADF and PP tests is that there is presence of unit root and the alternative hypothesis is that the time series is stationary. Whereas, the null hypothesis of KPSS test is exact opposite. The null hypothesis is that there is no presence of unit root against the alternative hypothesis there is presence of unit root. So, all these tests are applied to know at whichlevel the variables are stationary.

3.4.2 Lag length criteria

After conducting the unit root test, the order of lag that is incorporated is chosen under the Schwarz Bayesian Criterion (SBC). VAR lag length criteria are used to determine the optimal lag length. The Akaike information criteria (AIC), Schwarz information criteria (SC), and Hannan-Quinn statistics were used to determine the maximum lag period. The lower the values of AIC, SC, and HQ, better the model is said to be.

Based under the Schwarz Bayesian Criterion (SBC), we have selected the order of lags for the above model. Schwarz Bayesian Criterion is one of the statistics that helps to select the best model based on the goodness of fit. We select the model that has the lowest value for these statistics.

Where RSS is the residual sum of squares, n is the sample size, k is the number of parameters in the model.

3.4.3 ARDL Model

ARDL model is an OLS based model which is applicable for both non stationary time series as well as for time series having mixed order of integration. In this study, ARDL co integration procedure has been used to examine the long run relationship between the domestic credit and economic growth. ARDL approach is considered to have several advantages over the approach proposed byEngle & Granger (1987)and maximum likelihood approach proposed byJohansen &Juselius (1990). ARDL model can be applied irrespective of the order of integration and another advantage of this model is that it is not sensitive to the sample size. However,

the model will crash in the presence of I(2). Another advantage of ARDL model is it addresses the problems occurring during the time of estimation due to the presence of serial correlation, and produces robust result for small sample size. ARDL model examines the relationship between dependent variables and independent variables both contemporaneously and historically using current values and regressor's lagged valuesPanthi (2021).

3.4.4 Bounds test for cointegration

After applying the ARDL model, bounds test is performed inorder to examine whether the variables are co-integrated or not. The existence of long run relationship is confirmed using bounds test. The F-statistic is calculated and compared to upper bound and lower bound critical values. Pesaran et al. (2001) has provided two sets of critical values at different levels of significance. If the calculated F-statistic is lower than the lower bound critical value, we cannot reject the null hypothesis. Similarly, if the calculated F-statistic is higher than the upper bound critical values, we reject the null hypothesis. If the value lies between the lower bound and upper bound the obtained result is inconclusive.

3.4.5 Diagnostic test

In order to check whether the obtained results from the model are robust or not, various diagnostic tests are conducted. Whether there is presence of serial correlation or not in the residual the study conducts serial correlation test. Similarly, to test whether the data are normally distributed or not the study has conducted normality test. Whether the model has the presence of heteroscedasticity or homoscedasticity is also examined. At last, CUSUM and CUSUM Squared tests are also performed for the checking the stability of the model.

3.4.6 Toda-YamamotoGranger causality test

In order to ensure the robustness of ARDL model, Toda & Yamamoto (1995)granger-causality test is used in this research. Granger-causality is an econometric test that is used to determine whether a time series variable is able to forecast another time-series variable. Toda YamamotoGranger-causality, unlike the standard Granger-causality test, can be used when the time series are stationary, either $I(0)$ or $I(1)$, making it most suitable for robustness check in the case of ARDL model. This test is performed under the VAR model framework given in the following equations:

$$X_t = \alpha_i + \sum_{i=1}^{k} \alpha_{1i} X_{t-j} + \sum_{j=k+1}^{k+d_{max}} \alpha_{1i} X_{t-j} + \sum_{i=1}^{k} \beta_{1i} Y_{t-i} + \sum_{j=k+1}^{k+d_{max}} \beta_{1i} Y_{t-j} + v_{1it}$$

$$Y_t = \alpha_i + \sum_{i=1}^{k} \alpha_{2i} Y_{t-j} + \sum_{j=k+1}^{k+d_{max}} \alpha_{2j} Y_{t-j} + \sum_{i=1}^{k} \beta_{2j} X_{t-i} + \sum_{j=k+1}^{k+d_{max}} \beta_{2j} X_{t-j} + v_{2it}$$

In the above equations, X_t represents GDP and Y_{it} represents all the independent variables used in this study. K is the lag length that is determined by SIC criteria and d_{max} represents the maximum order of integration in the time series analysis which is 1 in this case.

3.5 Data and variables

Based on framework developed in this study, secondary source of data has been used for analysis. The data in the study has been drawn from the Ministry of Finance (MoF) and Nepal Rastra Bank (NRB). In order to perform co-integration analysis, it is required to have large time series dataset. So, time series data from 1975-2018 has been collected for this purpose.

3.5.1 Definitions of variables

The dependent variable for the study is GDP growth rate. Domestic credit is our main variable of interest. It acts as a proxy for financial development. The study also employs GFCF, population and export as set of control variable. Table 3.1 provides list of variables with their description.

Table 3.1: Variables definition

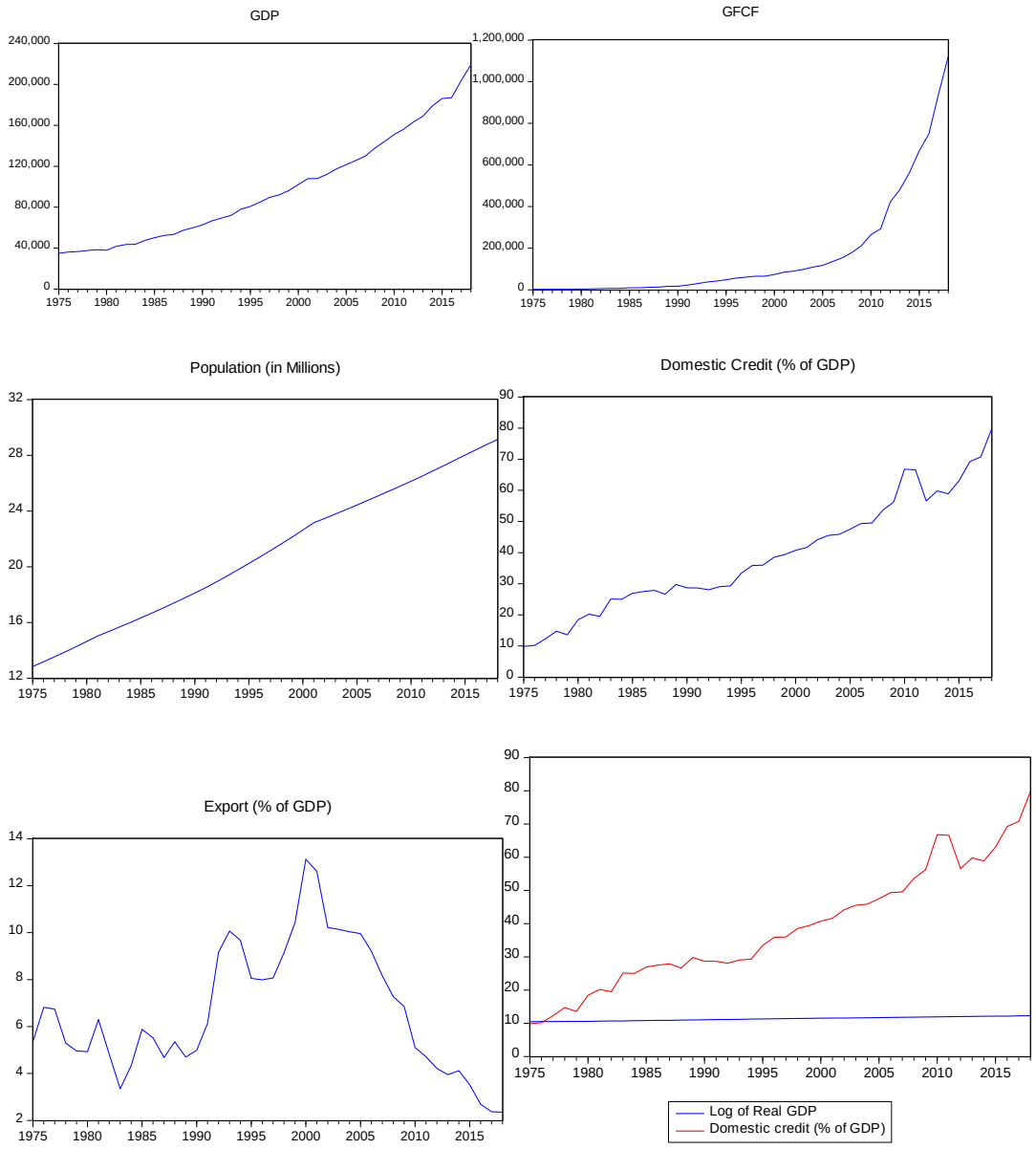
Variables	Description
GDP	GDP growth as a measure of output
GFCF	Gross Fixed Capital Formation is used as a proxy for physical capital accumulation
Population	Population size
Export	Exports of goods and services (percentage of GDP)
Domestic Credit	Domestic credit (percentage of GDP)

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Time series graph

This section shows the time series graph from the year 1975to 2018 of all the variables incorporated in the study.



Source: Author's Computation

Figure 4.1:Time series graph of macroeconomic variables under study

Figure 4.1shows the time series graph of different macroeconomic variables like GDP, GFCF,POP, Export, and Domestic Credit between the year 1975 and 2018.

The real sector variables such as GDP, GFCF, are increasing over time without any structural breaks but structural breaks are seen in export and domestic credit. Although domestic credit is increasing, the share of export is seen to be declining after 2000, one of the reason behind the decrease in export is the rapid increase in the amount of GDP than before and the amount of export also declined as Nepal become import based economy after the trade liberalization in 1990s which reduced tariffs in import and Nepal became a member of South Asian Preferential Trade Agreement (SAPTA) in 1995 now known as South Asian Free Trade Area(SAFTA) which decreased import barriers and promoted transit facilities among the SAARC countries Pant (2005), and as a result of that Nepal became import-led-economy which accelerated the pace of import but decline in export.

4.2 Descriptive statistics

Table 4.1 provides the descriptive statistics of the variables used in this study. The study has total of 44 observations. Variables named GDP, GFCF, POP represents Gross Domestic Product in million rupees, Gross Fixed Capital Formation in million rupees, and total population of the country in millions respectively. Similarly, DOMCRE represents domestic credit as a percentage of GDP, and EXPORT represents export of the country as a percentage of GDP. The maximum GDP and GFCF is 219370 million rupees and 1120863 million rupees respectively whereas the minimum GDP and GFCF are 34952 million rupees and 2223 million rupees respectively. The maximum population is 29 million and the minimum population is 12 million. The maximum percentage of domestic credit is 79.7 whereas the minimum percentage of domestic credit is 9.8. Similarly, the maximum percentage of export to is 13.13 and the minimum is 2.35. Similarly, the mean of GDP is 97400 million rupees, and GFCF is 165909 million rupees. Likewise, the mean population is 20.94 million and the mean value of DOMCRE and EXPORT are 38.6 percent and 6.6 percent respectively. The median value of GDP is 87227 million rupees, and that of GFCF is 58437 million rupees. Likewise, the median population is 20.92 million. The median of DOMCRE and EXPORT are 35.92 and 6.01 percentage respectively.

Table 4.1: Descriptive Statistics of macroeconomic variablesunder the study

Statistics	GDP	GFCF	POP	DOMCRE	EXPORT
Mean	97400.95	165909.90	20.93	38.63	6.66
Median	87227.77	58437.50	20.92	35.92	6.01
Maximum	219370.64	1120863.90	29.14	79.74	13.13
Minimum	34952.31	2223.00	12.83	9.87	2.35
Std. Dev.	52550.82	264954.86	4.98	18.13	2.72
Skewness	0.61	2.14	0.00	0.36	0.47
Kurtosis	2.27	6.87	1.70	2.24	2.38
Jarque-Bera	3.72	61.10	3.06	2.04	2.34
Probability	0.15	0.00	0.21	0.35	0.31
Sample (n)	44	44	44	44	44

Source: Author's Computation

4.3 VAR Lag Length Criteria

In order to select the lag length, the study has applied VAR Lag Length Criteria. The table4.2 below shows different lag length criteria.SchwarzBayesianCriterion has been chosen to select the maximum number of lag because Schwarz Criterion is found to perform better in small sample sizes than other criteria and is found to be robust Pesaran et al. (2001). And the results show that the maximum lag selected is 1. The lower the value of SC criterion, better the model is said to be.

Table 4.2: Lag Length Selection Criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-86.6186	NA	6.01E-05	4.469199	4.678172	4.545296
1	213.4074	512.2394	9.05E-11	-8.9467	-7.692867*	-8.490123*
2	240.7113	39.95694*	8.56e-11*	-9.05909	-6.76039	-8.22203
3	267.8215	33.06131	8.98E-11	-9.162026*	- 5.81847	-7.94449

Source: Author's Computation

* Indicatelag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error
AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

4.4 Unit root test

Various unit root tests are conducted to check the stationarity of the variables used in the study. The tables below show results of ADF, P-P, KPSS unit root tests.

Unit Root Tests

Table 4.3:ADF Unit Root Test

	Level			**First Difference**	
Variable	**Constant**	**Constant and Trend**	**Variable**	**Constant**	**Constant and Trend**
LnGDP	0.7127	-3.1983*	ΔlnGDP	-6.389***	-6.4084***
LnGFCF	0.565	-1.742	ΔlnlnGFCF	-3.6186***	-3.5804**
LnPOP	-2.0067	-0.7938	ΔlnPOP	-1.2432	-2.2647
EXPORT	-1.4752	-1.4037	ΔEXPORT	-4.8181***	-4.8129***
DOMCRE	0.677	-1.928	ΔDOMCRE	-6.4645***	-6.5262***

Source: Author's Computation

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

The table above shows all the results of the unit root test performed for checking the stationarity. The study conducted ADF (Table 4.3) test to check whether the variables are stationary at their level or first difference. ADF test shows that no variables are stationary at level while analyzing the constant and only LnGDP is found to be stationary at 10% significance level while analyzing both constant and trend, but the variables like LnGDP, LnGFCF, DOMCRE, and EXPORT are found to be stationary at first difference, but LnPOP is not found stationary both at level and first difference in ADF test.

Phillips-Perron Test

Table 4.4: Phillips-Perron Test

	Level			**First Difference**	
Variable	**Constant**	**Constant and Trend**	**Variable**	**Constant**	**Constant and Trend**
LnGDP	1.0891	-3.2163	ΔlnGDP	-7.6337***	-7.7049***
LnGFCF	0.58650	-1.696	ΔlnlnGFCF	-7.4819***	-7.4619***
LnPOP	-6.1152***	-0.2901	ΔlnPOP	-1.2379	-2.3304
EXPORT	-1.1134	-0.8945	ΔEXPORT	-4.7399***	-4.6259***
DOMCRE	0.8646	-1.9774	ΔDOMCRE	-6.4557***	-6.5191***

Source: Author's Computation

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

The above table shows the PP test conducted and found that no variables are stationary while analyzing constant and both constant and trend beside lnPOP which is found to be stationary at level with 1 % significance. Similarly, other variables like lnGDPlnGFCF, DOMCRE, and EXPORT are not found to be stationary at level but are found to be stationary after their first difference, whereas the variable lnPOP is only found stationary at level but not after the first difference.

KPSS Test

Table 4.5: KPSS Test

	Level			**First Difference**	
Variable	**Constant**	**Constant and Trend**	**Variable**	**Constant**	**Constant and Trend**
LnGDP	0.8416***	0.1027	ΔlnGDP	0.1865	0.1137
LnGFCF	0.8398***	0.0926	ΔlnGFCF	0.1273	0.1136
LnPOP	0.8405***	0.2143**	ΔlnPOP	0.7*	0.0763
EXPORT	0.1733	0.1744**	ΔEXPORT	0.2862	0.0983

DOMCRE	0.8442***	0.177**	ΔDOMCRE	0.1686	0.0599

Source: Author's Computation

Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

The above table shows the results obtained from KPSS test, the findings shows that all the variables are stationary at first difference while analyzing both the constant and trend. The null hypothesis of KPSS test is that the data is stationary. Therefore, the findings show that some variables are stationary at first difference and some variables to be stationary at their level. So, there is mixed integration i.e., presence of both I (0), and I (1) series in the study.

4.5 Zivot-Andrews Structural Break Unit Root Test

Table 4.6: Structural Break Unit Root Test

Variable	t-stats	Break year	Result
Log of GDP	-3.4178***	2003	Stationary
Log of population	-2.34***	2002	Stationary
Log of GFCF	-3.3077***	1999	Stationary
Domestic credit	-3385**	1990	Stationary
Export	-2.4294***	1991	Stationary

Source: Author's Computation

Note: *, ** and * denotes significance level at 10%, 5% and 1% respectively.**

Table 4.6 shows ZA structural break unit root test. The structural break unit root test allows one to examine the stationarity of time series in presence of break in the time series unlike other standard unit root tests. The ZA test reveals that all the time series are stationary at level in the presence of structural breaks in the series. The structural break in the population can be attributed to the census data which shows the decrease in population growth rate from 2000 A.D. onwards. Population growth rate is found to be increasing at a decreasing rate after 2002. The population growth rate was more than 2 % before 2000, and it slowly declined after and reached 1.5 percentage per annum. The decline in population growth can be linked with the better improvement in the health facilities of the people, including decrease in child mortality rate and increase in maternal health services. The use of measures for population control is another reason which resulted in decline in birth and other reason behind decreasing population growth rate is the outmigration of people for better employment facilities and higher studies. Similarly, the structural break in GDP

series can be attributed to the Royal Massacre that took place in 2001. The dissolvement of parliament by the then king Gyandendra Shah in 2002 led many political revolution and resolutions. Another reason behind decline in economic growth was the civil was ongoing in the country which led to political instability and slowed down the growth abruptly. The country going into civil war led to affect various sectors which impacted in decline in growth.

4.6 Bounds Test for cointegration

After applying the ARDL model, we performed bounds test for existence of co-integration among the variables. The calculated F-statistics is significant at1% indicating that there is the long run co-integrating relationship among the variables in the long run. Thus, we can proceed with the estimation of long-run relationship to explain the economic growth of Nepal.

Table 4.7: Cointegration Bound Test

Test Statistic	Value	K	
F-statistic	30.84179	4	
Critical Value Bounds			
Significance	I0 Bound	I1 Bound	
10%	2.2	3.09	
5%	2.56	3.49	
2.50%	2.88	3.87	
1%	3.29	4.37	

The table 4.7 shows the calculated value of F-statistics and found that the calculated F-statistics is significant at 1% level indicating there exists long-run relationship.

4.7 ARDL Long run coefficients

The VAR lag length criteria have been used to select the optimal number of lags. Based on Schwarz Bayesian Criterion, the optimal number of lags selected for the study and the maximum numbers of lag chosen under SC criteria was 1, therefore the number of optimal lags for our model is ARDL(1,0,0,0,1) for each variable.

Table 4.8: ARDL (1,0,0,0,1) Long run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGFCF	0.203504	0.044637	4.55912***	0.0001
LNPOP	0.137254	0.42333	0.324225	0.7476
EXP	0.01278	0.005913	2.16148**	0.0374
DOMCRE	0.009579	0.003148	3.043303***	0.0044
C	8.37273	0.783762	10.68275	0

*****, ** and * significant at 1%, 5% and 10% respectively**

The above estimates from the table 4.8 provides the long run coefficients obtained from the long run equation of the ARDL (1,0,0,0,1). All the coefficients show there is positive impacts of independent variables like capital formation, population, domestic credit, and export on GDP growth. The long run coefficients of GFCF, and DOMCRE are found to be highly significant at 1% level of significance, whereas, EXP is found to be significant at 5% significance level, but LNPOP is found to be insignificant. The long run coefficient of GFCF is 0.2 indicating that 1 percentage increase in capital formation leads to raise the economic growth of the country by 0.2%. Similarly, the coefficient of export shows that 1 percentage increase in export leads to increase the economic growth of the country by almost 1.3 percent. This result reveals that increase in export have significant role in contributing to higher economic growth. Likewise, 1 % increase in domestic credit will boost the economy by 0.95%. This indicates that financial development is also highly significant for enhancing the economic growth of Nepal. Along with that export also plays significant role in enhancing the economic growth of Nepal.

4.8 ARDL Short run coefficients

The table below shows the results of short run coefficients of all the variables used in the study.

Table 4.9: ARDL (1,0,0,0,1) Short Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGFCF)	0.060534	0.030347	1.994705**	0.0537
D(LNPOP)	0.066445	0.338513	0.196284	0.8455
D(EXP)	0.007566	0.002632	2.875093***	0.0067
D(DOMCRE)	0.000895	0.000917	0.975962	0.3356
CointEq(-1)	-0.38944	0.065693	-5.92819***	0

*****, ** and * significant at 1%, 5% and 10% respectively**

It is important to note the magnitude and significance level of the error correction term to determine the convergence or divergence of the estimated model. The Error Correction term(ECT) is defined as the speed of adjustment which proves that any disequilibrium in short run will converge itself to the long run equilibrium given that the coefficient is negative and significant. The ECT reported in the above table is -0.3894 which is both negative and significant at 1% and shows that any short-run disequilibrium among the variables converges in the long run at the rate of

38.94% per annum. Whereas, gross fixed capital formation and exports are found to be significant and positively affect economic growth in the short run.

4.9 Diagnostic Tests

In order to know whether the estimated ARDL model is stable or not we performed various diagnostic tests.

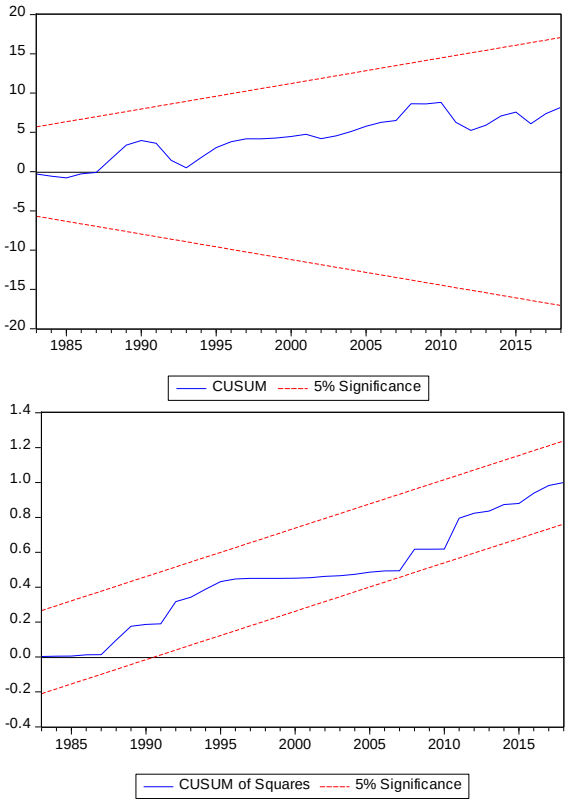
Table 4.10: Diagnostic Tests of ARDL model

Tests	Probability
Serial correlation	0.2089
Heteroscedasticity	0.4616
Ramsey RESET	0.0903
Normality	0.4635

Table 4.10 shows the diagnostic tests of the estimated ARDL model. It can be seen that the probability value for serial correlation, heteroscedasticity, functional form and normality are above 5% indicating that the ARDL model is stable. Therefore, we cannot reject the null hypothesis of no serial correlation, homoscedasticity, proper specification of the model and normality of the regression equation.

4.10 CUSUM and CUSUM Square plots

The CUSUM(Cumulative sum) and CUSUMQ (Cumulative sum of square) tests are used to assess the stability of a model. They were originally designed to detect structural breaks in a model without prior knowledge of when these breaks occur, similar to Chow tests. However, these tests are often used to check the stability of a regression model. The CUSUM test calculates the cumulative sum of the recursive residuals of the model and plots them against the upper and lower bounds of the 95% confidence interval. If the residual plots remain within these bounds, the null hypothesis of constant model coefficients is not rejected. On the other hand, if the plot crosses the critical bounds, the null hypothesis is rejected and the model is considered unstable. The CUSUMQ test follows a similar procedure, plotting the square of the residuals within the 5% bounds.



Source: Author's Computation

Figure 4.2: CUSUM and CUSUMQ

The results from CUSUM and CUSUMQ tests shows that the line falls within the upper and lower band which proves the model to be stable.

4.11 Toda YamamotoGranger causality test

Since there is long-run relationship between the time series in this research, there should be at least one unidirectional and bidirectional causal relationship between the time series. We find that there is bidirectional causal relationship between GDP and domestic credit of Nepal. GDP granger-causes domestic credit at 5% level of significance and domestic credit granger causes GDP at 10% level of significance. Similarly, GDP granger causes export at 5% level of significance. Therefore, we can tell that the ARDL long-run relationship result is robust since there is multiple granger-causality relationship established among the time-series.

4.12Findings

Similar studies conducted around the globe has found out having positive impact of financial development on economic growth. .Pradhan (2009) used various financial indicators and analyzed the impact of financial development on economic

growth in India and found positive relationship among domestic credit and economic growth. Likewise, M. A. Khan, (2008); Kumar &Paramanik, (2020); Mishra et al., (2009); Yakubu &Affoi, (2014) also found out long run relationship among economic growth and financial development. However, some studies have found out having negative impact of financial development on economic growth. The findings of Begum & Aziz, (2019); de Gregorio &Guidotti, (1995); Pham & Nguyen, (2020)found domestic credit to negatively affect the economic growth.Various studies were conducted in Nepal to analyze the impact of financial development on economic growth. The findings of Bist&Bista, (2018); Gautam, (2014); Panthi, (2021); Paudel& Acharya, (2020); Timsina, (2014) found out existence of long run relationship and positive impact of financial development on economic growth. Among various studies conducted to analyze the relationship between financial development and economic growth; some studies have used domestic credit as an indicator of financial development and found out positive impact of domestic credit on economic growth (Panthi, 2021; Paudel& Acharya, 2020; Timsina, 2014).

CHAPTER V.

SUMMARY,CONCLUSION AND POLICY IMPLICATIONS

5.1 Summary

The study was conducted using the time series data between the period 1974 to 2018 to analyze the relationship between the domestic credit and economic growth. Along with this, the study examined what causal relationship exists among the variables. Firstly, the study carried out series of unit root tests such as Augmented Dickey Fuller test, Phillip Perron test and KPSS test to check the stationarity of the variables. The findings show that some variables to be stationary at their level whereas some other variables were found to be stationary after first difference. So, the variables used in the study have mixed order of integration i.e., the presence of both I (0), and I (1). Similarly, the study used VAR lag length criteria in order to select the maximum number of lags and based on SC criterion the maximum number of lags used was 1. After, that the ARDL model was run to find out the values of both long run and short run coefficients. The results found out all variables to be positive and statistically significant Gross Fixed Capital Formation (GFCF), export, and domestic credit were found to be highly significant whereas the results show that population is statistically insignificant.

The results from ARDL long run coefficients shows that 1 % increase in GFCF leads to economic growth by 0.2%. Similarly, if population increases by 1% then it results in 0.13 % rise in economic growth. Along with that both domestic credit and export have positive and highly significant results indicating that 1% rise in domestic credit will accelerate the economic growth by 0.9%, and economic growth will boost by almost 1.3% if there is 1% rise in export.

The Error Correction Term (ECT) of short run coefficient is found to be both negative and significant at 1% level of significance. The value of ECT is -0.389 which means that any disequilibrium in short run created by some shocks will eventually converge to long run equilibrium at the rate of 38% per annum. So, in order to check whether all the conditions of normality, serial correlation, and heteroscedasticity are satisfied

or not diagnostics tests were run and the results from the tests show that all the conditions are satisfied.

The results show positive relationship among all the variables used in the study. To achieve the economic growth all the variables like GFCF, population, domestic credit, and export play a significant role. The study mainly analyzed the impact of domestic credit on economic growth, and found out positive and statistically significant impact of domestic credit on enhancing the economic growth of Nepal, this result matches with the findings ofBist&Bista (2018). This result matches with the findings of previous studies where impact of financial development on economic growth has been analyzed. This finding is similar with the findings of (Gautam, 2014; Panthi, 2021b; Paudel& Acharya, 2020; Timsina, 2014).

The long run coefficient of domestic credit shows that if domestic credit is increased by 1 % then it will boost the economy by 0.9 %. So, from the results what we found is that domestic credit has a vital role in economic growth of the country so if the available credit is channeled into the productive sector, then it can increase the growth. Developing countries like Nepal, spend most of the credit in consumption. Consumer durables like automobiles and cars and real estate are the areas where most of the country's credit is used which doesn't result in economic growth. So, policy makers should formulate programs and policies which ensures that the large portion of available credit goes to productive sectors like agriculture and manufacturing. Along with that central bank should also monitor the flow of credit and control the flow of credit in unproductive sector by creating a minimum threshold of credit that must be provided to agriculture and manufacturing sectors which leads to economic growth of the nation.

5.2 Conclusion

Although, Nepal Rastra Bank has directed banking and financial institutions to provide certain percentage of their total credit of their credit to agriculture and manufacturing sectors. But in reality, it has not been implemented properly so the central bank must supervise the credit operations functioned by the banking and financial institutions are being channeled towards productive sectors or not. Along with that the minimum threshold of providing credit facility towards agriculture sector must be increased and monitored properly as, Nepal is an agriculture country with most of the population engaged in it. Thus, if this sector is provided with enough

credit and a favorable market by the government then, a lot benefits can be gained through which it helps to accelerate the pace of economic growth. Thus, the findings shows that domestic credit as well as export both plays significant role in affecting the economic growth of Nepal. So, policy must be made in such a way that available credit should be utilized in productive sectors.

Similarly, export has also been found to affect the economic growth positively. The major exports of Nepal include agricultural products like honey, cardamom, ginger, lentils, tea, medicinal herbs, essential oils, handmade paper, silver jewelry, wool products, pashmina, sugar, coffee, along with dairy products. So, in order to increase the amount of export and benefit from it, government should focus of providing farmers with concession loans with lower interest rate which helps them to increase the agricultural production and thereby increase in exports as well which helps in increasing the economic growth as the results show that 1 percentage increase in export leads to rise the economic growth by almost 1.3 percentage. Along, with that government should focus towards providing subsidies to farmers and a better market for their production to ultimately enhance the growth of the country. The development of credit market will lead new entrepreneurs to come to market with innovative ideas, which improves both the production and productivity. So, policy makers must focus on improving the efficiency of financial institutions and develop modern financial system and regularly monitor the flow of credit towards productive sector to ensure higher economic growth.

Most portion of exports of Nepal involves agricultural products and having around 66% of total population engaged in that sector and having one third contribution to GDP, enhancement of agriculture sector can have very fruitful impact both on the country's growth along with the betterment of farmers who are involved in this sector. Thus, it can be seen that Nepal can benefit in many ways, thus, policy makers must focus on enhancing and improvising the agriculture sector through various ways; modernization of agriculture and introduction of technology and innovations, providing enough credit facility with lower interest rates to the farmers, and a better market.

5.3 Policy Recommendations

According to Financial Access Report published by NRB in 2021 shows that out of total population 67.3% population has at least one unique bank account indicating huge financial access but the statistics from same report found that out of those 67.3% around 33% account are found to be dormant. So, if the inclusion of people towards the financial sector can be increased then the impact of domestic credit could be increased. So, policies should be directed toward more financial inclusion and financial literacy. Thus, policies should be directed towards increasing domestic credit as it has significant impact on economic growth.

Subsidies to the farmers by the government should be increased so that the farmers can improve their production at a larger scale and sufficient enough to export to rest of the world. So, it can be seen that the country can improve its economic growth in multiple ways. Establishment of agriculture-based industries by the government can help solving the problem heavy out migration in search of job and along with higher economic growth. The numbers of people migrating to foreign land for employment opportunities is increasing rapidly. So proper investment in agriculture and establishment of different agriculture-based industries is a must in context of Nepal. If government can work on this then the problem of heavy out migration can be controlled as people can easily get job within the countries. So, if people seeking opportunities in foreign land are provided with job here in the country, then it will help to increase the production, resulting in lower imports of agriculture products and along with that export can be increased from which the country can be benefitted.

Future studies can incorporate more countries into analysis to form cross country panel data set, so that comparison can be made among south Asian countries and rest of the world as well.

REFERENCES

Acharya, M. (2003). Development of the financial system and its impact on poverty alleviation in Nepal. *Economic Review, 15*(2003), 1–32.

Al-Malkawi, H.-A. N., Marashdeh, H. A., & Abdullah, N. (2012). Financial development and economic growth in the UAE: Empirical assessment using ARDL approach to co-integration. *International Journal of Economics and Finance, 4*(5), 105–115.

Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? *Journal of Economic Growth*, *20*(2), 105–148.

Beck, T., Levine, R., &Loayza, N. (2000). Finance and the Sources of Growth. *Journal of Financial Economics*, *58*(1–2), 261–300.

Begum, H., & Aziz, M. S. I. (2019a. Impact of domestic credit to private sector on gross domestic product in Bangladesh. *IOSR Journal of Economics and Finance (IOSR-JEF)*, *10*(10), 45–54.

Bhetuwal, K. R. (2007). Financial liberalization and financial development in Nepal. *Economic Review*, *19*(2), 23–41.

Bist, J. P., &Bista, N. B. (2018). Finance–growth nexus in Nepal: An application of the ARDL approach in the presence of structural breaks. *Vikalpa*, *43*(4), 236–249.

Brooks, C. (2014). In C. Brooks. *Introductory Econometrics for Finance*, *331*.

Budha, B. (2012). *A multivariate analysis of savings, investment and growth in Nepal*.

Cobb, C. W., & Douglas, P. H. (1928). *A theory of production*.

Das, P. (2019). Econometrics in Theory and Practice: Analysis of Cross Section. *Time Series, and Panel Data with Stata*, *15*.

de Gregorio, J., &Guidotti, P. E. (1995). Financial development and economic growth. *World Development*, *23*(3), 433–448.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*(366a), 427–431.

Domar, E. D. (1946). Capital expansion, rate of growth, and employment. *Econometrica, Journal of the Econometric Society*, 137–147.

Durusu-Ciftci, D., Ispir, M. S., &Yetkiner, H. (2017). Financial development and economic growth: Some theory and more evidence. *Journal of Policy Modeling*, *39*(2), 290–306.

Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251–276.

Gautam, B. P. (2014). *Financial development and economic growth in Nepal*. Nepal Rastra Bank, Research Department.

Granger, C. W. J. (1981). Some properties of time series data and their use in econometric model specification. *Journal of Econometrics*, *16*(1), 121–130.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, *2*(2), 111–120.

Harrod, R. F. (1939). An Essay in Dynamic Theory. *The Economic Journal*, *49*(193), 14–33.

Johansen, S., &Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with appucations to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169–210.

Khan, M. A. (2008a). Financial development and economic growth in Pakistan: evidence based on autoregressive distributed lag (ARDL) approach. *South Asia Economic Journal*, *9*(2), 375–391.

Khan, M. S., &Senhadji, A. S. (2000). *Financial development and economic growth: An overview*.

Khanal, M. (2021). Relationship between Macroeconomic Policy and Long-Run Economic Growth of Nepal. *Quest*, *3*(2), 265–276.

Kharel, R. S., &Pokhrel, D. R. (2012). Does Nepal's financial structure matter for economic growth. *NRB Economic Review*, *24*(2), 31–46.

Kumar, K., &Paramanik, R. N. (2020). Nexus between Indian economic growth and financial development: A non-linear ARDL approach. *The Journal of Asian Finance, Economics and Business*, *7*(6), 109–116.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics*, *54*(1–3), 159–178.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, *46*(1), 31–77.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42.

Maddala, G. S., & Kim, I.-M. (1998). *Unit roots, cointegration, and structural change*.

Mishra, P. K., Das, K. B., & Pradhan, B. B. (2009). Credit market development and economic growth in India. *Middle Eastern Finance and Economics*, *5*(3), 92–106.

Narayan, P. (2004). *Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji* (Vol. 2, Issue 04). Monash University Australia.

Nkoro, E., &Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, *5*(4), 63–91.

NPC/GoN. (2020). *The fifteenth plan*.

Pant, B. (2005). Nepal's trade sector: Review, repercussions and recommendations. *Economic Review*, *17*, 89–115.

Panthi, P. (2021). *Financial Development and Economic Growth in Nepal: An ARDL Bound Test Approach*.

Paudel, R. C., & Acharya, C. P. (2020). Financial development and economic growth: Evidence from Nepal. *NRB Economic Review*, *32*(1), 15–36.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326.

Pham, H., & Nguyen, P. (2020). Empirical research on the impact of credit on economic growth in Vietnam. *Management Science Letters*, *10*(12), 2897–2904.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335–346.

Pradhan, R. P. (2009). The nexus between financial development and economic growth in India: Evidence from multivariate VAR model. *International Journal of Research and Reviews in Applied Sciences*, *1*(2).

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, *94*(5), 1002–1037.

Shreezal, G. C. (2020). Relationship between trade openness, financial development and economic growth of Nepal: evidence from a developing country. *Quest Journal of Management and Social Sciences*, *2*(2), 206–224.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70*(1), 65–94.

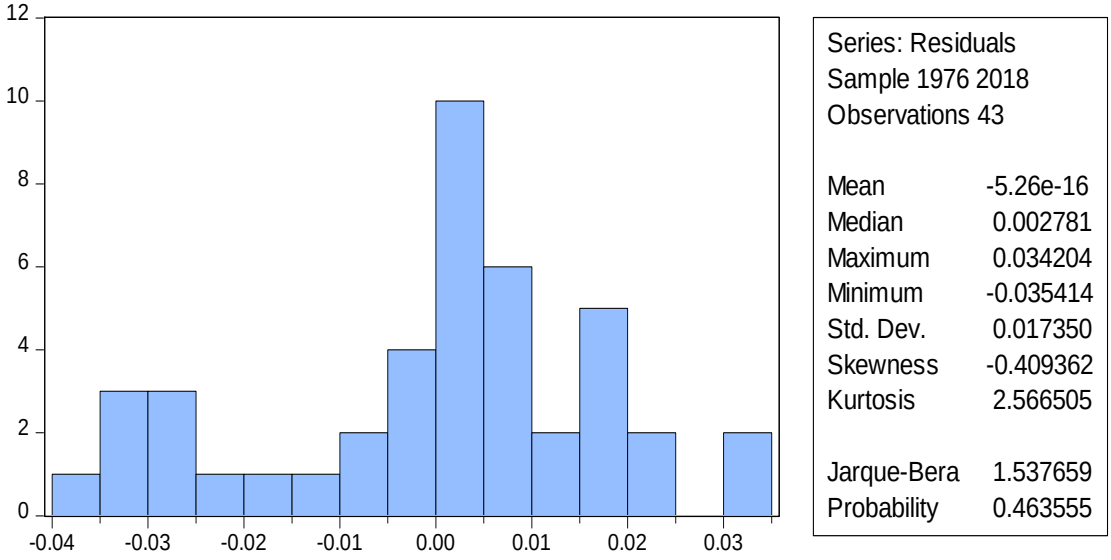
Timsina, N. (2014). Impact of bank credit on economic growth in Nepal. *Nepal Rastra Bank, Research Department*, *22*, 1–23.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics, 66*(1–2), 225–250.

Yakubu, Z., &Affoi, A. Y. (2014). An analysis of commercial banks' credit on economic growth in Nigeria. *Current Research Journal of Economic Theory*, *6*(2), 11–15.

ANNEX

Figure: Normality



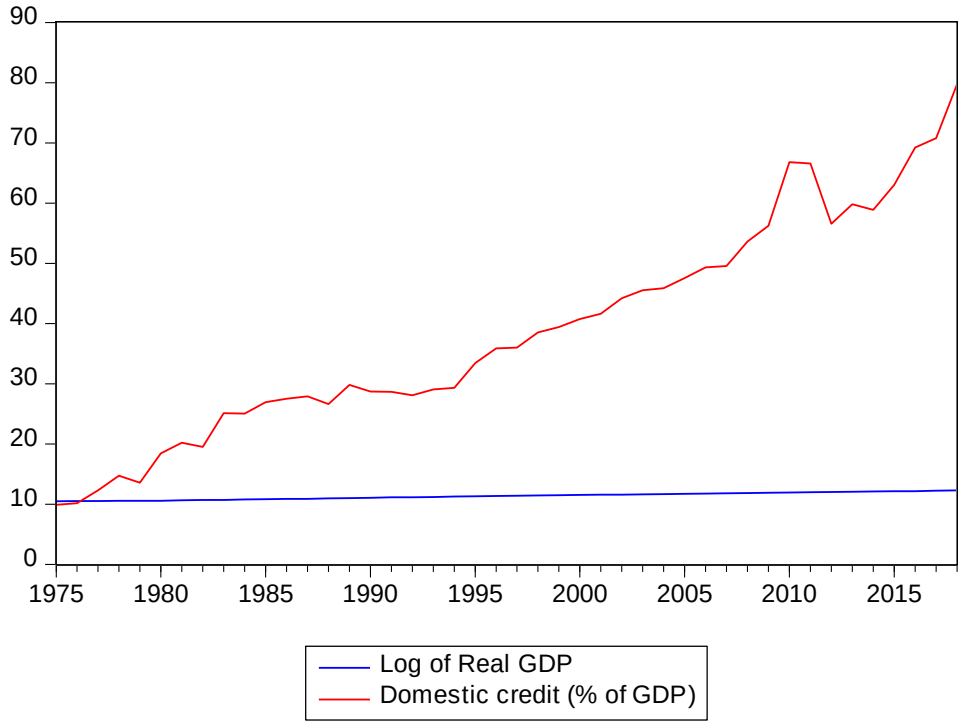
From the above figure what we can see is that p value of Jarque Bera is 1.5276>0.05, and the value of Jarque Bera is 1.5276 and the corresponding p value is 0.46. Since, the corresponding p value is greater than 0.05, we reject the alternative hypothesis and accept the null hypothesis of normal distribution. Thus the results show that the data are normally distributed according to the normality preconditions.

Granger-Causality test

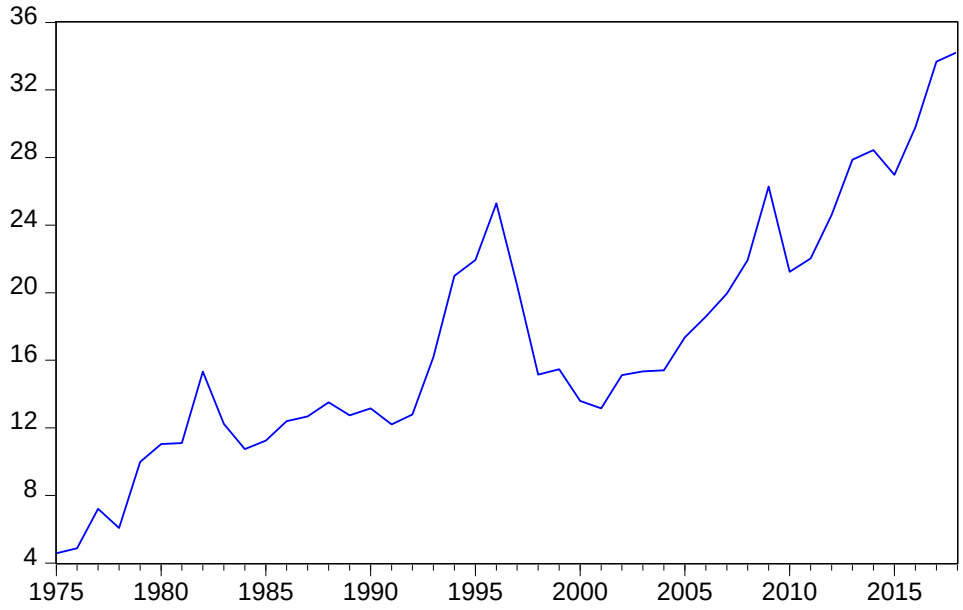
Null Hypothesis	**P value**
LNGFCF does not granger cause LNGDP	0.1284
LNPOP does not granger cause LNGDP	0.0733*
DOMCRE does not granger cause LNGDP	0.1050*
EXP does not granger cause LNGDP	0.1353
LNGDP does nor granger cause LNGFCF	0.6045
LNPOP does not granger cause LNGFCF	0.7862
DOMCRE does not granger cause LNGFCF	0.3587
EXP does not granger cause LNGFCF	0.3624
LNGDP does not granger cause LNPOP	0.1704

LNGFCF does not granger cause LNPOP	0.3661
DOMCRE does not granger cause LNPOP	0.5551
EXP does not granger cause LNPOP	0.2024
LNGDP does not granger cause DOMCRE	0.0596**
LNGFCF does not granger cause DOMCRE	0.8440
LNPOP does not granger cause DOMCRE	0.9003
EXP does not granger cause DOMCRE	0.2955
LNGDP does not granger cause EXP	0.0574**
LNGFCF does not granger cause EXP	0.8427
LNPOP does not granger cause EXP	0.0157***
DOMCRE does not granger cause EXP	0.4242

Trend of GDP and Domestic credit



Net import (% of GDP)



VAR Lag Order Selection Criteria
Endogenous variables: LNGDP LNGFCF LNPOP DOMCRE

NETIMP_PERCENT

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-109.4750	NA	0.000183	5.584148	5.793120	5.660244
1	175.3453	486.2786	5.80e-10	-7.090015	-5.836182*	-6.633438*
2	204.6558	42.89335*	4.97e-10*	-7.300281*	-5.001587	-6.463223
3	226.3540	26.46121	6.79e-10	-7.139217	-3.795662	-5.921679

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

ARDL Bounds Test
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	30.57188	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

ARDL Cointegrating And Long Run Form
Dependent Variable: LNGDP

Selected Model: ARDL(1, 0, 0, 1, 0)

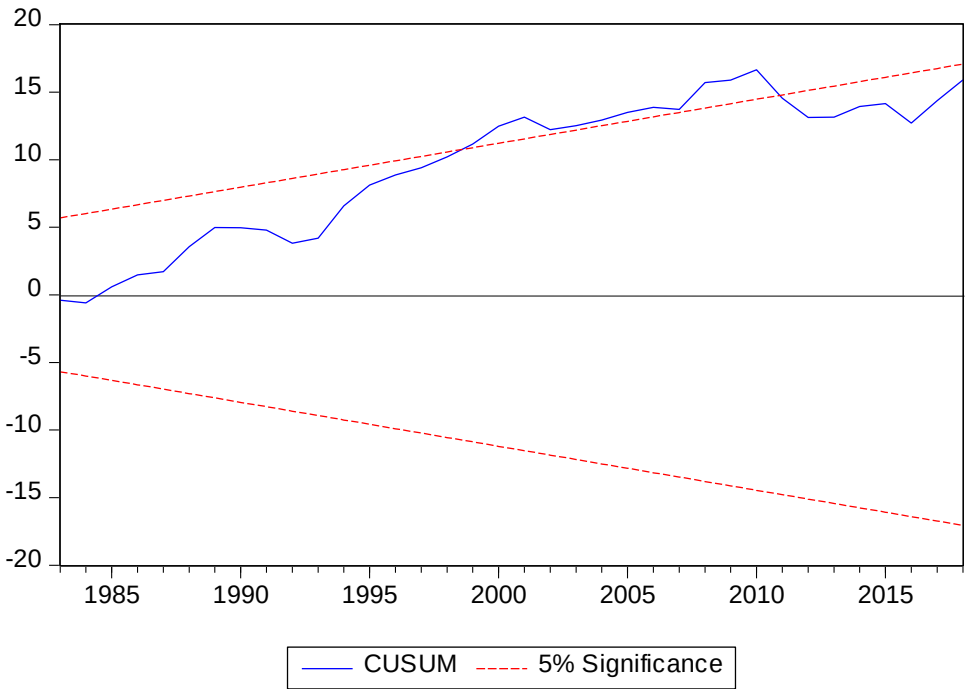
Cointegrating Form

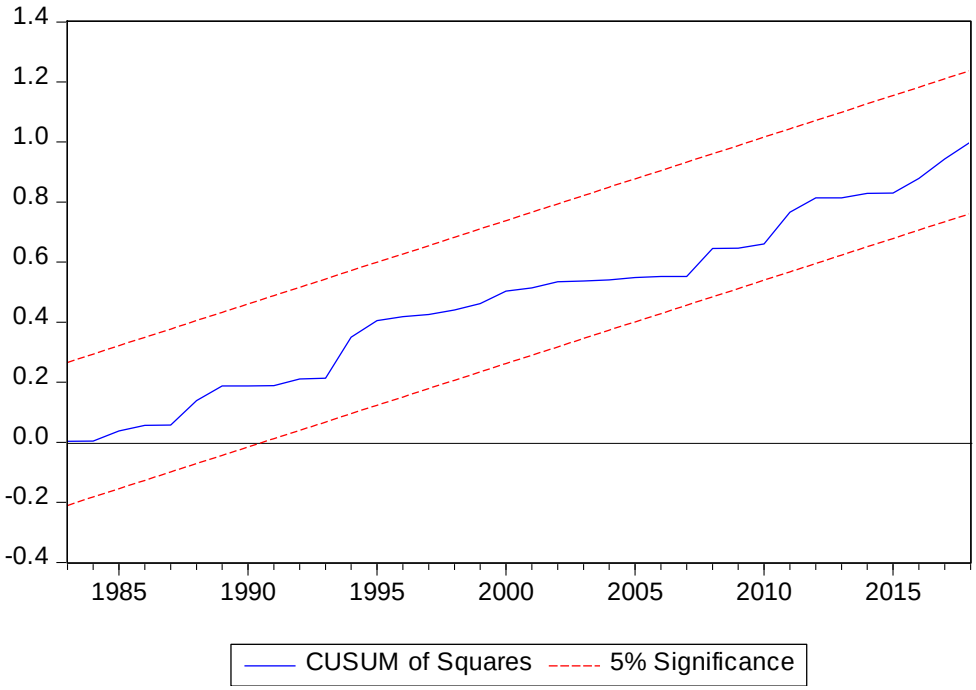
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGFCF)	0.032217	0.033690	0.956258	0.3453
D(LNPOP)	0.403866	0.340227	1.187049	0.2430
D(DOMCRE)	-0.000464	0.000961	-0.483380	0.6318
D(NETIMP_PERCENT)	-0.000175	0.001274	-0.137622	0.8913
ECT(-1)	-0.357122	0.067154	-5.317944***	0.0000

Cointeq = LNGDP - (0.1622*LNGFCF + 0.8125*LNPOP + 0.0046*DOMCRE -0.0003*NETIMP_PERCENT + 7.0709)

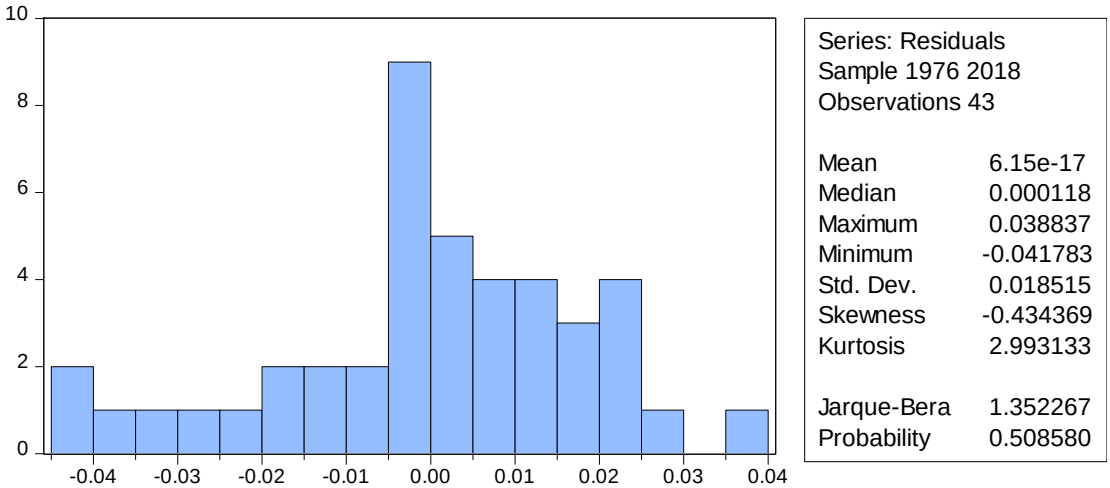
Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGFCF	0.162180	0.058951	2.751125***	0.0092
LNPOP	0.812492	0.352719	2.303509**	0.0271
DOMCRE	0.004557	0.002331	1.954999*	0.0584
NETIMP_PERCENT	-0.000268	0.003675	-0.072903	0.9423
C	7.070888	0.549728	12.862524***	0.0000





Tests	Probability
Serial correlation	0.1599
Heteroscedasticity	0.2698
Ramsey RESET	0.1946
Normality	0.5085



Toda- Yamamoto Granger-Causality test

VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LNGDP

Excluded	Chi-sq	Df	Prob.
LNGFCF	4.917017	2	0.0856
LNPOP	6.306605	2	0.0427
DOMCRE	6.010260	2	0.0495
NETIMP_PERCENT	1.195804	2	0.5500
All	21.33396	8	0.0063

Dependent variable: LNGFCF

Excluded	Chi-sq	Df	Prob.
LNGDP	3.024145	2	0.2205
LNPOP	0.050974	2	0.9748
DOMCRE	7.791142	2	0.0203
NETIMP_PERCENT	3.876319	2	0.1440
All	17.87895	8	0.0222

Dependent variable: LNPOP

Excluded	Chi-sq	Df	Prob.
LNGDP	2.331728	2	0.3117
LNGFCF	1.680157	2	0.4317
DOMCRE	2.586919	2	0.2743
NETIMP_PERCENT	1.263960	2	0.5315
All	9.858417	8	0.2751

Dependent variable: DOMCRE

Excluded	Chi-sq	Df	Prob.
LNGDP	7.272634	2	0.0263
LNGFCF	2.711053	2	0.2578
LNPOP	1.579342	2	0.4540
NETIMP_PERCENT	9.120585	2	0.0105
All	19.80570	8	0.0111

Dependent variable: NETIMP_PERCENT

Excluded	Chi-sq	Df	Prob.
LNGDP	1.493674	2	0.4739
LNGFCF	10.62313	2	0.0049

LNPOP	3.618543	2	
			0.1638
DOMCRE	3.490933	2	
			0.1746
All	20.71541	8	
			0.0079