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**IMPLICATIONS OF SAVINGS AND INVESTMENT ON ECONOMIC GROWTH
IN MYANMAR**

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**IMPLICATIONS OF SAVINGS AND INVESTMENT ON ECONOMIC GROWTH
IN MYANMAR**

A thesis submitted as a partial fulfillment towards the requirements for the degree of
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ABSTRACT

This study aims to achieve the implications of savings and investment on economic growth in Myanmar. The study attempts to identify the long run relationship of saving and investment on economic growth and investigate the direction of causality from savings and investment to economic growth in Myanmar. The study uses annual time series data from 1989 to 2017 by conducting Johansen co-integration test to find out the long run effect of saving and investment on economic growth in Myanmar. Vector Autoregression (VAR), Vector Error Correction Model (VECM) and Granger causality test are applied to meet the purpose of the study. According to short run Vector Auto-regression (VAR) results, domestic savings has positive effect on economic growth for all lag 3 years but the coefficients are not significant. Foreign direct investment has alternate sign depending upon lag period but not statistically significant. The study found out that there is long run relationship between savings and foreign direct investment on economic growth in Myanmar using Johansen co-integration test and long run VECM model. The study proved gross domestic savings and foreign direct investment have positive effect on economic growth in the long run. However, the coefficient for domestic savings is not statistically significant while the coefficient for foreign direct investment is significant. Granger Causality Test shows that there is unidirectional causality from gross domestic savings to economic growth and but not from economic growth to gross domestic savings. Foreign direct investment does not granger cause economic growth in Myanmar. But, economic growth does granger cause foreign direct investment in Myanmar. The study also found out that government expenditure and export have bidirectional causality on economic growth in Myanmar. Therefore, this study would recommend that more savings through formal financial institutions should be encouraged since most of Myanmar people less save at formal institutions. And, more foreign direct investment ought to be attracted for economic growth in Myanmar.

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LIST OF ABBREVIATIONS

ADB	Asia Development Bank
AIC	Akaike Information Criteria
ADF	Augmented Dickey-Fuller Test
FDI	Foreign Direct Investment
IFS	International Financial Statistics
GDP	Gross Domestic Product
GDS	Gross Domestic Savings
GNS	Gross National Savings
MDI	Myanmar Development Institute
NLD	National League for Democracy
PP	Philips-Perron Test
UN	United Nations
UNCDF	United Nations Capital Development Fund
USD	U.S. Dollars
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WDI	World Development Indicators

CHAPTER (1)

INTRODUCTION

There have been a lot of well-known literatures between economic growth and foreign direct investment and between economic growth and domestic savings. Economic growth can be financed through domestic savings or through foreign capital inflows. However, most of the literature pointed out that a nation has to rely on private savings in the long run. During 1984-94, countries average GDP growth is 2.5% or higher. The median saving rate was 24% in these successful countries. On the other hand, in the 59 countries where per capital income grew at 1% per year, the median saving rate was 16% (Rodrick, 2000). It shows that there is positive relationship between growth and saving rates. Understanding the relationship between and the direction of the causality economic growth and other macroeconomic indicators is important since it gives the considerable points for the policy makers to define their development policies and goals.

Starting from early 90s, the international capital has increasingly flown into the developing countries. Foreign Direct Investment (FDI) has become significant important factor for accelerating growth and for the development of any country especially for the developing countries. Almost all studies have proved that FDI has positive effect on the economic development of the country because it can bring managerial skills, technology, market access which can accelerate the growth and development of a country.

The theoretical findings of the relationship between savings and growth come from the growth model of Harrod (1939) and Domar (1946). The higher saving ultimately brings economic growth. On the other hand, Economist John Maynard Keynes (1936) believed that the allocation savings would grow when the income level rose. Life-cycle model by Modigliani (1970) and his student also supports Keynes's hypothesis of growth drives savings. Life-cycle theory assumed that the young relative to the old, the young save a larger allocation of life-time wealth than the old in order to maintain their level of consumption when they retire.

It is concluded that theories are different in their implications for causality while empirical researches are also different in their results based on the methodology and variables they used. Therefore, it is worthwhile to analyze the long run relationship and

the direction of causality between economic growth, domestic savings and foreign direct investment in Myanmar.

1.1 Rationale of the Study

Myanmar financial sector experienced banking crisis in 2003 and the collapse of three financial institutions led to the economic hardship and alarmed the credibility of Myanmar banking sector. Since 2003 banking crisis, the legal framework to regulate the financial sector has been initiated to bring the Myanmar Banking sector closer to internationally accepted banking standards and practices. People has lost trust in the banking system and rarely used the formal banking system for their savings.

Both developing and developed countries are concerned with saving and economic growth with the possible distortion of aggregate saving. However, few developing countries does not have proper fiscal system which allows the manipulation of personal disposable income to help stability output and employment (Deaton, 1989). Myanmar is one of the least developed countries where the majority of the people do not trust the formal financial institutions to save their asset. They prefer to save physical assets such as gold, USD and real estate as their savings. Domestic Savings at formal institution is quite low compared to regional level. As per UNCDF's report, 62 percent of total adult population do not report any savings.¹

The other factor why people less save their share of disposable income in the financial institutions is that the difference between saving rate and inflation rate. This research tries to investigate the relationship between savings and economic growth in Myanmar so that policymakers can identify and design the policies that people are able to save at the formal institutions.

Myanmar banking sector are structured with four state owned banks, thirteen foreign banks branches, twenty seven private banks and forty five foreign bank's representative offices.² After the financial sector has been started to liberalize since 2011-12, banks have started to provide different financial products and services. GIZ (2018) Myanmar Banking report mentioned that the assets in the private banking sector has been increased more than six-fold between March 2012 and March 2017. The assets

¹ <https://www.mmtimes.com/news/digitalisation-will-boost-savings-culture-myanmar-expert.html>

² <https://www.cbm.gov.mm/content/representative-offices-foreign-banks>

of the stated owned banks remain almost the same between FY 2015-16 and FY 2016-17.

The ratio of foreign direct investment to GDP is 1.82% in 2010 and 6.99 % in 2017. Myanmar Development Institute (MDI), a think-tank under NLD government highlights that oil and gas sector took 69% of total FDI in 2015 and in 2016, transport and communication sector increased to 52% of total FDI.

The examination of the causal relationship between savings and investment on economic growth in Myanmar is important since it will provide useful policy information on which economic variables that Myanmar government and relevant policymakers need to control to achieve the desired level of economic growth in Myanmar. For.eg. if the results of the analysis indicate that savings and investment lead to economic growth, then Myanmar government can design the policies which would promote savings and investment in order to attain higher economic growth in Myanmar. On the other hand, if the result reveals the opposite, efforts would be made to eliminate the obstacles and to accelerate the economic growth in order to raise the level of saving and investment.

This study will identify the possibility of long-run relationship and the direction of causality between economic growth, domestic savings and foreign direct investment in Myanmar where GDP is 66.7 billion US\$ and per capita GDP is 1,267 US\$ as of 2017-18 (IMF, 2019).

1.2 Objective of the Study

The objectives of the study are;

1. To identify the long-run relationship of savings and investment on economic growth in Myanmar.
2. To investigate the direction of causality from savings and investment to economic growth in Myanmar.

1.3 Method and Scope of the Study

The study focuses on the study of the relationship between savings and investment on the economic growth in Myanmar during the period of (1989-2017) by using time series annual data.

The secondary data is collected from statistical yearbook and selected monthly indicators published by the Central Statistical Organization, quarterly financial statistical bulletin published by Central Bank of Myanmar, the World Bank Database, Asia Development Bank (ADB) and International Financial Statistics. The dependent variable is economic growth captured with gross domestic product while the independent variables are gross domestic savings, foreign direct investment, export and government expenditure.

The study employs stationary test and co-integration test to identify the long-run relationship between dependent variable and independent variables. In addition, the Granger causality test is applied to determine the direction of causality among the variables.

1.4 Organization of the Study

The study is composed of five chapters. Chapter (1) is introductory chapter, which describes objectives, method and scope of the study. Chapter (2) provides theoretical background and literature review on private savings and investment on economic growth. Chapter (3) explains the overview of savings and investment in Myanmar. Chapter (4) emphasizes research methodology and empirical analysis of savings and investment on the economic growth in Myanmar. Chapter (5) includes conclusion, findings and recommendations, which will contribute to policy considerations. This chapter will also suggest limitations and issues for future research.

CHAPTER 2

THEORETICAL BACKGROUND AND LITERATURE REVIEW

This chapter is divided into two main parts which are theoretical framework and literature review of the study. The theoretical framework section explains role of savings and investment in different growth model, life cycle theory of savings and background of causality between savings and economic growth. Literature review parts covers previous empirical studies about the relationship between savings and growth in different countries using different econometric techniques.

2.1 Theoretical Framework

This section provides role of savings at different growth model by Harrod (1939) and Domar (1946), Solow-Swan model (1956) and Romer (1986). And, the life cycle theory of savings by Franco Modigliani (1950) is referenced since this study focus on the direction of savings and economic growth. In addition, the supply leading and demand following hypothesis by Patrick (1966) is explained for the causality between savings and economic growth.

2.1.1 Role of Savings in Growth Model

The theoretical findings of the relationship between savings and growth come from the growth model of Harrod (1939) and Domar (1946). The Harrod-Domar model demonstrated that the national saving rate must be equal to the product of capital-output ratio and the rate of growth of the labor force for the country to be at the equilibrium growth path (Mphuka, 2010). The conclusion from Harrod-Domar model is that the doubling the saving rate might lead to the double rate of economic growth. If a developing country want to achieve economic growth, the government need to encourage more and more savings.

Later, Solow (1957) developed growth model that the core determinant to sustainable economic growth is technological progress and not the saving rate. The Solow (1956) -Swan (1956) model illustrated the saving rate affects temporarily on economic growth rate of output through increasing accumulation of stock of capital. According to the Solow-Swan model, a change in the saving rate impact the economy's growth of per capital output till only at the steady state. After the steady state, these

savings and investment from subsequent periods are necessary to maintain the large capital stock through the replacement of old capital stock. Only exogenous technological change does impact on increasing the rate of output per worker.

On the other hand, the Romer (1986) growth model where technology factor becomes endogenous in the model demonstrated that an increase in saving rate increase both per capital output in steady state and growth rate of per capital output. The Romer model illustrated that the impact of saving is not on the steady state output but on the growth rate of output directly. When the technology become endogenous in the model, the growth rate will persist indefinitely. Thus, while the Solow-Swan model proved that the saving rate has temporary effect on growth rate, the Romer model showed the growth effect has permanent effect (Romm, 2003).

2.1.2 Life Cycle Theory of Savings

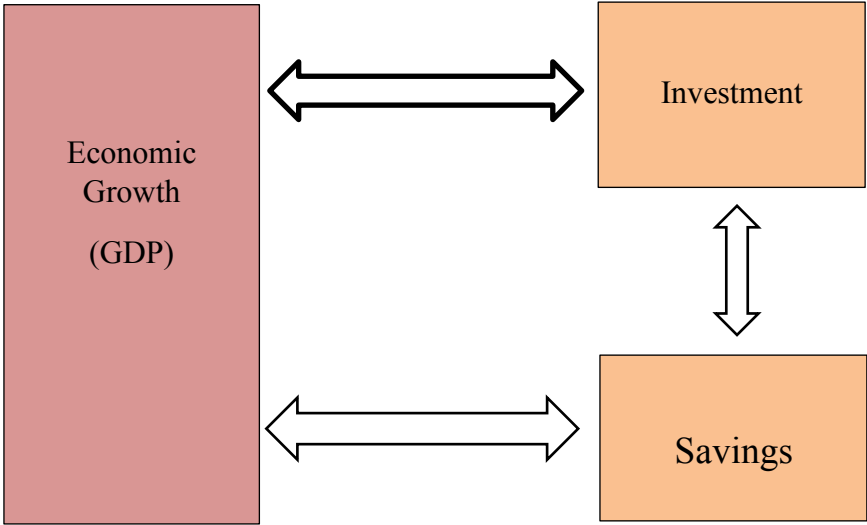
In the early 1950s, Franco Modigliani and other researchers developed the theory of spending based on how much they want to spend at each age level constrained by the resources available over their lives. The life cycle theory of saving and consumption demonstrates that changes in an economic growth rate will affect aggregate saving rate. To put it into simple way, when people are young, individual borrow to finance current consumption. When they become at middle age level, they repay back their loan taken out in the first period and make provision save for retirement. The old consume their previous accumulated assets. An increase in economic growth will increase the aggregate saving rate. This theory results important and non-obvious prediction about the economy as a whole, that national saving depends on the rate of growth of national income (Deaton, 2005).

2.1.3 Causal Relationship between Savings and Growth

Patrick (1966) postulated the causality between savings and growth as the supplying leading and demand following hypothesis. The supply leading hypothesis is defined as the causal relationship from financial sector development to economic growth which means deliberate creation of financial markets result increasing financial services driving economic growth. The demand following hypothesis means the causal relationship from economic growth to the development of financial services. People

demand more financial services and it can accelerate economic growth. However, he developed a third hypothesis called the stage of development hypothesis that the supply leading financial development can create real investment in the early stages of economic development. And the economy becomes developed, the supply leading become less and less important and demand following hypothesis becomes dominant.

Figure (2.1) Conceptual Framework of the study



Source: Based on different Empirical Research Papers

2.2 Literature Review

There is a large empirical literature on savings, investment and economic growth in the developed and developing countries using different research methodology and analytical tools. The empirical results are different based on the different methodology and the variables.

Chukwu and Agu (2009) assessed the multivariate causality between financial depth and economic growth in Nigeria from 1971 to 2008 by using Vector Error Correction Model. The result suggested that the financial depth and economic growth has long run relationship and there is unidirectional causality from economic growth to financial sector development. The study used credit to private sector, ratio of bank deposit to GDP, broad money to GDP ratio and loan to deposit ratio as financial depth indicators.

Nwanne (2014) analyzed the implications of savings and investment on economic growth in Nigeria over the period of 1981-2014 using ordinary least square method and cointegration test. The study found that saving has negative effect on economic growth while investment has positive effect on economic growth. There is long term relationship between savings, investment and economic growth in Nigeria. Adebisi (2005) assessed the saving and growth relationship in Nigeria by using Vector Autoregressive (VAR) model and Granger Causality Test and applying quarterly time series data during 1970-1998. The correlation between saving-GDP ratio has significantly negative impact to GDP and GDP per capital is caused by saving in Nigeria.

Nwakoby and Bernard (2016) investigated the effect of private sector investment on economic growth in Nigerian economy from 1986 to 2014 by applying Philip-Peron Unit root test, Johansen cointegration test and Ordinary least square (OLS). The result indicated that domestic investment and foreign direct investment and interest rate had positive relationship with real GDP growth, however, the inflation rate and exchange rate had negative relationship with real GDP. Sunday (2017) examined the impact of domestic savings on Nigeria's economic growth between 1990 and 2013 using ordinary least square (OLS) and Error Correction Model (ECM). And the research found out savings has long run relationship and positive impact on economic growth of Nigeria's economy.

Katircioglu and Naraliyeva (2006) studied foreign direct investment, domestic savings and economic growth in Kazakhstan by using Johansen cointegration test to analyze the long run equilibrium relationship of the variables. In addition, Vector Autoregressive (VAR) model and Vector Error Correction (VECM) model were used to assess the causal relationship of the variables. The results show that there is positive long run relationship between the variables and unidirectional causation from savings to GDP and foreign direct investment to GDP.

Calderon and Liu (2002) analyzed the direction of causality between financial development and economic growth of 109 developing and industrial countries from 1960 to 1994 using the Geweke (1982) decomposition test. The paper found that financial development leads to economic growth, financial sector development contributes more in developing countries rather than industrial economies and the Granger causality test shows that financial sector development to economic growth and economic growth driving financial sector development co-exist.

Ellias and Worku (2015) studied causal relationship between gross domestic savings and economic growth in East Africa, evidence from Ethiopia, Uganda and Kenya (1981-2014) using Vector Error Correction (VECM) model and Granger causality test. It showed that there is unidirectional causality between savings and economic growth in Ethiopia and Uganda but not in Kenya. Gross domestic product (GDP) does Granger cause gross domestic savings and it means that economic growth accelerates gross domestic savings.

Adu, Marbuah and Mensah (2013) studied financial development and economic growth in Ghana by using Auto Regressive Distribution Lag (ARDL) bound test for cointegration and Principal Component Analysis. The study used eight indicators such as real GDP growth, private sector credit to GDP, broad money to GDP, ratio of narrow money to broad money, ratio of currency to M2, ratio of currency to GDP, total bank deposit liabilities to GDP and total credit to GDP as financial development indicators. And the study found that the relationship between financial development is sensitive to the indicators used to proxy for financial development. The ratio of private sector credit to GDP or the ratio of private sector credit to total credit have positive relationship and significantly impact on economic growth. However, broad money supply to GDP had significantly negative effect to economic growth. The study recommended that it is important to choose the indicators to capture the financial development so that policy maker can make the right decision to design and develop the growth policies.

Kar and Pentecost (2000) examined the causal relationship between financial development and economic growth in Turkey by applying Cointegration test, Vector Error correction method (VECM) and Granger Causality test. The study used five indicators such as ratio of broad money to GNP, ratio of bank deposit liabilities to GNP, ratio of claims on private sector to GNP, ratio of bank deposit liabilities to GNP and ratio of domestic credit to GNP to capture financial development. The result indicated that the direction of causality between financial development and economic growth depends on the choice of variables measured for financial development. It is not clear interpretation from the empirical analysis whether finance leads growth or finance follows growth. The paper concluded that the strength of the causality between financial development and economic growth is much weaker than between economic growth and financial development.

Misztal (2010) examined the relationship between savings and economic growth in advanced economies and in emerging and developing countries. The result suggested

that there is one-way causal relationship from gross domestic savings to gross domestic products both in developed and developing countries. However, there is no causal relationship from gross domestic products to savings.

Romm (2003) assessed the relationship between savings and growth in South Africa over the period of 1946-1992 by using Johansen Vector Error Correction (VECM) model. The paper proved that saving is important for growth and growth is important for saving as well. The saving rate influences steady state per capita output directly and indirect through the private investment rate. The study noted that the liquidity constraints will affect the growth on saving rate.

Jagadeesh (2015) investigated the impact of savings in Economic Growth in Botswana by using Auto Regressive Distributed Lagged (ARDL) model and Dynamic Ordinary Least Square (DOLS) during the period of 1980 to 2013. The empirical result concluded that savings accelerate economic growth channeling through capital formation.

Nzomoi and Rutto (2012) tried to measure the impact of access to bank credit on economic performance using sectoral panel data in Kenya. The study found that there is a positive and significant impact of credit on sectoral gross domestic product. But, the magnitude of the impact of credit is smaller than other growth factors such as labor force, past economic performance in the sector.

Mphuka (2010) studied the relationship between savings and economic growth in Zambia by using Vector Autoregressive (VAR) model and Granger causality test. The study found that economic growth granger causes savings. The paper argued that savings might influence economic growth indirectly because savings will propel accumulation of capital stock.

Shimul and Siddiqua (2009) studied the relationship between FDI and GDP in Bangladesh between 1973 and 2007. The study concluded that there is no linkage between FDI and GDP growth. Athukorala (2003) did the research about the impact of FDI on economic growth in Sri Lanka. The study found that GDP growth cause to FDI instead of FDI to GDP growth. Shawa and Shen (2013) studied the relationship between foreign direct investment, GDP growth and export in Tanzania using 33 years' time series data. The studied revealed that FDI influence on export but there is no direct relationship between FDI and economic growth in Tanzania. Miankhel, Thangavelu and Kalirajan (2009) investigated the linkage between FDI, export and GDP growth in six countries; Thailand, Maxico, Chile, Malaysia, India and Pakistan. Their empirical results

are different from all countries. In India, economic growth attracts FDI but in Thailand, economic growth attracts FDI and also, FDI drives GDP growth. In Thailand, there is bidirectional relationship between FDI and GDP.

Table 2.1 Summary of Literature

Author and Year	Title	Variables	Methodology	Major Findings
Dr. Mohamed Sayed Abou EI-Seoud (2014)	Testing the relationship between private savings and Economic Growth: Case Study in Bahrain	GDP growth rate, saving growth rate	<ul style="list-style-type: none"> • Johansen Co-integration test • Granger causality test 	<ul style="list-style-type: none"> • Positive long run relationship between the variables, • Bidirectional causation from/to saving to/from GDP
Dr. Nwanne, T.F.I (2014)	Implication of savings and investment in Economic Growth in Nigeria	GDP, Gross Domestic Saving, Gross Domestic Investment	<ul style="list-style-type: none"> • Co-integration test, • Ordinary Least Square (OLS) 	<ul style="list-style-type: none"> • Saving has negative effect and investment has positive effect on economic growth
Salih Turan Katircioglu and Ainur Naraliyeva (2006)	Foreign Direct Investment, Domestic Savings and Economic Growth in Kazakhstan: Evidence Co-integration and Causality Test	Real GDP, Domestic Savings (DS) and FDI	<ul style="list-style-type: none"> • Johansen Co-integration test, • Granger causality test 	<ul style="list-style-type: none"> • Positive long run relationship between the variables, • Unidirectional causation from DS to GDP and from FDI to GDP

Table 2.2 Summary of Literature (Continued)

Author and Year	Title	Variables	Methodology	Major Findings
Samuel Elias and Abebe Worku (2015)	Causal relationship between gross domestic saving and economic growth in East Africa, Evidence from Ethiopia, Uganda and Kenya	Per capita GDP, domestic savings	<ul style="list-style-type: none"> • Co-integration test, • Vector Error Correction (VEC), • Granger Causality Test 	<ul style="list-style-type: none"> • Long run relationship between savings and economic growth in Ethiopia and Uganda, but not in Kenya. • Economic growth causes savings in Ethiopia and Uganda.
Clem Nwakoby (2016)	Effect of private sector investment on economic growth in Nigeria	GDP, Domestic Private Investment, FDI, foreign portfolio investment (FPI), Interest rate, inflation rate, exchange rate	<ul style="list-style-type: none"> • Co-integration test, • Ordinary Least Square (OLS) 	<ul style="list-style-type: none"> • Private investment, FDI and FPI has positive effect on GDP growth. • Inflation and exchange rate have negative relationship.
Chukwu and Agu (2009)	Multivariate causality between financial depth and economic growth in Nigeria	Private sector, ratio of bank deposit to GDP, broad money to GDP ratio and loan to deposit ratio	<ul style="list-style-type: none"> • Vector Error Correction Model • Granger Causality Test 	<ul style="list-style-type: none"> • Financial depth and economic growth have long run relationship. • There is unidirectional causality from economic growth to financial sector development.

Table 2.3 Summary of Literature (Continued)

Author and Year	Title	Variables	Methodology	Major Findings
Cesar Calderon and Lin Liu (2002)	The Direction of Causality between Financial development and economic growth (109 countries)	Real GDP, M2/GDP, domestic credit to GDP	<ul style="list-style-type: none"> • Granger causality test 	<ul style="list-style-type: none"> • Bidirectional causality that financial depth drives growth and economic growth drives financial development
Okpala Cyril Sunday (2017)	Domestic Savings and Economic Growth in Nigeria (1980-2015)	Real GDP, domestic savings, per capita income, real interest rate	<ul style="list-style-type: none"> • Co-integration test, • Ordinary Least Square (OLS) 	<ul style="list-style-type: none"> • Positive long run relationship • saving has positive impact on GDP growth
Su Su Myat (2017)	The financial reforms and implementation of monetary policy in Myanmar	GDP growth, government expenditure & investment expenditure ratio to nominal GDP, export, M1, M2, credit to private sector, Quasi money growth	<ul style="list-style-type: none"> • Co-integration test, • Vector Autoregressive (VAR) model, • Vector Error Correction Model (VEC) • Lagrange Multiplier Test (residual serial correlation) 	<ul style="list-style-type: none"> • Credit to private sector in two-year lag has positive effect on economic growth.

Table 2.4 Summary of Literature (Continued)

Author and Year	Title	Variables	Methodology	Major Findings
Adu, Marbuah and Mensah (2013)	Financial development and economic growth in Ghana: Does the measure of financial development matter?	Real GDP growth, private sector credit to GDP, Broad money to GDP, Ratio of narrow money to broad money, Ratio of currency to M2, Ratio of currency to GDP, Total bank deposit liabilities to GDP and total credit to GDP	<ul style="list-style-type: none"> • Auto Regressive Distribution Lag (ARDL) bound test • Principal Component Analysis 	<ul style="list-style-type: none"> • The relationship between financial development is different to the indicators used to proxy for financial development.
Muhsin Kar and Eric Pentecost (2000)	Financial development and Economic Growth in Turkey: Further Evidence on the Causality Issue	Ratio of broad money to GNP, Ratio of bank deposit liabilities to GNP, Ratio of claims on private sector to GNP, Ratio of bank deposit liabilities to GNP, Ratio of domestic credit to GNP	<ul style="list-style-type: none"> • Co-integration test • Vector Error correction model • Granger Causality test 	<ul style="list-style-type: none"> • The direction of causality between financial development and economic growth depends on the choice of variables measured for financial development.

Table 2.5 Summary of Literature (Continued)

Author and Year	Title	Variables	Methodology	Major Findings
M.A. Adebisi	Saving-Growth Relationship in Nigeria: An empirical evidence	Ratio of savings to GDP, Per capita GDP	<ul style="list-style-type: none"> • Vector Autoregressive (VAR) model • Granger Causality Test 	<ul style="list-style-type: none"> • The correlation between saving-GDP ratio has significantly negative impact to GDP. • Savings to GDP cause per capital GDP
Piotr Misztal (2010)	The relationship between savings and economic growth in countries with different level of economic development	Gross Domestic Product (GDP), Gross Domestic Savings	<ul style="list-style-type: none"> • Granger Causality Test 	<ul style="list-style-type: none"> • There is one-way causal relationship from gross domestic savings to gross domestic products.
Aylit Tina Romm (2003)	The relationship between savings and growth in South Africa: An empirical study	Per capita GDP, Ratio of private investment to GDP, Ratio of private saving to GDP, Credit ratio, Government expenditure, tax rate, index of political stability, human capital variable	<ul style="list-style-type: none"> • Cointegration test • Vector Error correction method 	<ul style="list-style-type: none"> • The private saving rate has a direct and indirect effect on economic growth.

Table 2.6 Summary of Literature (Continued)

Author and Year	Title	Variables	Methodology	Major Findings
Dhanya Jagadeesh (2015)	The impact of Savings in Economic Growth: An Empirical Study Based on Botswana	Gross Domestic Product, Gross Domestic Savings, Labor Force, Export, Inflation Rate	<ul style="list-style-type: none"> • Auto Regressive Distributed Lagged (ARDL) model • Dynamic Ordinary Least Square (DOLS) 	<ul style="list-style-type: none"> • There is significant correlation between savings and economic growth.
Joseph Nzomoi, Nelson Rutto and Maureen Were (2012)	Assessing the Impact of Private Sector Credit on Economic Performance: Evidence from Sectoral Panel Data for Kenya	Private Sector Credit, Employment Level (Labor), Interest Rate	<ul style="list-style-type: none"> • Panel Data Analysis • Generalized Method of Moments (GMM) 	<ul style="list-style-type: none"> • There is a positive and significant impact of credit on sectoral gross domestic product.
Chrispin Mphuka (2010)	Are Savings Working for Zambia's Growth?	Per Capita GDP, Private Consumption, Export, Inflation	<ul style="list-style-type: none"> • Vector Autoregressive (VAR) model • Granger Causality Test 	<ul style="list-style-type: none"> • Economic growth granger causes domestic savings. • Inflation and export have positive relationship with savings. • Private consumption has negative impact on domestic savings.

Source: Own Compilation based on literature review

CHAPTER 3

OVERVIEW OF SAVINGS AND INVESTMENT IN MYANMAR

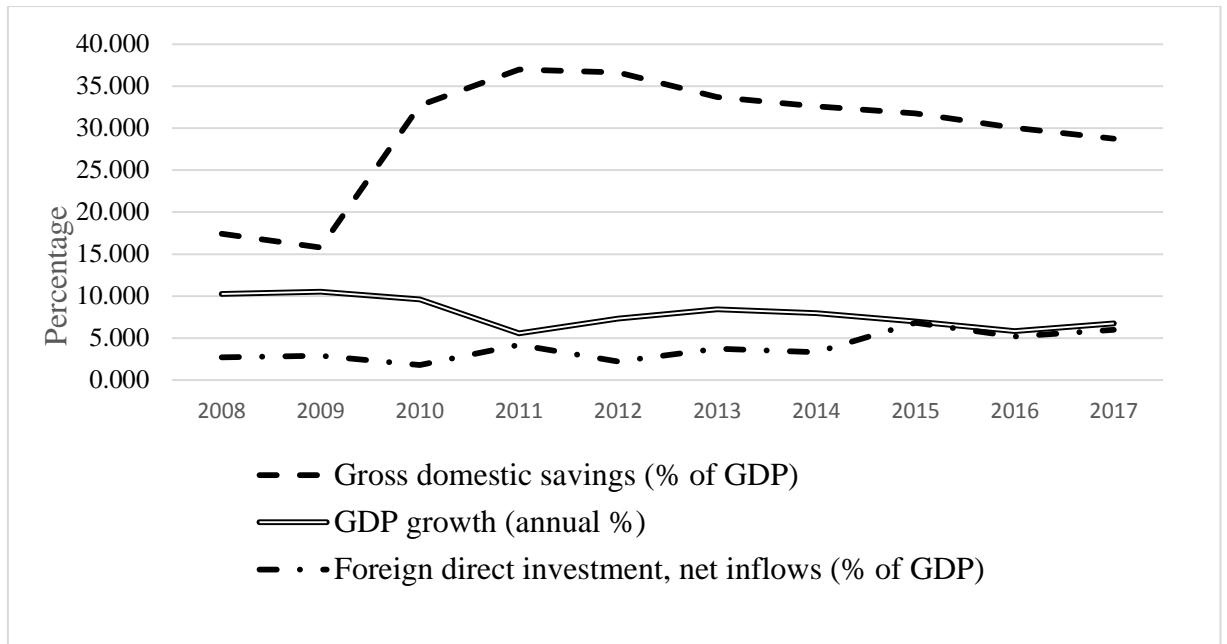
This chapter describes overview of savings and investment in Myanmar. Savings are defined as an action of not consuming a disposable income. Savings and investment are critically important for the accumulation of capital in order for a country to achieve sustainable economic growth.

3.1 Overview of Savings in Myanmar

Savings in Myanmar is quite low. During the period of 2000-2017, the gross domestic savings as a percentage of Gross Domestic Product (GDP) in Myanmar is about 29.63%³. The gross domestic savings percentage of GDP has increase from 17.42% in 2000 to 28.74% in 2017. It is lower than that of East Asia countries. During the same period, the average percentage of gross domestic savings as a percentage of GDP from East Asia countries is 42.72%. The following figure (3.1) shows annual GDP growth rate, ratio of gross domestic savings to GDP and foreign direct investment to GDP. Gross Domestic savings to GDP has dramatically increased to 32.69 % of GDP in 2010 from 15.79% of GDP in 2009. It reached to around 36% of GDP in 2011 and 2012. From 2013, it started to decrease and it became 28.74% in 2017. Foreign Direct Investment fluctuates around at 6% of GDP.

³ World Development Indicators, The World Bank

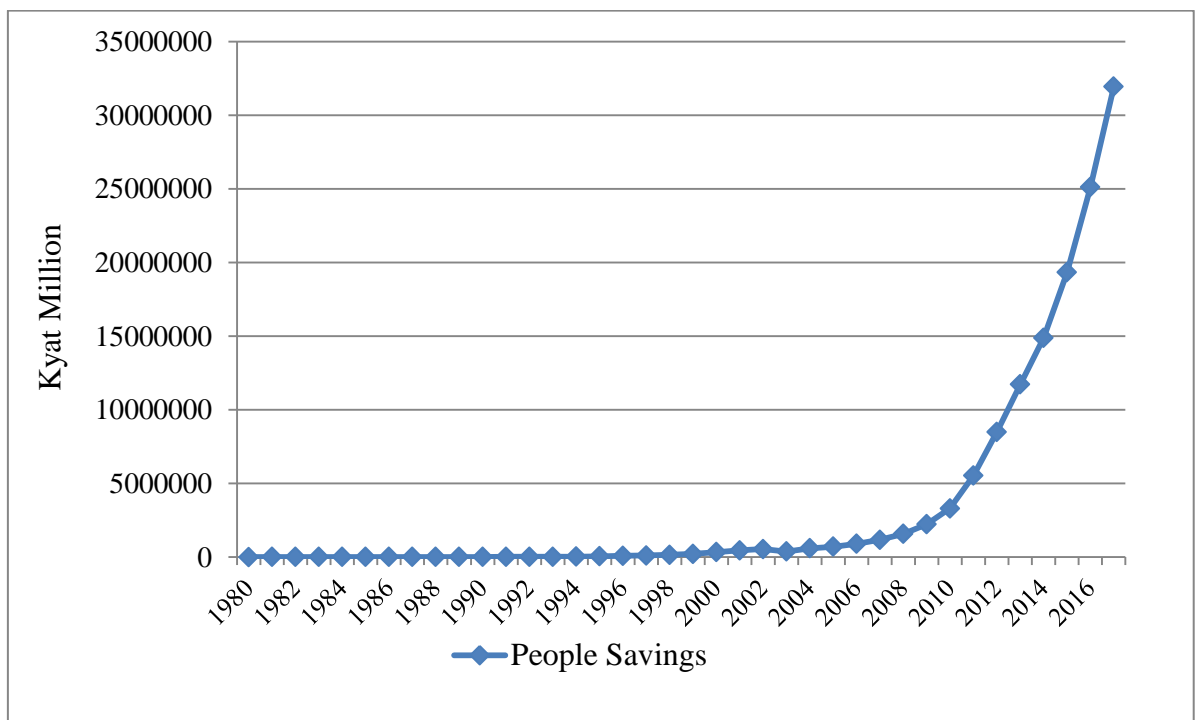
Figure (3.1) GDP Growth (annual %), Gross Domestic Savings (% of GDP) and Foreign direct investment (% of GDP) of Myanmar



Source: World Development Indicators, The World Bank

There are different forms of People’s savings in Myanmar. Figure (3.2) describes people’s saving in Myanmar from 1980 to 2017 and it has exponentially increased over time.

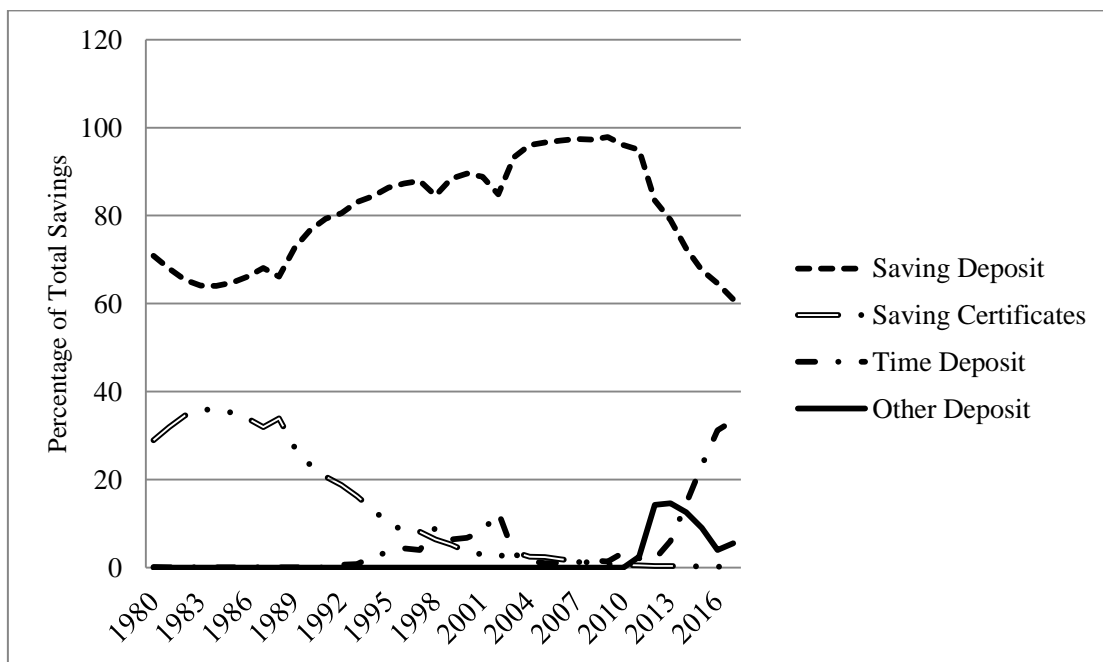
Figure (3.2) People’s Savings in Myanmar during 1980-2017



Source: Statistical Year Book, Ministry of Planning and Finance

In 1980, people's saving in Myanmar was 2,016.3 million kyats and it reached to 31,931 billion kyat in 2017. Figure (3.3) illustrates overview of different types of savings in Myanmar. People mostly save as saving deposit and saving certificates. However, time deposit savings has been increasing over time.

Figure (3.3) Overview of Different Types of Savings in Myanmar during 1980-2017

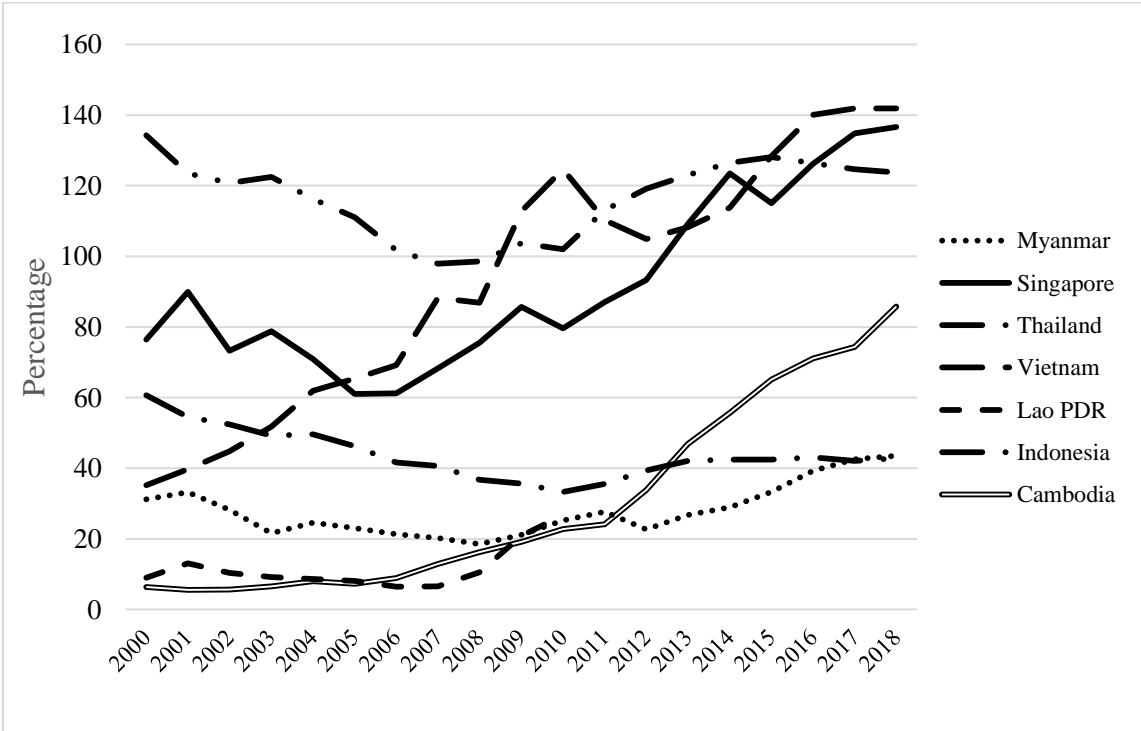


Source: Statistical Year Book, Ministry of Planning and Finance

To increase level of domestic savings is critically important for the country since it can be able to create financial resources for the private sector to make investment. Another reason is that domestic savings can create domestic credit to the private sector not subject to country's political and economic stability while foreign direct investment is subject to political and economic stability of a country. Figure (3.4) illustrates the percentage of domestic credit to private sector from financial sector by GDP. Domestic credit to private sector is defined as financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment (The World Bank). For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial institutions such as finance and leasing companies, money lenders,

insurance corporations, pension funds, and foreign exchange companies (The World Bank). During 2000-2018, the percentage of domestic credit to private sector by GDP in Myanmar has increased from 33.17% to 43.51%. The domestic credit to private sector in Myanmar is quite low in comparison with regional countries such as 123% in Thailand, 136% in Singapore, 141% in Vietnam and 85.72 % in Cambodia in 2018.

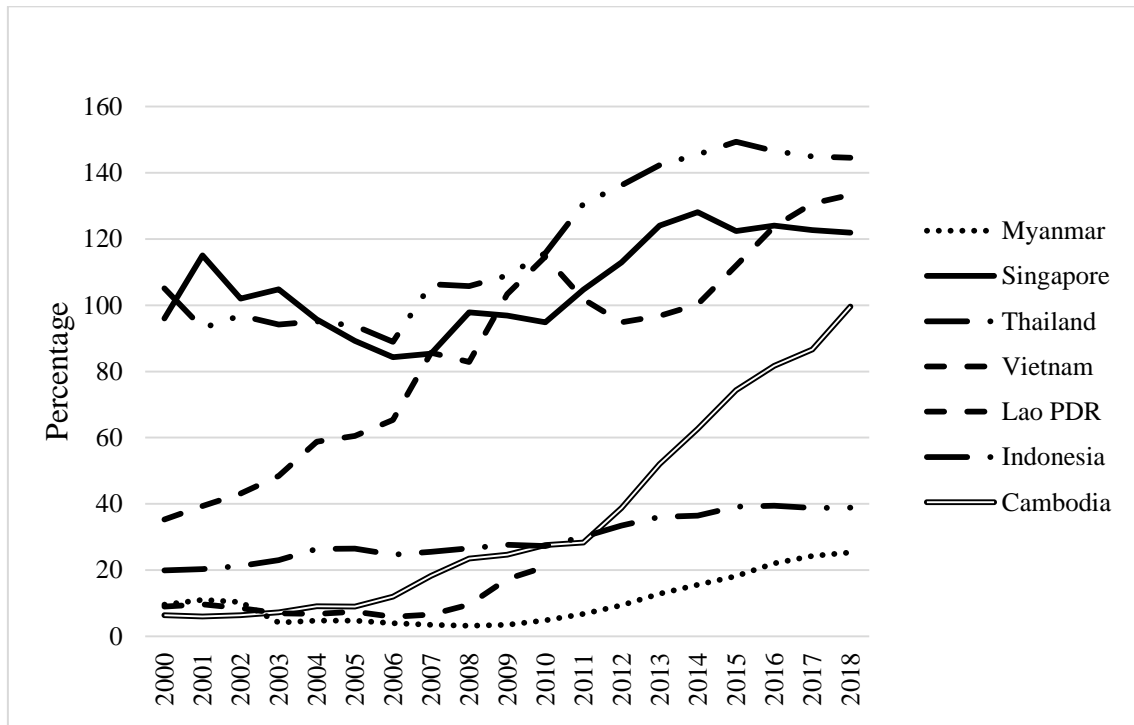
Figure (3.4) Domestic Credit to Private Sector from financial sector (%of GDP)



Source: World Development Indicators, The World Bank

Figure (3.5) shows the percentage of domestic credit to private sector from banks and other depository corporations by GDP. During 2000-2018, the percentage of domestic credit to private sector from banks and depository corporations by GDP in Myanmar has increased from 9.51% to 25.26%. The domestic credit to private sector from depository institutions in Myanmar is quite low compared to regional countries such as 144.59% in Thailand, 121.90% in Singapore, 133.30% in Vietnam and 99.57 % in Cambodia in 2018.

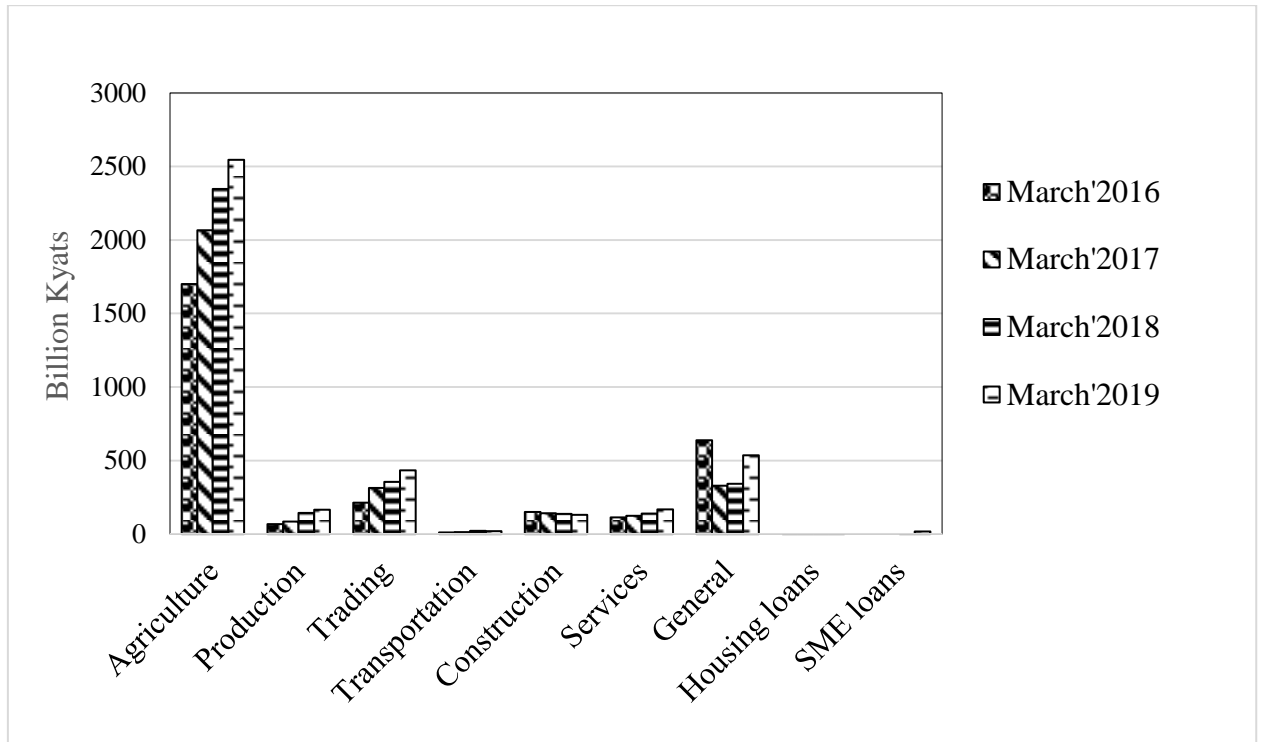
Figure (3.5) Domestic Credit to Private Sector from depository institutions (% of GDP)



Source: World Development Indicators, The World Bank

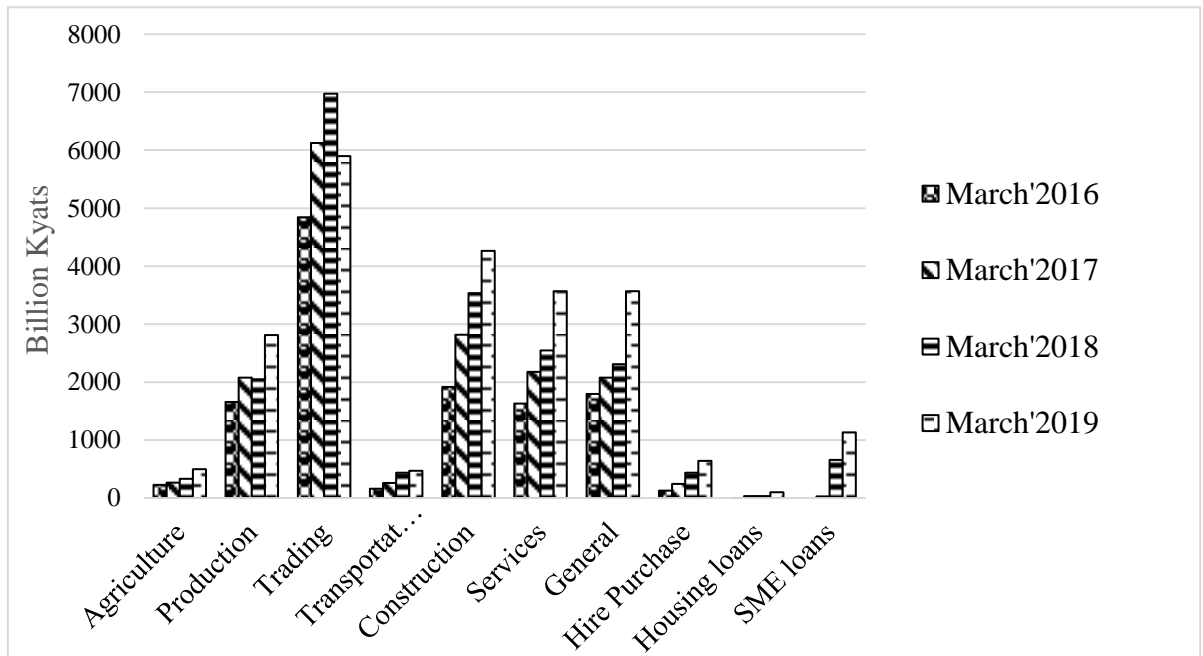
Figure (3.6), (3.7) and (3.8) shows the sectoral loan from state owned banks, private banks and foreign banks in Myanmar. Most of the loan from state owned banks goes to the agricultural sector. Agricultural loan from state owned banks has been increased from Kyat 1,702 Billion in 2016 to Kyat 2,546 Billion in 2019. Most of the loans from private banks are borrowed from trading and construction industry. Private banks' loan to trading sector has been increased from Kyat 4,842 Billion in 2016 to Kyat 5,896 Billion in 2019. Construction loan taken from private banks has been increased from Kyat 1,916 Billion in 2016 to Kyat 4,263 Billion in 2019. Most of the loan from foreign banks goes to production and service sector. Loan for production sector has increased from Kyat 322 Billion in 2018 to Kyat 479 Billion in 2019. And loan for service sector has increased from Kyat 286 Billion in 2018 to Kyat 505 Billion in 2019. Figure (3.9) and (3.10) describes loan from private banks by states and regions in Myanmar. Most of the loan goes to Shan states, Mon state, Yangon region and Mandalay region. Detail data can be found at appendix 4 and 5.

Figure (3.6) Sectoral Loan of State-owned Banks



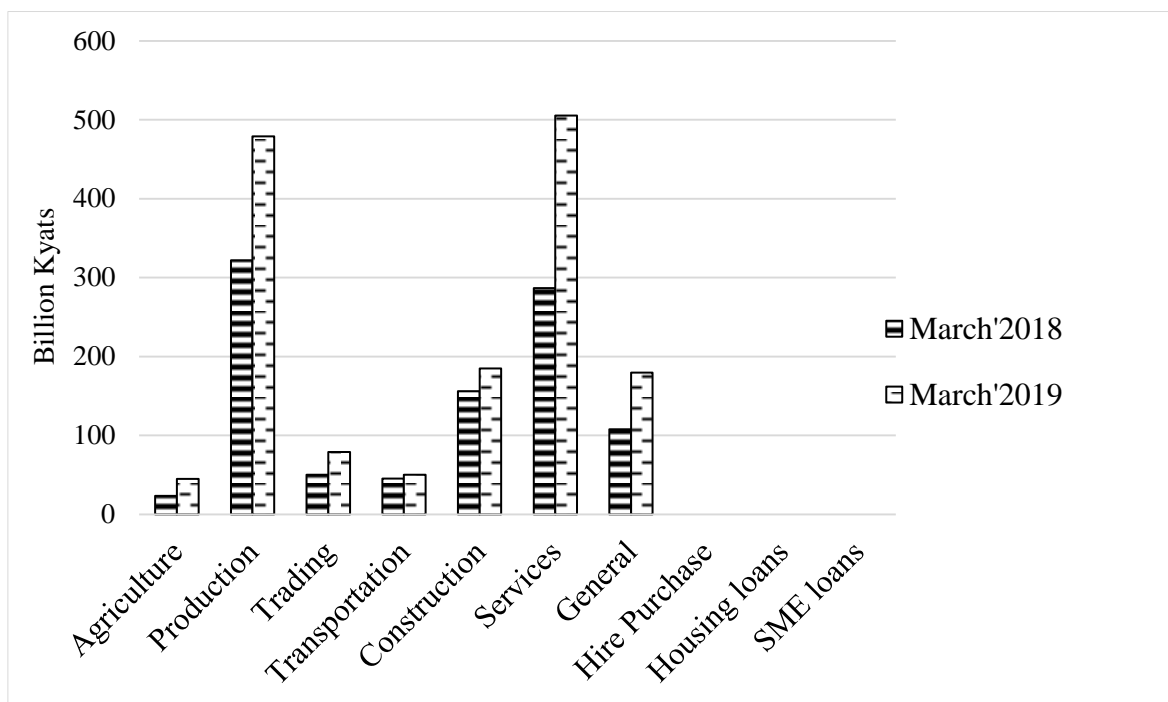
Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Figure (3.7) Sectoral Loan of Private Banks



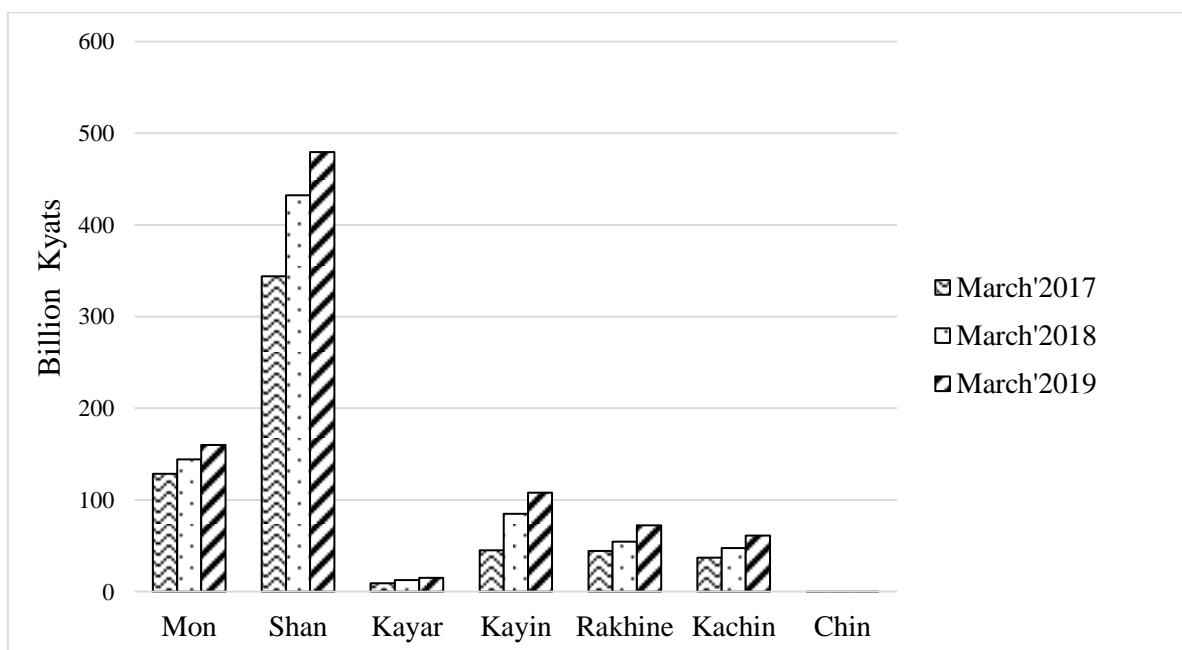
Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Figure (3.8) Sectoral Loan of Foreign Banks



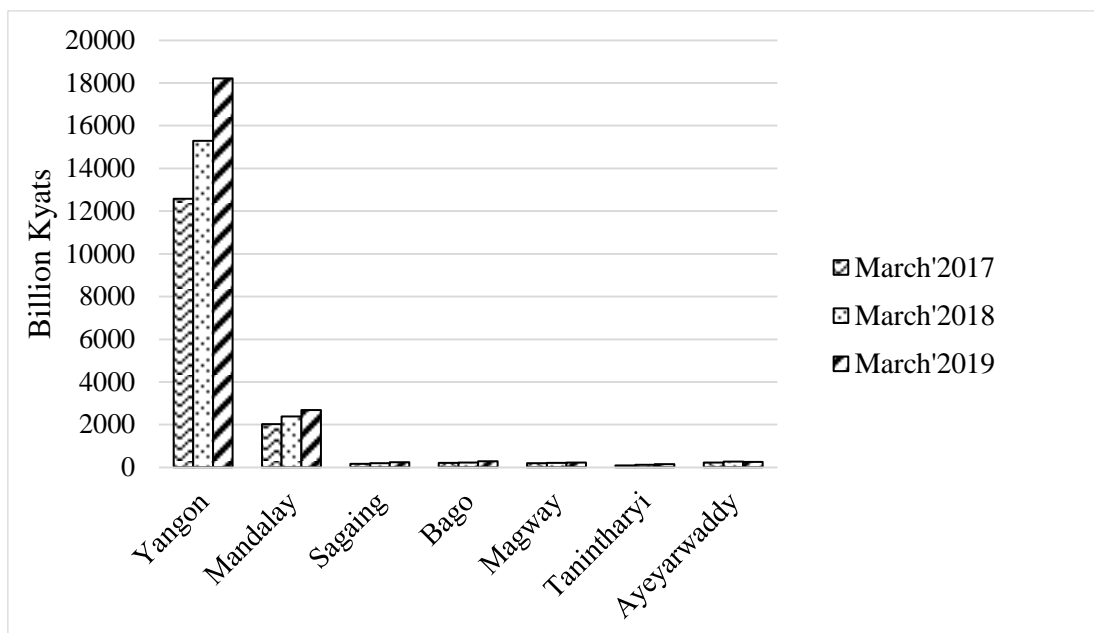
Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Figure (3.9) Loans from Private Banks (by States in Myanmar)



Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Figure (3.10) Loans from Private Banks (by Regions in Myanmar)



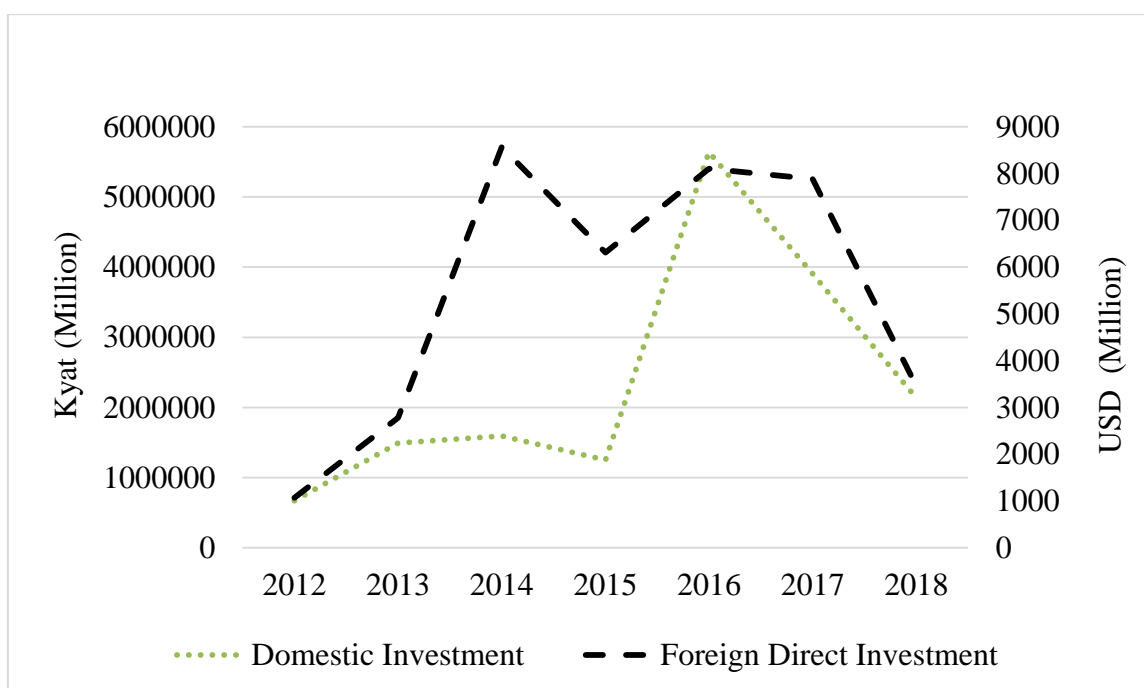
Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

3.2 Overview of Investment in Myanmar

Approved Foreign Direct Investment in Myanmar was at USD 1068 million in 2012. It has increased to USD 7844.72 million in 2017⁴ and decreased to USD 3454.626 million in 2018 after the conflict in western Rakhine state in 2017. Approved domestic investment from Myanmar citizen was Myanmar Kyat 668 billion in 2012 and increase to Kyat 3905 billion in 2017. Figure (3.11) shows the trend of both domestic and foreign direct investment. Foreign direct investment has increased to Kyat 8567.10 million in 2014 from Kyat 2780.892 million in 2013. It dropped to Kyat 6310.52 million in 2015. Again, it has increased to Kyat 8102 million in 2016. However, soon after the conflict at Rakhine state in western Myanmar, foreign direct investment has decreased to Kyat 7884 million in 2017 and Kyat 3454 million in 2018.

⁴ The year here is calendar year which covers from January to December.

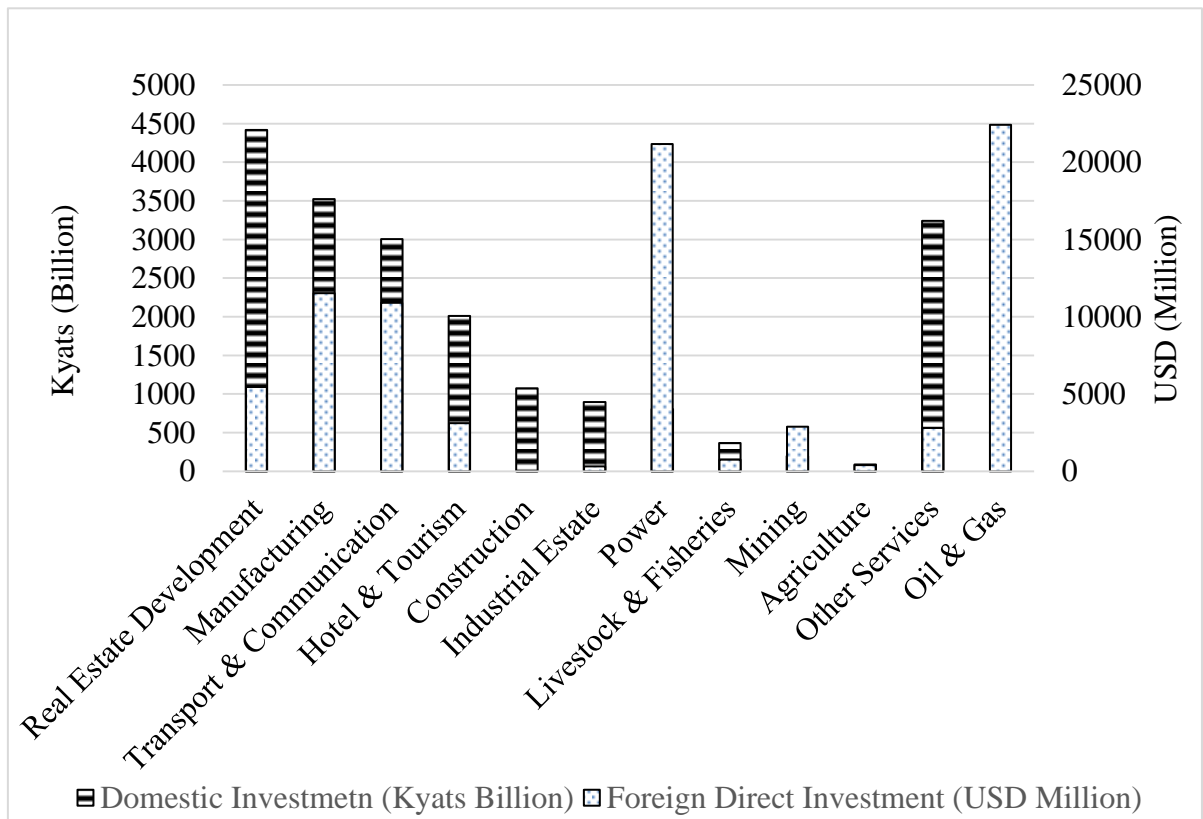
Figure (3.11) Trend of Domestic and Foreign Direct Investment during 2012-2018



Source: Directorate of Investment and Company Registration

Figure (3.12) describes sector -wise domestic and Foreign Direct Investment as of 30/9/2019. According to Directorate of Investment and Company Registration (DICA), foreign direct investment mainly goes to Oil and Gas, Power sector, transport and communication and manufacturing sector.

Figure (3.12) Domestic and Foreign Direct Investment as of 30/9/2019 (By sector)



Source: Directorate of Investment and Company Registration

As of dated 31st, October 2019, Oil and gas sector has 27%, power sector has 26%, Manufacturing sector has 14% and transport and communication sector have 13% of total investment. On the other hand, most of the domestic investment goes to real estate development which is 23% of total investment. It is followed by manufacturing sector (18% of total investment) and transport and communication sector (15% of total investment).

This chapter tried to explain overview of savings and investment in Myanmar. People in Myanmar have different forms of savings such as real estate, gold and USD rather than savings at financial institutions. This study will cover domestic savings through formal institutions. It is likely that the estimation in this study might overestimate or underestimate the effect of savings on economic growth. In Myanmar, foreign direct investment is subject to political stability and macroeconomic stability. Both foreign and domestic investment declined in 2015 due to the election and in 2017 and 2018 due to conflict in western Rakhine State.

CHAPTER 4

RESEARCH METHODOLOGY AND EMPIRICAL STUDY

This section investigates two research questions using the selected macroeconomic variables of Myanmar during the period of 1989-2017. Data used in this research are annual figures during the time frame. The first question is whether there is a long run relationship among savings, investment and economic growth in Myanmar using Johansen Co-integration test. The other one is to investigate the direction of causality from savings and investment to economic growth in Myanmar using Granger Causality Test. The study employs stationary test and co-integration test to identify the long-run relationship between dependent variable and independent variables.

4.1 Model Specification and Variables

Most of the empirical studies about role of savings and investment on economic growth generally estimate the following equation;

$$Y_t = A.f(L_t, K_t) \quad (4.1)$$

Where Y= aggregate output or GDP growth

A= technological shift which is assumed as exogenous variable

L= labour

K= capital stock through savings and investment

Based on the general growth model of equation (4.1) and empirical studies by (Nwakoby & Bernard, 2016) and (Jagadeesh, 2015), the following regression which is adopted for this study

$$GDP_t = c + \beta_1 GDS_t + \beta_2 FDI_t + \beta_3 Exp_t + \beta_4 Gov_t + \mu_t \quad (4.2)$$

Where GDP = Gross Domestic Product

GDS = Gross Domestic Savings

FDI = Foreign Direct investment

Exp = Export

Gov = Government expenditure

$\beta_1, \beta_2, \beta_3, \beta_4$ = coefficients of explanatory variables

μ_t = error term

For the equation (4.2), the secondary data are compiled from statistical yearbook and selected monthly indicators published by the Central Statistical Organization,

quarterly financial statistical bulletin published by Central Bank of Myanmar, the World Bank Database, Asia Development Bank (ADB) and International Financial Statistics (IFS). The detail data can be found at appendix (2) and (3). The dependent variable is economic growth captured with real gross domestic product while the independent variables are gross domestic savings, foreign direct investment, exports and government expenditure which seems to drive economic growth in Myanmar.

Table (4.1) Variables used in this study

Variables	Description	Source
log GDP	Natural Logarithm of Real Gross Domestic Product	World Development Indicators
log GDS	Natural Logarithm of Gross Domestic Savings	ADB
FDI	Foreign Direct Investment	ADB, DICA
Log Gov	Natural Logarithm of Government Expenditure	ADB, Budget Department, World Bank
Log EXP	Natural Logarithm of Export	ADB

Source: Own Compilation

4.2 Empirical Methodology

This study applies the following four procedures to investigate the relationship between savings, investment and economic growth by using time series data;

- (1) Stationary or unit root test to check the data are stationary or not
- (2) Co-integration test to identify the variables have short-run and long run relationship
- (3) Vector Autoregressive model (VAR) to estimate the short run relationship and Vector Error Correction model (VECM) to estimate the long run relationship
- (4) Granger Causality test to check the causal effect among the variables

4.2.1 Stationary Test

The first step is to test whether the variables are stationary or not since most macroeconomic time series have trend, structural break and seasonal variations. And, it is

likely that most of the time series data are non-stationary. A time series data is called stationary if its value tends to revert to its long-run average value and on the contrary, the non-stationary time series does not tend to return to its long-run average value (Shrestha and Bhatta, 2018). It means that its mean, variance and co-variance also change overtime. Therefore, the empirical analysis starts with performing Augmented Dickey-Fuller (ADF) unit root test and Philips- Perron (PP) on each series of the variables. Under unit root test, the null hypothesis is the series of the concerned variable has unit root, which is non-stationary, and the alternative hypothesis is that the time series does not have unit root, which is stationary.

After performing stationary test, there are three likely outcomes⁵;

- (1) If the null hypothesis of having unit root for the series is rejected, the series does not have unit root, which is stationary. It is called that the series are integrated of order (0). It requires no differencing.
- (2) If the null hypothesis of having unit root for first difference is rejected, the series is non-stationary. But the null hypothesis of first difference level is not rejected, the series become stationary at first difference. It is called that the series are integrated of order I (1).
- (3) The time series can be integrated of different orders which is a combination of I (0) and I (1) series. If the time series are mixed with I(0) and I (1), Auto-regressive distributed lag (ARDL) model should be used instead of Vector-auto regressive (VAR) model. The visual explanation about selection time series model can be found at Appendix (5).

4.2.2 Co-integration Test

After unit root or stationary test, it can be found out whether co-integration test is necessary to identify the long run relationship among the variables. If the time series are stationary and integrated of order I (0), co-integration test is not necessary to perform since any shock to the system in the short run will adjust to the long run. If the time series are integrated of order I (1) which means the series become stationary after first difference, performing co-integration test is necessary to check whether the long run relationship exist among the variables. Two prominent co-integration test for I (1) are Engle-Granger co-integration test and Johansen co-integration test.

⁵ <https://cruncheconometrix.com.ng/>

If the series are integrated of different order and combination of both level and first difference, co-integration test is necessary to perform but Johansen co-integration test is not valid to apply. And the appropriate co-integration test is Bounds co-integration test.

The co-integration test investigates the following hypothesis;

H0: There is no long-run relationship between savings and investment on economic growth.

H1: There is long-run relationship between savings and investment on economic growth.

4.2.3 Johansen co-integration test

Under Johansen co-integration test, the null hypothesis is there is no integration against the alternative hypothesis which is there is co-integration. The decision criteria is that null hypothesis can be rejected if the Trace statistics and maximum Eigenvalue is greater than 5% critical value⁶.

The conclusions from Johansen co-integration test are as follows⁷;

If series are co-integrated which means the series have long run relationship:

- (1) The series are related and can be estimated for long run and short run models.
- (2) Vector Autoregressive (VAR) model and Vector error correction model (VECM) can be applied for estimation.

If series are not co-integrated which means the series do not have long run relationship:

- (1) Vector Autoregressive (VAR) model can be applied for short run estimation.

4.2.4 Vector Autoregressive (VAR) Model

Vector auto-regressive (VAR) model is run with vector of lagged value of different independent variables at right hand side of the equation. There is no exogenous variable in the model. VAR can be used with the time series of integrated order (1). VAR model is estimated with Ordinary Least Square (OLS) and must be specified in levels not at difference. The simple VAR model with two variables is as follows;

$$X_t = c + \sum_{i=1}^k \beta_i X_{t-i} + \sum_{j=1}^k \alpha_j Y_{t-j} + \mu_{1t} \quad (4.3)$$

⁶ <https://cruncheconometrix.com.ng/>

⁷ <https://cruncheconometrix.com.ng/>

$$Y_t = c + \sum_{i=1}^k \beta_i X_{t-i} + \sum_{j=1}^k \alpha_j Y_{t-j} + \mu_{2t} \quad (4.4)$$

Where i = lag of period of variable X

j = lag of period of variable Y

4.2.4 Vector Error Correction Model (VECM)

Vector error correction model (VECM) can be applied if the time series are co-integrated. Co-integration means that there is a long-run relationship among the variables. VECM is restricted VAR model which takes into account of co-integration. Co-integrating term in the model is just error correction term. The simple VECM model with two variables can be specified as;

$$\Delta X_t = c + \sum_{i=1}^{k-1} \beta_i X_{t-i} + \sum_{j=1}^{k-1} \alpha_j Y_{t-j} + \lambda_1 ECT_{t-1} + \mu_{1t} \quad (4.5)$$

$$\Delta Y_t = c + \sum_{i=1}^{k-1} \beta_i X_{t-i} + \sum_{j=1}^{k-1} \alpha_j Y_{t-j} + \lambda_1 ECT_{t-1} + \mu_{2t} \quad (4.6)$$

Where $k-1$ = lag length is reduced by 1

λ = speed of adjustment parameter with negative sign

ECT_{t-1} = error correction term

4.3 Empirical Results

This section describes the empirical result after the data are run with Statistical Software STATA 14. This section includes Unit Root Test Result, optimum lag length selection of the variables, Vector Autoregressive Test Result, Johansen co-integration test result, Vector Error Correction Model and Granger causality test result.

4.3.1 Unit Root Testing Result

Table (4.1) and (4.2) below shows the result of stationary or unit root test by using Augmented Dicky- Fuller (ADF) test. The stationary test shows in two forms: one with drift (intercept) and another one with trend. It can be chosen depending on the nature of the data. This study tested with both. It is found that all the variables are non-

stationary at their level. They all become stationary after their first difference. Since most of the variables are stationary at first difference, co-integration test analysis is conducted at I(1) order using Johansen co-integration test (Nwakoby & Bernard, 2016). Detail results can be found at Appendix (8), (9), (10) and (11).

Table (4.2) Results of Unit Root Test (With Drift)

Variables	level		First Difference		Decision
	ADF	1%, 5% and 10% Critical Value	ADF	1%, 5% and 10% Critical Value	
Log GDP	0.960	-2.479	-2.577*	-2.485	I(1)
		-1.705		-1.708	
		-1.315		-1.316	
Log GDS	-1.843	-2.479	-3.937*	-2.485	I(1)
		-1.705		-1.708	
		-1.315		-1.316	
FDI	0.561	-2.479	-9.432*	-2.485	I(1)
		-1.705		-1.708	
		-1.315		-1.316	
Log Exp	-1.798	-2.479	-4.864*	-2.485	I(1)
		-1.705		-1.708	
		-1.315		-1.316	
Log Gov	-0.829	-2.479	-4.963*	-2.485	I(1)
		-1.705		-1.708	
		-1.315		-1.316	

Source: STATA 14 Output

Note: * means stationary after first difference at 1% significant level since ADF test statistics is greater than respective critical values.

Table (4.3) Results of Unit Root Test (With Trend)

Variables	level		First Difference		Decision
	ADF	1%, 5% and 10% Critical Value	ADF	1%, 5% and 10% Critical Value	
log GDP	-2.466	-4.352	-2.335	-4.362	Integrated Order
		-3.588		-3.592	
		-3.233		-3.235	
Log GDS	-0.579	-4.352	-4.447*	-4.362	I(1)
		-3.588		-3.592	
		-3.233		-3.235	
FDI	-1.131	-4.352	-11.486*	-4.362	I(1)
		-3.588		-3.592	
		-3.233		-3.235	
Log Exp	-2.460	-4.352	-4.884*	-4.362	I(1)
		-3.588		-3.592	
		-3.233		-3.235	
Log Gov	-1.433	-4.352	-4.935*	-4.38	I(1)
		-3.588		-3.6	
		-3.233		-3.24	

Source: STATA 14 Output

Note: * means stationary after first difference at 1% significant level since ADF test statistics is greater than respective critical values. ** denotes stationary after first difference at 5% significant level.

After unit root or stationary test, VAR lag selection criterion is applied to estimate the optimal lag length to test for the co-integration. Table (4.3) describes the lag-length selection of the variables which is calculated from VAR lag selection criteria. According to the result, Akaike information criterion (AIC), Hannan-Quinn Information criterion (HQIC) and likelihood ratio suggests lag 3 and Schwarz-Bayesian information criterion (SBIC) suggests lag order 1. But, FPE suggests lag order 4.

Table (4.4) Lag Length Selection of the variables

Lag	LogL	LR	FPE	AIC	HQIC	SBIC
0	-132.485		0.04115	10.9988	11.0664	11.2425
1	-7.4961	249.98	0.000014	2.99969	3.40537	4.4623*
2	32.0355	76.063	6.0e-06	1.83716	2.5809	4.5187
3	72.9294	81.788*	3.9e-06	0.56565*	1.6475*	4.46605
4			-8.2e-23*			

Source: STATA 14 Output

For the co-integration test, both the Trace statistics criterion and the maximum Eigen value criterion are used to decide whether the study can reject the null hypothesis or not. The meaning of co-integration is different from correlation. Correlation refers the variables move the same direction or the opposite direction, they are positively or negatively correlated. Co-integration refers to the movement among the variables over the long-run. Co-integration means that the variables that would not deviate too far away from each other in the longer term and would revert to a mean difference between them. The decision criterion is that there is a co-integrating relationship among the variables if the Trace statistics and the maximum Eigen value is greater than 5 % critical value. According to the Johansen Co-integration test shown at Table (4.4), it can be concluded that there are at most one co-integrating equations/vectors among the variables since trace statistics at maximum rank 2 is greater than critical value at 5% level.

Table (4.5) Johansen Co-integration Test

maximum rank	Parms	trace statistics	5% critical value
0	30	89.5899	68.52
1	39	42.4975*	47.21
2	46	19.7314	29.68
3	51	10.4212	15.41
4	54	2.0279	3.76
5	55		
maximum rank	Parms	max statistics	5% critical value
0	30	47.0924	33.46
1	39	22.7661*	27.07
2	46	9.3102	20.97
3	51	8.3934	14.07
4	54	2.0279	3.76
5	55		

Source: STATA 14 Output

Note:* shows maximum co-integration equations.

After the co-integration test, the next step is to estimate short-run Vector auto-regression (VAR) model. Since Akaike information criterion (AIC), Hannan-Quinn Information criterion (HQIC) suggests lag order 3, the study includes previous three years in the short run Vector auto-regression (VAR) model. According to Vector auto-regression (VAR) results shown at table (4.5), domestic savings has positive effect on economic growth for all lag 3 years. And the coefficients are not significant. But foreign direct investment has alternate sign depending upon lag period but not statistically significant. Regarding with export, last three years export have negative effect on economic growth but the results are not significant except lag 3 variable. Regarding with government expenditure, it has positive impact on economic growth but not significant. Detail result can be found at Appendix (13). To sum up, all the coefficients are not significant at short-run VAR model.

Table (4.6) Vector Auto-regression Result

Variables	Coefficient	Standard Error	z	P> z	[95% conf.Interval]	
logGDP _{t-1}	1.329	0.1661	8.00	0.000***	1.003	1.6542
logGDP _{t-2}	-0.0597	0.2222	-0.27	0.788	-0.4952	0.3758
logGDP _{t-3}	-0.3944	0.1533	-2.57	0.010***	-0.6948	-0.093
GDS _{t-1}	0.016	0.0172	0.95	0.344	-0.0174	0.0499
GDS _{t-2}	0.0339	0.0214	1.58	0.113	-.0080	0.0759
GDS _{t-3}	0.0034	0.0219	0.16	0.875	-.03953	0.0464
FDI _{t-1}	-1.12e-06	3.97e-06	-0.28	0.778	-8.89e-06	6.6e-06
FDI _{t-2}	4.66e-06	3.59e-06	1.30	0.194	-2.38e-06	0.00001
FDI _{t-3}	4.76e-06	5.59e-06	0.85	0.394	-6.1e-06	0.00001
Exp _{t-1}	-0.0485	0.0381	-1.27	0.203	-0.123	0.0261
Exp _{t-2}	-0.0053	0.0275	-0.19	0.848	-0.059	0.0487
Exp _{t-3}	-0.0751	0.0241	-3.11	0.002***	-0.122	-0.0277
Gov _{t-1}	0.0232	0.0118	1.96	0.050	0.00001	0.0464
Gov _{t-2}	0.0230	0.0140	1.63	0.102	-0.0045	0.0506
Gov _{t-3}	-0.0046	0.0164	-0.28	0.778	-0.0368	0.0275
Constant	1.2172	1.5548	0.78	0.434	-1.83015	4.264

Source: STATA 14 Output

Note: *** means that the variables are significant at 1% level.

After the short-run VAR, the study uses long-run VECM model since Johansen co-integration test shows there is at most one co-integrating equation. VECM which is restricted VAR model and takes into account of co-integration also generates short run result. All VECM result can be found at Appendix (14). Table (4.6) extracts the short run estimation from VECM. Gross domestic savings, export and government expenditure has positive effect on economic growth in the short run but not significant. Foreign direct investment has negative effect on economic growth in the short run and it is also not significant.

Table (4.7) Vector Error Correction Model Result

Variables	Coefficient	Standard Error	z	P> z	[95% conf.Interval]	
-ce1	0.107	0.201	0.53	0.593	-0.2868	-0.501
logGDP _{t-1}	0.236	0.203	1.16	0.245	-0.162	0.635
logGDP _{t-2}	0.241	0.203	1.19	0.234	-0.156	0.640
GDS _{t-1}	0.0055	0.0265	0.21	0.834	-0.046	0.057
GDS _{t-2}	0.0275	0.0253	1.09	0.277	-0.022	0.077
FDI _{t-1}	-4.71e-06	6.3e-06	-0.74	0.460	-0.00002	7.76e-06
FDI _{t-2}	-5.2e-06	5.21e-06	-1.00	0.316	-0.00002	4.99e-06
Exp _{t-1}	0.0044	0.0311	0.14	0.888	-0.0566	0.065
Exp _{t-2}	0.021	0.0318	0.66	0.509	-0.04144	0.083
Gov _{t-1}	0.017	0.0327	0.54	0.590	-0.0465	0.081
Gov _{t-2}	0.019	0.0260	0.77	0.443	-0.0310	0.071
Constant	0.0095	0.0138	0.69	0.492	-0.017	0.0367

Source: STATA 14 Output

The second part of VECM estimation generates long run equation. Table (4.7) is Johansen Normalization test result which shows long run equation of the variables using Vector Error Correction Model (VECM). When the normalization report is interpreted, the signs of the coefficients are reversed.⁸ According to the Johansen Normalization test using Vector Error Correction Model (VECM), gross domestic savings and foreign direct investment have positive effect on economic growth in the long run. However, the coefficient for domestic savings is not statistically significant while the coefficient for foreign direct investment is significant. The study found out that both government expenditure and export has positive impact on long run economic growth in Myanmar and both of them are statistically significant based on the period of 1989-2017.

⁸ <https://cruncheconometrix.com.ng/blog/tag/vecm-in-stata/>

Table (4.8) Johansen Normalization Restriction Result using VECM

Variables	Coefficient	Standard Error	z	P> z	[95% conf.Interval]	
log GDP	1					
log GDS	-0.020	0.0151	-1.34	0.181	-0.0499	0.0094
FDI	-0.00002	4.37e-06	-6.77	0.000	-0.00003	-0.00002
Log Export	-0.284	0.0355	-7.99	0.000	-0.3539	-0.21444
Log Gov	-0.135	0.0084	-16.00	0.000	-0.1517	-0.11864
constant	6.14					

Source: STATA 14 Output

Table (4.9) Granger Causality Test

	Prob>chi2	Remark
GDS does granger cause GDP	0.014***	Significant
GDP does granger cause GDS	0.499	Not Significant
FDI does granger cause GDP	0.499	Not Significant
GDP does granger cause FDI	0.012***	Significant
EXP does granger cause GDP	0.003***	Significant
GDP does granger cause EXP	0.000***	Significant
Gov does granger cause GDP	0.017**	Significant
GDP does granger cause Gov	0.000***	Significant
Exp does granger cause FDI	0.504	Not Significant
FDI does granger cause Exp	0.000***	Significant
GDS does granger cause FDI	0.000**	Significant
FDI does granger cause GDS	0.057	Not Significant
FDI does granger cause Gov	0.555	Not Significant
Gov does granger cause FDI	0.016**	Significant

Source: STATA 14 Output

Table (4.7) describes the results from Granger Causality Test. There is unidirectional relationship from gross domestic savings to economic growth and but not from economic growth to gross domestic savings. According to the result, foreign direct investment does not granger cause economic growth in Myanmar. But, economic growth does granger cause foreign direct investment in Myanmar. This result is similar with the study in Sri Lanka by Athukorala (2003), in India by Chakraborty and Basu, (2002) and in India by Miankhel, Thangavelu and Kalirajan (2009). The study also found out that

government expenditure and export have bi-directional relationship with economic growth in Myanmar. Government expenditure drives economic growth and economic growth leads government expenditure. Export causes economic growth and vice-versa. The test also revealed that foreign direct investment causes export.

To sum up, the empirical results found out that there is long-run relationship between savings and investment on economic growth. However, the coefficient for domestic savings is not statistically significant while the coefficient for foreign direct investment is significant at VECM long run model. But, short run results are not significant at both VAR and VECM short run model.

CHAPTER 5

CONCLUSION

This chapter includes three parts. The first part describes the summary of findings and the second part includes suggestions from the study. The last part presents the recommendations for further study.

5.1 Summary of findings

This study tried to identify the possibility of long-run relationship and the direction of causality between economic growth, domestic savings and foreign direct investment in Myanmar over the period of 1989-2017. The study undertook four steps to answer the research question of whether there is a long run relationship and causal direction between savings, investment and economic growth. The first step of stationary test by Augmented Dicky- Fuller (ADF) found that all the variables are non-stationary at their level. They all become stationary after their first difference. The second step is to identify long run relationship between savings and investment on economic growth by using Johansen Co-integration test. According to the Johansen Co-integration test, it can be concluded that there are at most one co-integrating equation/vector among the variables since trace statistics at maximum rank 1 is greater than critical value at 5% level.

According to third step of short-run Vector Auto-regression (VAR) results, both domestic savings and foreign direct investment have positive and negative effect on economic growth depending upon lag period but not statistically significant. Export and government expenditure have also positive and negative impact on economic growth depending upon the lag period but not statistically significant.

According to long run VECM model, gross domestic savings and foreign direct investment have positive effect on economic growth in the long run. However, the coefficient for domestic savings is not statistically significant while the coefficient for foreign direct investment is significant.

As a final step of Granger Causality Test, there is unidirectional relationship from gross domestic savings to economic growth and but not from economic growth to gross domestic savings. According to the result, foreign direct investment does not granger cause economic growth in Myanmar. But, economic growth does granger cause foreign

direct investment in Myanmar. The study also found out that government expenditure and export have bi-directional relationship with economic growth in Myanmar. Government expenditure drives economic growth and economic growth leads government expenditure. Export causes economic growth and vice-versa. The test also revealed that foreign direct investment causes export.

5.2 Suggestions

Based on the result of the study, the short run relationship between savings and investment on economic growth are not significant. However, the study assessed that gross domestic savings and foreign direct investment have positive effect on economic growth in the long run. And, the coefficient for domestic savings is not statistically significant while the coefficient for foreign direct investment is significant.

In addition, granger causality test confirmed that gross domestic savings cause economic growth in Myanmar. Therefore, the government should be able to encourage more savings through formal financial institutions and more foreign direct investment into the country. In Myanmar, people do not usually save at formal financial institutions since they used to save gold and real estate as their forms of savings. And, the number of people who save at formal institutions has increased from 6 percent in 2013 to 11 percent in 2018 according to UNCDF report. Informal savings dominates saving culture in Myanmar. Another reason people have less incentive to save at formal institutions is the gap between deposit rate and inflation rate. The government should encourage savings and create the enabling platform so that people are willing to save at formal institution since the inflow of foreign direct investment depends on the political and economic situation of the country.

5.3 Need for further study

The study covers only 28 observations to investigate the relationship between savings, investment and economic growth. The validity of the research critically relies on the quality of data and model specification. It can be assumed that the time period covered in the study is quite short. The results might be more robust by taking more extended time period and/or by applying more detailed data such as quarterly data. The omitted variables might derive the conclusion that the result from this study may

overestimate the relationship among savings, investment and economic growth in Myanmar.

Due to the quality and availability of the data, not only the quantitative research but also the qualitative research should be done to reflect the real situation in Myanmar. Further research can be done with the inclusion of more macroeconomic variables since there can be other omitted variables interest rate, labor force, employment level which can drive the economic growth of the country.

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Appendix (1)

Different Types of Savings in Myanmar

Million Kyat/ Year	Saving Deposit	Saving Certificates	Time Deposit	Other Deposit
1980	1429.4	584.3	2.6	0
1981	1939.2	912.3	2.6	0
1982	2433.5	1285.5	2.6	0
1983	2930.5	1641.3	2.6	0
1984	3609.7	2026.4	2.6	0
1985	4232.5	2298.5	2.6	0
1986	4902	2510.8	2.6	0
1987	5727.1	2683.7	2.6	0
1988	5013	2568	2.6	0
1989	6838	2565.2	2.6	0
1990	8744	2659	3	0
1991	10794	2812	3	0
1992	14158	3296	119	0
1993	19630	3824	182	0
1994	28465	4446	826	0
1995	46419	5419	1892	0
1996	72153	6879	3585	0
1997	88620	8232	4006	0
1998	127759	9620	13779	0
1999	191811	11331	13814	0
2000	300704	12249	22700	0
2001	399534	13402	36879	0
2002	456556	13326	68200	0
2003	354434	13612	11966	0
2004	570696	14749	8584	0
2005	674392	16628	7188	0
2006	877027	16713	9982	0
2007	1142249	16834	13168	0
2008	1526930	17212	25613	0
2009	2179101	17651	29756	0
2010	3163527	18701	112780	0
2011	5264059	25556	115904	137115
2012	7091825	31265	162085	1211931
2013	9262466	41926	706892	1712194
2014	10797928	46398	2167722	1874239
2015	13054580	47465	4476687	1744598
2016	16216696	55103	7826465	1008260
2017	19462206	53644	10658224	1757026

Source: Central Statistical Year Book, Ministry of Planning and Finance

Appendix (2)

Raw Data for this research

Year	Real GDP (Kyat billion)	GDS (Kyat Billion)	FDI (USD Million)	Export (USD million)	Gov (Kyat Million)
1989	6256.58	11	7.8	214.5217	15035
1990	6432.82	18	161.1	325.2266	18891
1991	6390.97	26	238.1	419.4711	22771
1992	7008.40	32	171.6	536.5488	26177
1993	7431.66	41	95.1	582.717	32393
1994	7987.40	56	138.1	770.5204	44129
1995	8542.37	81	324.4	846.3568	59247
1996	9092.73	91	315.5	731.7502	72519
1997	9606.61	132	418.8	866.2698	87933
1998	10170.16	190	274.8	1065.22	104187
1999	11283.30	285	212.2	1124.587	112394
2000	12834.29	315	254.8	1397.388	89778
2001	14290.21	409	210.9	2281.566	553300
2002	16008.68	575	189.7	3014.723	985200
2003	18224.92	851	249.5	2458.392	1353800
2004	20697.07	1113	268.9	2354.84	1692400
2005	23505.45	1604	238.8	3776.453	2353400
2006	26579.04	2561	277.4	4619.779	3692800
2007	29766.25	3475	714.8	6252.941	4900800
2008	32818.87	5092	871.5	6882.191	5314200
2009	36281.27	5351	1076.7	6661.897	6256100
2010	39776.76	13006	1491.8	8661.085	7505700
2011	42000.88	17117	2539	9238.044	8581600
2012	45080.66	18781	1342	8878.42	9865100
2013	48879.16	19595	2244.2	11232.8	12741300
2014	52785.05	14977	2175.9	11299.2	15356000
2015	56476.23	16998	4098.1	11431.8	17086600
2016	59787.13	19624	3274.7	11819.85	16749900
2017	63827.92	22865	4692.5	13878	20206500

Source: ADB, DICA, CSO, Budget Law

Appendix (3)

Logarithmic Form of Raw Data for Statistical Software- STATA 14

Year	log GDP LCU real	log GDS	log Gov	log exp	FDI*
1989	12.80	10.04	4.18	2.33	7.8
1990	12.81	10.25	4.28	2.51	161.1
1991	12.81	10.42	4.36	2.62	238.1
1992	12.85	10.51	4.42	2.73	171.6
1993	12.87	10.61	4.51	2.77	95.1
1994	12.90	10.74	4.64	2.89	138.1
1995	12.93	10.91	4.77	2.93	324.4
1996	12.96	10.96	4.86	2.86	315.5
1997	12.98	11.12	4.94	2.94	418.8
1998	13.01	11.28	5.02	3.03	274.8
1999	13.05	11.45	5.05	3.05	212.2
2000	13.11	11.50	4.95	3.15	254.8
2001	13.16	11.61	5.74	3.36	210.9
2002	13.20	11.76	5.99	3.48	189.7
2003	13.26	11.93	6.13	3.39	249.5
2004	13.32	12.05	6.23	3.37	268.9
2005	13.37	12.21	6.37	3.58	238.8
2006	13.42	12.41	6.57	3.66	277.4
2007	13.47	12.54	6.69	3.80	714.8
2008	13.52	12.71	6.73	3.84	871.5
2009	13.56	12.73	6.80	3.82	1076.7
2010	13.60	13.11	6.88	3.94	1491.8
2011	13.62	13.23	6.93	3.97	2539
2012	13.65	13.27	6.99	3.95	1342
2013	13.69	13.29	7.11	4.05	2244.2
2014	13.72	13.18	7.19	4.05	2175.9
2015	13.75	13.23	7.23	4.06	4098.1
2016	13.78	13.29	7.22	4.07	3274.7
2017	13.81	13.36	7.31	4.14	4692.5

Source: ADB, DICA, CSO, Budget Law

Note: * FDI data was run with absolute value not in logarithmic form.

Appendix (4)

Loans to Different Sector (Kyat Billion)

State-owned Bank	March'2016	March'2017	March'2018	March'2019
Agriculture	1702.17129	2067.38351	2348.61633	2546.28797
Production	68.56	85.62373	144.84244	165.45462
Trading	214.27649	314.59014	355.79259	433.38866
Transportation	11.24202	14.49011	21.91071	19.24151
Construction	151.30179	143.08466	137.68621	131.34535
Services	114.066	123.70302	138.75303	168.35362
General	638.4724	328.4952	342.12744	535.68881
Housing loans	0.88627	0.77909	0.72363	0.66347
SME loans	0	0	0.86792	18.641
TOTAL	2900.97626	3078.14946	3491.3203	4019.06501

Private Bank	March'2016	March'2017	March'2018	March'2019
Agriculture	225.25713	263.4993	331.60109	498.47898
Production	1657.47016	2074.66312	2046.89841	2812.10405
Trading	4842.95405	6122.27276	6973.71284	5896.71516
Transportation	161.48504	260.55087	434.73723	466.67909
Construction	1916.70118	2814.92065	3536.75097	4263.62795
Services	1628.85001	2177.6787	2546.65614	3568.38623
General	1793.08525	2077.39269	2310.50003	3566.57925
Hire Purchase	128.35227	244.92947	435.02963	641.83932
Housing loans	2.05237	34.489	35.72509	100.58632
SME loans	0	26.17939	654.69227	1131.66602
TOTAL	12356.2075	16096.576	19306.3037	22946.6624

Foreign Banks	March'2018	March'2019
Agriculture	23.52238	44.8226
Production	322.02735	479.14311
Trading	50.24586	78.94884
Transportation	45.46672	50.46184
Construction	156.35667	185.05695
Services	286.62892	505.22216
General	107.76289	179.84199
Hire Purchase	0	0
SME loans	0	0
TOTAL	992.01079	1523.49749

Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Appendix (5)

Loans to Different States and Regions (Kyat Billion)

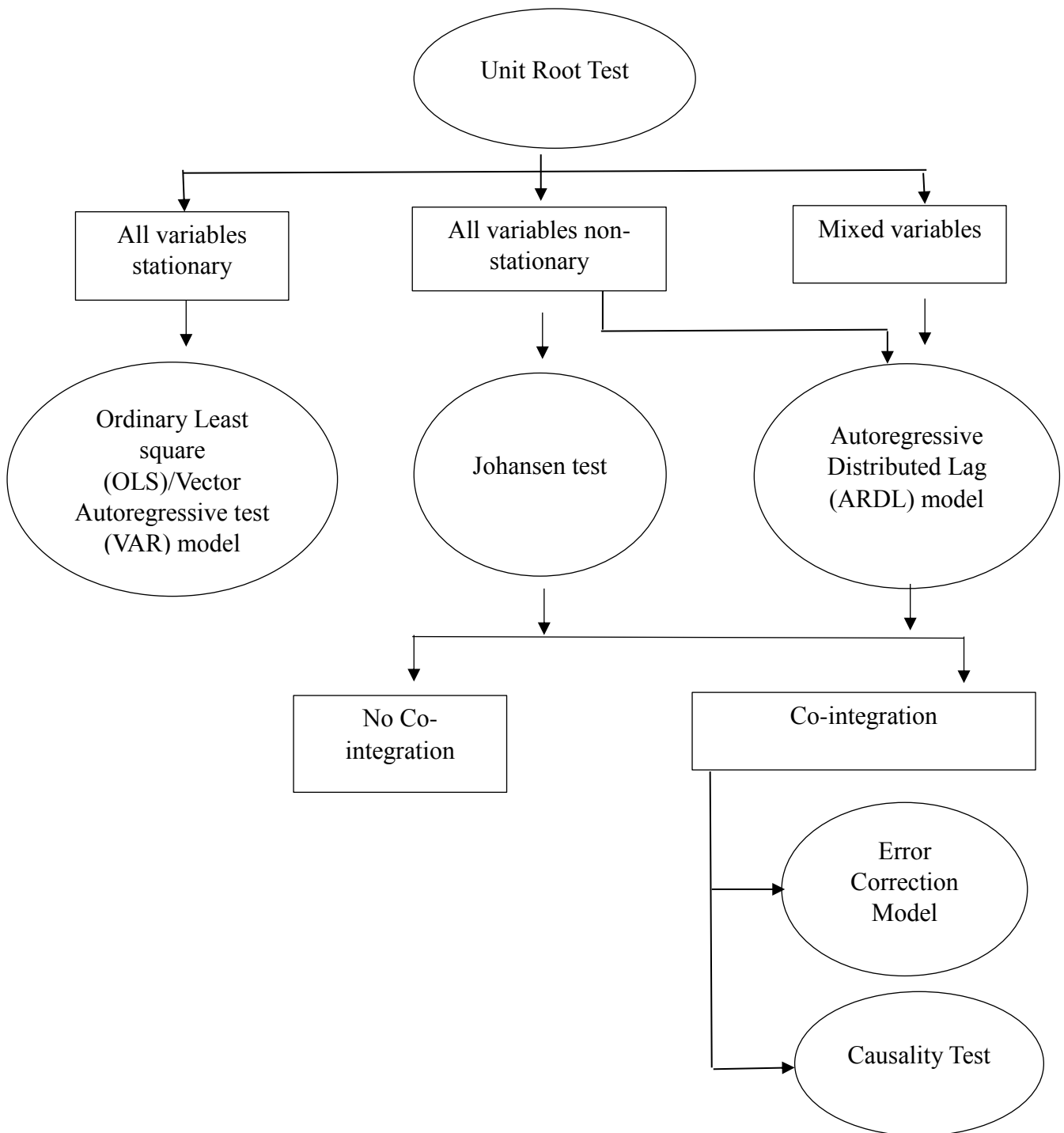
States	March'2017	March'2018	March'2019
Mon	128.64646	144.41181	159.83929
Shan	343.95709	432.17795	479.2833
Kayar	9.28066	12.77414	15.29554
Kayin	45.07494	84.92118	108.13921
Rakhine	44.31537	54.71773	72.22026
Kachin	36.9631	47.60116	61.2956
Chin	0.0003	0.1315	0.59305
Total	608.23792	776.73547	896.66625

Regions	March'2017	March'2018	March'2019
Yangon	12578.23516	15289.06402	18216.43655
Mandalay	2022.6308	2383.25278	2679.74521
Sagaing	157.92954	192.34082	233.11322
Bago	202.46694	226.237	277.68433
Magway	184.67351	201.43879	221.96219
Tanintharyi	90.98602	109.29917	149.87684
Ayeyarwaddy	221.53188	260.54727	250.39425
Total	15458.45385	18662.17985	22029.21259

Source: Quarterly Financial Statistics Bulletin, Central Bank of Myanmar

Appendix (6)

Selecting Appropriate Methodological Framework for Time Series Data Analysis



Source: Shrestha & Bhatta (2017)

Appendix (7)

Unit Root Test Results (With Trend at Level)

A. GDP (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10%
Critical	Value	Value	Value
Statistic	Value	Value	Value
Z(t)	-4.352	-3.588	-3.233

MacKinnon approximate p-value for Z(t) = 0.3452

B. GDS (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.352	-3.588	-3.233

MacKinnon approximate p-value for Z(t) = 0.9800

C. FDI (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.352	-3.588	-3.233

MacKinnon approximate p-value for Z(t) = 0.9236

D. Government expenditure (At Level)

Dickey-Fuller test for unit root Number of obs = 28

	----- Interpolated Dickey-Fuller -----			
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-1.433	-4.352	-3.588	-3.233

MacKinnon approximate p-value for Z(t) = 0.8509

E. Export (At Level)

Dickey-Fuller test for unit root Number of obs = 28

	----- Interpolated Dickey-Fuller -----			
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-2.460	-4.352	-3.588	-3.233

MacKinnon approximate p-value for Z(t) = 0.3480

Source: STATA 14 Output

Appendix (8)

Unit Root Test Results (With trend at first difference)

A. GDP (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10%
Critical			
Statistic	Value	Value	
Value			
Z(t)	-2.335	-4.362	-3.592
			-3.235

MacKinnon approximate p-value for Z(t) = 0.4146

B. GDS (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.693	-4.362	-3.592
			-3.235

MacKinnon approximate p-value for Z(t) = 0.0007

C. FDI (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-11.486	-4.362	-3.592
			-3.235

MacKinnon approximate p-value for Z(t) = 0.0000

D. Government expenditure (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

	----- Interpolated Dickey-Fuller -----			
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-4.935	-4.362	-3.592	-3.235

MacKinnon approximate p-value for Z(t) = 0.0003

E. Export (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

	----- Interpolated Dickey-Fuller -----			
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-4.884	-4.362	-3.592	-3.235

MacKinnon approximate p-value for Z(t) = 0.0003

Source: STATA 14 Output

Appendix (9)

Unit Root Test Results (With Drift at Level)

A. GDP (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Z(t) has t-distribution -----				
Test	1% Critical	5% Critical	10%	
Critical				
Statistic	Value	Value		
Value				
Z(t)	0.960	-2.479	-1.706	-1.315

p-value for Z(t) = 0.8271

B. GDS (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Z(t) has t-distribution -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-1.843	-2.479	-1.706	-1.315

p-value for Z(t) = 0.0384

C. FDI (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Z(t) has t-distribution -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	0.561	-2.479	-1.706	-1.315

p-value for Z(t) = 0.7102

D. Government expenditure (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Z(t) has t-distribution -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-0.829	-2.479	-1.706	-1.315

p-value for Z(t) = 0.2073

E. Export (At Level)

Dickey-Fuller test for unit root Number of obs = 28

----- Z(t) has t-distribution -----				
Test	1% Critical	5% Critical	10% Critical	
Statistic	Value	Value	Value	
Z(t)	-1.798	-2.479	-1.706	-1.315

p-value for Z(t) = 0.0419

Source: STATA 14 Output

Appendix (10)

Unit Root Test Results (With Drift at first difference)

A. GDP (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Z(t) has t-distribution -----				
Critical	Test	1% Critical	5% Critical	10%
Value	Statistic	Value	Value	
	Z(t)	-2.577	-2.485	-1.708 -1.316

p-value for Z(t) = 0.0081

B. GDS (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Z(t) has t-distribution -----				
Critical	Test	1% Critical	5% Critical	10% Critical
Value	Statistic	Value	Value	Value
	Z(t)	-4.447	-2.485	-1.708 -1.316

p-value for Z(t) = 0.0001

C. FDI (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Z(t) has t-distribution -----				
Critical	Test	1% Critical	5% Critical	10% Critical
Value	Statistic	Value	Value	Value
	Z(t)	-9.432	-2.485	-1.708 -1.316

p-value for Z(t) = 0.0000

D. Government expenditure (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Z(t) has t-distribution -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.963	-1.708	-1.316

p-value for Z(t) = 0.0000

E. Export (At first difference)

Dickey-Fuller test for unit root Number of obs = 27

----- Z(t) has t-distribution -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-4.864	-1.708	-1.316

p-value for Z(t) = 0.0000

Source: STATA 14 Output

Appendix (11)
Lag Length Selection of the Variables

Selection-order criteria

Sample: 1993 - 2017

Number of obs = 25

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-132.485			.	041155	10.9988	11.0664	11.2425
1	-7.4961	249.98	25	0.000	.000014	2.99969	3.40537	4.46234*
2	32.0355	79.063	25	0.000	6.0e-06	1.83716	2.5809	4.51869
3	72.9294	81.788*	25	0.000	3.9e-06	.565646*	1.64745*	4.46605
4	.	.	25	.	-8.2e-23*	.	.	.

Endogenous: logGDPLCUreal logGDS logGov logexp FDI

Exogenous: _cons

Source: STATA 14 Output

Appendix (12)

Johansen Co-integration Test Result

Johansen tests for cointegration

Trend: constant Number of obs = 27
Sample: 1991 - 2017 Lags = 2

5%

maximum				trace	critical
rank	parms	LL	eigenvalue	statistic	value
0	30	-27.297485	.	89.5899	68.52
1	39	-3.7512853	0.82521	42.4975*	47.21
2	46	7.6317748	0.56966	19.7314	29.68
3	51	12.286861	0.29165	10.4212	15.41
4	54	16.483545	0.26719	2.0279	3.76
5	55	17.497473	0.07235		

5%

maximum				max	critical
rank	parms	LL	eigenvalue	statistic	value
0	30	-27.297485	.	47.0924	33.46
1	39	-3.7512853	0.82521	22.7661	27.07
2	46	7.6317748	0.56966	9.3102	20.97
3	51	12.286861	0.29165	8.3934	14.07
4	54	16.483545	0.26719	2.0279	3.76
5	55	17.497473	0.07235		

Source: STATA 14 Output

Appendix (13)

Vector Auto-regressive (VAR) Result

Vector autoregression

Sample: 1992 - 2017	Number of obs	=	26
Log likelihood = 56.35563	AIC	=	1.818798
FPE = .0000118	HQIC	=	2.933525
Det(Sigma_ml) = 9.01e-09	SBIC	=	5.689864

Equation	Parms	RMSE	R-sq	chi2	P>chi2
logGDP	16	.008936	0.9997	84485.06	0.0000
logGDS	16	.094271	0.9963	6914.7	0.0000
logexp	16	.040886	0.9971	8941.195	0.0000
logGov	16	.125905	0.9938	4170.579	0.0000
FDI	16	394.238	0.9636	687.9764	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

logGDP						
logGDP						
L1.	1.328547	.1661662	8.00	0.000	1.002867	1.654226
L2.	-.0596712	.2222239	-0.27	0.788	-.495222	.3758796
L3.	-.3943476	.1533056	-2.57	0.010	-.694821	-.0938742
logGDS						
L1.	.0162652	.0171845	0.95	0.344	-.0174158	.0499462
L2.	.033963	.0214333	1.58	0.113	-.0080454	.0759715
L3.	.0034568	.0219363	0.16	0.875	-.0395375	.0464512
logexp						
L1.	-.0485507	.0381184	-1.27	0.203	-.1232613	.02616
L2.	-.0053018	.0275841	-0.19	0.848	-.0593656	.048762
L3.	-.0751047	.0241458	-3.11	0.002	-.1224297	-.0277797
logGov						
L1.	.023208	.0118359	1.96	0.050	.00001	.046406
L2.	.0230385	.0140958	1.63	0.102	-.0045888	.0506658
L3.	-.0046263	.0164247	-0.28	0.778	-.0368181	.0275655

FDI						
L1.	-1.12e-06	3.97e-06	-0.28	0.778	-8.89e-06	6.66e-06
L2.	4.66e-06	3.59e-06	1.30	0.194	-2.38e-06	.0000117
L3.	4.76e-06	5.59e-06	0.85	0.394	-6.19e-06	.0000157

_cons	1.217284	1.554842	0.78	0.434	-1.83015	4.264718

logGDS						
logGDP						
L1.	1.018223	1.752993	0.58	0.561	-2.41758	4.454025
L2.	.0336426	2.344381	0.01	0.989	-4.561259	4.628544
L3.	1.126487	1.617318	0.70	0.486	-2.043397	4.296371

logGDS						
L1.	.693127	.1812903	3.82	0.000	.3378046	1.048449
L2.	.0673209	.2261134	0.30	0.766	-.3758531	.5104949
L3.	-.2490362	.2314199	-1.08	0.282	-.7026109	.2045386

logexp						
L1.	-.0363801	.4021351	-0.09	0.928	-.8245503	.7517902
L2.	-.3691838	.2910019	-1.27	0.205	-.9395371	.2011695
L3.	.6928966	.2547299	2.72	0.007	.1936353	1.192158

logGov						
L1.	.0338864	.1248646	0.27	0.786	-.2108436	.2786165
L2.	-.1117847	.1487056	-0.75	0.452	-.4032422	.1796728
L3.	-.1845321	.1732742	-1.06	0.287	-.5241434	.1550791

FDI						
L1.	-.0000272	.0000418	-0.65	0.515	-.0001092	.0000548
L2.	-.0000244	.0000379	-0.64	0.520	-.0000986	.0000499
L3.	-.0001185	.0000589	-2.01	0.044	-.0002339	-2.98e-06

_cons	-22.24258	16.40301	-1.36	0.175	-54.3919	9.906727

logexp						
logGDP						
L1.	3.68199	.7602893	4.84	0.000	2.19185	5.17213
L2.	1.882242	1.01678	1.85	0.064	-.1106105	3.875094
L3.	-1.939177	.7014459	-2.76	0.006	-3.313985	-.5643682

logGDS						
L1.	.0591625	.0786273	0.75	0.452	-.0949442	.2132691
L2.	.0993198	.0980675	1.01	0.311	-.0928889	.2915285
L3.	-.1713114	.100369	-1.71	0.088	-.368031	.0254082

logexp						
L1.	-.0785457	.1744098	-0.45	0.652	-.4203826	.2632911
L2.	-.3862885	.1262103	-3.06	0.002	-.633656	-.1389209
L3.	.0762908	.1104787	0.69	0.490	-.1402436	.2928251
logGov						
L1.	-.0215556	.0541549	-0.40	0.691	-.1276973	.0845861
L2.	-.2441645	.064495	-3.79	0.000	-.3705724	-.1177567
L3.	-.1416113	.0751507	-1.88	0.060	-.2889039	.0056813
FDI						
L1.	-.0000681	.0000181	-3.75	0.000	-.0001037	-.0000326
L2.	-.0000183	.0000164	-1.11	0.266	-.0000505	.0000139
L3.	-2.94e-06	.0000256	-0.12	0.908	-.000053	.0000471
_cons	-40.87698	7.11414	-5.75	0.000	-54.82044	-26.93352

logGov						
logGDP						
L1.	7.291628	2.341243	3.11	0.002	2.702877	11.88038
L2.	4.058244	3.131083	1.30	0.195	-2.078565	10.19505
L3.	-6.523977	2.16004	-3.02	0.003	-10.75758	-2.290378
logGDS						
L1.	-.2643766	.2421257	-1.09	0.275	-.7389342	.210181
L2.	.5798471	.30199	1.92	0.055	-.0120424	1.171737
L3.	-.42682	.3090773	-1.38	0.167	-1.0326	.1789605
logexp						
L1.	-.0921045	.5370792	-0.17	0.864	-1.14476	.9605514
L2.	-.7119469	.3886532	-1.83	0.067	-1.473693	.0497993
L3.	.2360084	.3402094	0.69	0.488	-.4307897	.9028065
logGov						
L1.	.355883	.1667653	2.13	0.033	.0290291	.6827369
L2.	-.0241568	.1986065	-0.12	0.903	-.4134185	.3651049
L3.	-.4657871	.2314197	-2.01	0.044	-.9193614	-.0122129
FDI						
L1.	-.0000689	.0000559	-1.23	0.218	-.0001784	.0000406
L2.	-4.75e-06	.0000506	-0.09	0.925	-.0001039	.0000944
L3.	-5.06e-07	.0000787	-0.01	0.995	-.0001547	.0001537
_cons	-54.42972	21.90736	-2.48	0.013	-97.36735	-11.49209

```

FDI
logGDP |
    L1. | 3699.383 7330.957 0.50 0.614 -10669.03 18067.79
    L2. | 3555.366 9804.123 0.36 0.717 -15660.36 22771.09
    L3. | 10378.41 6763.569 1.53 0.125 -2877.941 23634.76

logGDS
    L1. | -578.8888 758.1499 -0.76 0.445 -2064.835 907.0577
    L2. | -3894.527 945.5986 -4.12 0.000 -5747.866 -2041.187
    L3. | 2474.921 967.7906 2.56 0.011 578.0863 4371.756

logexp
    L1. | -1378.716 1681.716 -0.82 0.412 -4674.818 1917.387
    L2. | 1589.624 1216.96 1.31 0.191 -795.5745 3974.823
    L3. | 1.568338 1065.272 0.00 0.999 -2086.326 2089.463

logGov
    L1. | -1320.8 522.1795 -2.53 0.011 -2344.253 -297.3473
    L2. | -388.3701 621.8817 -0.62 0.532 -1607.236 830.4957
    L3. | -956.289 724.627 -1.32 0.187 -2376.532 463.9539

FDI
    L1. | -.1410336 .1749651 -0.81 0.420 -.4839589 .2018917
    L2. | .4379809 .1583977 2.77 0.006 .1275271 .7484347
    L3. | -.3233523 .2464011 -1.31 0.189 -.8062896 .159585

_cons | -193345 68596.85 -2.82 0.005 -327792.4 -58897.69
-----

```

Source: STATA 14 Output

Appendix (14)

Vector error-correction model Result

Vector error-correction model

Sample: 1992 - 2017	Number of obs	=	26
	AIC	=	2.641472
Log likelihood = 29.66086	HQIC	=	3.533254
Det(Sigma_ml) = 7.03e-08	SBIC	=	5.738325

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_logGDP	12	.009318	0.9709	466.7554	0.0000
D_logGDS	12	.107489	0.6943	31.80344	0.0015
D_logGov	12	.145567	0.6753	29.11561	0.0038
D_logexp	12	.040025	0.8993	125.0232	0.0000
D_FDI	12	453.082	0.7197	35.95113	0.0003

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

D_logGDP						
_ce1						
L1.	.1075249	.2012171	0.53	0.593	-.2868535	.5019032
logGDP						
LD.	.236614	.203547	1.16	0.245	-.1623308	.6355588
L2D.	.2417939	.2032229	1.19	0.234	-.1565157	.6401035
logGDS						
LD.	.0055642	.0265601	0.21	0.834	-.0464926	.057621
L2D.	.0275481	.0253378	1.09	0.277	-.0221131	.0772093
logGov						
LD.	.0176355	.0327401	0.54	0.590	-.0465339	.081805
L2D.	.0199565	.0260084	0.77	0.443	-.031019	.070932
logexp						
LD.	.0043757	.0311107	0.14	0.888	-.0566001	.0653514
L2D.	.0210468	.0318853	0.66	0.509	-.0414472	.0835408
FDI						
LD.	-4.71e-06	6.36e-06	-0.74	0.460	-.0000172	7.76e-06
L2D.	-5.23e-06	5.21e-06	-1.00	0.316	-.0000154	4.99e-06

_cons	.0095414	.0138826	0.69	0.492	-.0176679	.0367508

D_logGDS						
_ce1						
L1.	1.222726	2.321104	0.53	0.598	-3.326554	5.772005
logGDP						
LD.	.4436837	2.34798	0.19	0.850	-4.158272	5.045639
L2D.	.4982855	2.344241	0.21	0.832	-4.096342	5.092913
logGDS						
LD.	.1321133	.3063789	0.43	0.666	-.4683783	.7326049
L2D.	.266559	.2922798	0.91	0.362	-.3062989	.839417
logGov						
LD.	.2773375	.3776676	0.73	0.463	-.4628775	1.017552
L2D.	.2154028	.3000149	0.72	0.473	-.3726156	.8034213
logexp						
LD.	.0413174	.3588713	0.12	0.908	-.6620574	.7446922
L2D.	-.2602307	.3678069	-0.71	0.479	-.981119	.4606576
FDI						
LD.	.0000127	.0000734	0.17	0.863	-.0001312	.0001565
L2D.	.0000211	.0000601	0.35	0.726	-.0000968	.000139
_cons	-.0456884	.16014	-0.29	0.775	-.359557	.2681803

D_logGov						
_ce1						
L1.	5.087905	3.143366	1.62	0.106	-1.072979	11.24879
logGDP						
LD.	1.074572	3.179763	0.34	0.735	-5.157648	7.306793
L2D.	3.012997	3.1747	0.95	0.343	-3.2093	9.235294
logGDS						
LD.	-.2386268	.4149151	-0.58	0.565	-1.051846	.574592
L2D.	.321932	.3958214	0.81	0.416	-.4538636	1.097728
logGov						
LD.	.3663652	.5114583	0.72	0.474	-.6360746	1.368805
L2D.	.3741837	.4062967	0.92	0.357	-.4221432	1.170511
logexp						
LD.	.9480492	.4860032	1.95	0.051	-.0044996	1.900598

L2D.		.014417	.4981043	0.03	0.977	-.9618495	.9906835
FDI							
LD.		.000033	.0000994	0.33	0.740	-.0001618	.0002278
L2D.		-.0000141	.0000815	-0.17	0.863	-.0001737	.0001455
_cons		-.3146945	.2168704	-1.45	0.147	-.7397527	.1103636

D_logexp							
_cel							
L1.		4.332072	.8642961	5.01	0.000	2.638083	6.026061
logGDP							
LD.		-.7191837	.8743037	-0.82	0.411	-2.432787	.99442
L2D.		1.199302	.8729116	1.37	0.169	-.511573	2.910178
logGDS							
LD.		.1905656	.1140846	1.67	0.095	-.0330361	.4141672
L2D.		.2467735	.1088346	2.27	0.023	.0334616	.4600853
logGov							
LD.		.5235719	.1406299	3.72	0.000	.2479423	.7992015
L2D.		.2125639	.1117148	1.90	0.057	-.0063932	.4315209
logexp							
LD.		.1343724	.1336308	1.01	0.315	-.1275393	.396284
L2D.		-.1754688	.1369582	-1.28	0.200	-.4439019	.0929642
FDI							
LD.		.0000309	.0000273	1.13	0.259	-.0000227	.0000844
L2D.		-7.39e-06	.0000224	-0.33	0.741	-.0000513	.0000365
_cons		-.1974577	.0596304	-3.31	0.001	-.3143312	-.0805842

D_FDI							
_cel							
L1.		5869.354	9783.822	0.60	0.549	-13306.59	25045.29
logGDP							
LD.		1386.42	9897.109	0.14	0.889	-18011.56	20784.4
L2D.		7769.454	9881.35	0.79	0.432	-11597.64	27136.54
logGDS							
LD.		-205.0856	1291.436	-0.16	0.874	-2736.254	2326.083
L2D.		-3379.145	1232.006	-2.74	0.006	-5793.832	-964.4571

```

logGov
  LD. | -358.3006 1591.929 -0.23 0.822 -3478.425 2761.824
  L2D. | 204.0171 1264.611 0.16 0.872 -2274.575 2682.609

logexp
  LD. | 695.8377 1512.7 0.46 0.646 -2268.999 3660.675
  L2D. | 1698.158 1550.365 1.10 0.273 -1340.501 4736.818

  FDI
  LD. | -.4858734 .309337 -1.57 0.116 -1.092163 .120416
  L2D. | .343587 .2535234 1.36 0.175 -.1533097 .8404837
  |
  _cons | .0004534 675.0157 0.00 1.000 -1323.006 1323.007

```

Cointegrating equations

Equation	Parms	chi2	P>chi2

_cel	4	45923.57	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]

_cel					
logGDP	1
logGDS	-.0202419	.0151354	-1.34	0.181	-.0499068 .0094229
logGov	-.1352148	.0084525	-16.00	0.000	-.1517814 -.1186483
logexp	-.2841911	.0355837	-7.99	0.000	-.3539339 -.2144483
FDI	-.0000296	4.37e-06	-6.77	0.000	-.0000381 -.000021
_cons	-11.21816

Source: STATA 14 Output

Appendix (15)

Granger Causality Test Result

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
logGDP	logGDS	10.643	3	0.014
logGDPI	logexp	14.225	3	0.003
logGDPI	logGov	10.154	3	0.017
logGDP	FDI	2.6037	3	0.457
logGDP	ALL	30.376	12	0.002
logGDS	logGDP	2.3727	3	0.499
logGDS	logexp	7.5642	3	0.056
logGDS	logGov	1.5753	3	0.665
logGDS	FDI	7.5321	3	0.057
logGDS	ALL	26.619	12	0.009
logexp	logGDP	60.974	3	0.000
logexp	logGDS	4.7082	3	0.194
logexp	logGov	19.913	3	0.000
logexp	FDI	18.934	3	0.000
logexp	ALL	135.11	12	0.000
logGov	logGDP	29.603	3	0.000
logGov	logGDS	4.1084	3	0.250
logGov	logexp	3.7314	3	0.292
logGov	FDI	2.0837	3	0.555
logGov	ALL	64.755	12	0.000
FDI	logGDP	10.957	3	0.012
FDI	logGDS	32.373	3	0.000
FDI	logexp	2.3433	3	0.504
FDI	logGov	10.346	3	0.016
FDI	ALL	49.31	12	0.000

Source: STATA 14 Output