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COLLEGE OF BUSINESS & ECONOMICS

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**THE NEXUS BETWEEN FOREIGN DIRECT INVESTMENT,
DOMESTIC INVESTMENT AND ECONOMIC GROWTH IN
ETHIOPIA**

BY

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**The Nexus between Foreign Direct Investment, Domestic Investment
and Economic Growth in Ethiopia**

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DECLARATION

I, the undersigned, declare that this Master's thesis work, entitled, Foreign Direct Investment, Domestic investment and Economic Growth in Ethiopia. Presented by me for the award of the degree of Masters of Science (MSc) in Development Economics of Addis Ababa University at Addis Ababa, Ethiopia, is my original work and it has not been submitted for the award of any other degree, diploma and to any other institutions for earning degree. All source of materials used for the thesis have been responsibly acknowledged.

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Abstract

This study empirically studied the link between FDI (Foreign Direct Investment), domestic investment (private and public investment) and economic growth of Ethiopia for the period 1992 to 2019 by applying time series modelling and tests. ADF test for unit root result indicates all the variables are integrated of order one $I(1)$, at their first differences. Johansen cointegration test shows the presence of cointegration among the variables in the long run. The long run estimates it indicated that domestic investment (private and public) and FDI have a positive relationship with economic growth, while, exchange rate was insignificant and negative relationship with economic growth of Ethiopia. Meanwhile, the Error Correction Term result indicates, the long run economic growth shock is adjusted (back to) equilibrium by 48% within a year. The pairwise Granger causality result showed economic growth Granger causes, FDI and vice-versa and there exist a bi-directional causality between FDI, exchange rate and economic growth. Impulse Response Function (IRF) indicates the response of economic growth to a unit standard deviation/shock/ on FDI, private investment, public investment and exchange rate were positive. Variance decomposition showed, the variability of economic growth fluctuation explained at the first period by itself and 73.7% shock explained in the second period, and 26.3% of shock is explained by FDI, exchange rate, private and public investment as a whole. Finally, as a policy implication the study recommends, government enhancement of private investment and FDI by removing of bottlenecks, such as volatility of exchange rate and creating fertile environment of investment in Ethiopia.

Keywords: Economic growth, VECM, cointegration, FDI, Granger causality, Ethiopia.

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Acronyms

ADB	African Development Bank Group
ADF	Augmented Ducky Fuller
AIC	Akaike Information Criterion
CUSUM	Cumulative Sum of Recursive Residual
DI	Domestic Investment
EIC	Ethiopian Investment Commission
ER	Exchange Rate
FDI	Foreign Direct Investment
GDF	Global Development Finance
GDP	Gross Domestic Product
GTP	Growth Transformation Plan
HQIC	Hannan Quin Information Criterion
IFS	International Financial Statistics
IMF	International Monetary fund
IPS	Industrial Project Service (IPS)
IRF	Impulse Response Function
LM	Lagrange Multiplier
MNES	Multinational Enterprises
NBE	National Bank of Ethiopia
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Square
PRI	Private Investment
PUI	Public Investment
SBIC	Schwarz Bayesian Information Criterion
SSA	Sub Saharan Africans
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WB	World Bank
WDI	World Development Indicator
WIR	World Investment Report

CHAPTER ONE

1. Introduction

1.1. Background of the Study

Despite the fact that Ethiopia is non-oil producing, land locked and the second most population in Africa, the country registered the fastest economic growth in the region. The economy highly experienced a broad -based progress, an average growth of 9.9% per year from 2007/08 to 2017/18, compared to a regional average of 5.4%, while the real growth of domestic product (GDP) slowdown to 7.7% in 2017/18. Among many sectors agriculture and manufacturing made lower contribution to growth in 2017/18 compared to previous year (World Bank, 2018).

According to the planning development commission 2016 report, GTPI brings rapid real GDP growth overall development along with the increased inflow of FDI. GTP II has also amide at meeting the concrete target of average growth of 11% in the next five years with the objective to sustain rapid economic growth and to join lower middle-income countries by 2025. Indeed, the government come up with consistent and sound macroeconomic policies (Legese, 2018). Hence the government starts to invest in large scale in different sector especially in manufacturing, service, and construction and tourism sectors by combining the participation of both domestic investment and FDI to meet the above stated goals. In addition to these enabling growth facilitator sectors, Ethiopia give special attentions to investment and innovation to increase the economic growth and capital accumulation by narrowing the gap of domestic saving and problems of balance of payment in the country through creating of favourable conditions to investment activities by providing an incentives of duty free import of capital goods, tax holiday, vehicles, export tax exemption and acquisition of land to encourage both foreign and domestic investment (Gebrekidan, 2013). FDI come up economic growth like, technological advancement, managerial skills and spill over effects to the host countries (Zhang 2001).

According to Ndikumana and Verick, (2008) FDI can stimulate growth; these growth effects are sustainable when FDI stimulates the utilisation of domestic factors of production, increasing employment and stimulating private investors. Nevertheless these complement effects of FDI on the domestic economy must be appropriate with technological spill over effect and facilitating access to global markets competitions.

The successfulness of the domestic investor is the prerequisite to increase the inflows of FDI and economy. Hence the positive and steady growth of the host country's economy is the bed rock to encourage and to bring the estimated economic growth by foreign and domestic investors. Because of these increment of investment comes up the growth driven and assuring its sustainability by promoting the inflow of FDI (Legese, 2018).

The negative and significant impact of inflation, interest rate, exchange rate, political situations and other macroeconomic policy environment must support and apt the economy and builds confidence for potential investors. Otherwise, the investors may face out flow of FDI. Similarly, poor infrastructure has also a negative impact of the inflow of FDI. The government should invest more in infrastructure because it is essential for the creation of a productive business environment to domestic and foreign investors (Melak, 2018).

The role and impact of FDI have been hugely recognized as being a growth factor and a path way of technology and innovation from developed countries to developing countries. However the developmental role of FDI in developing countries like Ethiopia should not be supposed to be a given, much of the desired outcome depends rather on host countries characteristics, industries motivation for placing investment and all stakeholders involvements are required(Weldekidan,2015).

Furthermore, the recipient countries with a better endowment of human capital are more likely to get benefits from FDI and these also requires the absorptive capacity likewise, transformative institutional development such as rule of law, peace and security, level of corruption, protection of property right, quality of public management ,stable macroeconomic and unrestricted government interference and others are an indispensable factors that determine technology and managerial knowhow transfers from foreign investors to domestic firms to reap economic growth.

1.2. Statement of the Problem

FDI and domestic investment have been considered as the two most crucial macroeconomic variables, which are highly responsible for achieving sustainable economic growth and development both in developed and developing countries.

Domestic investment plays a decisive role in economic growth (Saleem and Zaheer, 2018). A low level of domestic investment is one of the most serious obstacles to achieve a higher and sustainable economic growth. Because of that FDI is the source of capital accumulation which leads to the gross fixed capital formation or investment and output (Melak, 2018). On the other hand according to Adam Smith theory of free market, economic growth is efficiently related to the rate of investment and increment in investment is considered as an important factor of economic growth (Smith, 1776). Thus nexus between FDI, domestic investment and economic growth is noticeable, because investment is a catalyst for economic growth.

In the classical economic theory, an increase in investment will bring to an increase in the economic growth (Mankiw, 2012). Hence; economic growth of any country requires investment which can be produced by foreign and domestic investors. The sense of FDI, domestic investment and economic growth in by all means is not new but their associations on economic growth have a causal relationship results in both developing and developed countries remains a debatable issue for long time.

In most cases of in macroeconomics there is a controversial opinion in the theories and empirical results among various studies concerning the direction of causality, so does for FDI and domestic investment (Aboye, 2017)? Even though, the linkage between FDI, domestic investment and economic growth have a big different implication of causality for different studies; an empirical investigation by (Zhang, 2001) stated that knowing the linkage between FDI and economic growth gives information for the amount of domestic investment and development of the host country.

The causality of FDI and economic growth were articulated by different scholars (Zhang, 2001) investigated the impact of FDI on economic growth of East Asia and Latin America by taking 11 countries which is 4 countries from Latin America (Argentina, Brazil, Colombia, Mexico) and 7 countries from East Asia namely (Hong Kong, Malaysia, Taiwan, Singapore, Thailand, Korea, Indonesia) and then he

examined the finding using the Granger cointegration test to short run causality and ECM test for long run causality. The result shows are: Only five countries are (Hong Kong, Colombia, Mexico, Indonesia and Taiwan) FDI and economic growth have a long run positive relations. For the rest countries FDI brings economic growth and the effect of FDI on economic growth depends on the specific characteristics and policies related to FDI.

Ndikumana and Verick, (2008) investigated the studies on the linkage between FDI and domestic investment in Sub-Saharan Africa (SSA), the results shows that the relation between FDI and domestic investment runs in both sides one is FDI crowds in domestic investment in SSA countries and private investment performance have a positive causal relation to FDI, but they didn't investigate the linkages of FDI to economic growth and economic growth to domestic investments.

Although, plenty of studies were forwarded by academia and policy makers so far, inconclusive empirical findings were obtained on the causality of FDI and domestic investment.

In Ethiopia, besides the scanty research efforts on the issue, the findings were also inconclusive as the international experience. Most of the studies were focused on three key macroeconomic variables to analyze their dynamic nexus and causal relationship in the case of a country's economic growth. Those most empirical studies and literatures that conducted in Ethiopia are highly focused on the relation or determinant of FDI, economic growth and development. Merga (2018) empirically investigates the possible factors that determine the inflows of FDI in Ethiopia by taking the time ranges from 1992-2015 and applying vector autoregressive model (VAR) and Vector error correction model (VECM), argued that economic growth and FDI in Ethiopia have a positive relation and statistically significant in the long run whereas the macroeconomic stability, gross fixed capital, external debt trade openness and GDP growth rate have insignificant effect on the impact of FDI.

Gizaw (2015) The Impact of FDI on Economic growth, the case of Ethiopia. The study examined that results by using a time series data and a pairwise granger to test causality and gets a result of strong and stable long run positive relation of FDI and economic growth and there is a unidirectional causality from FDI to economic growth. Getachew (2019) argued that, FDI have a positive relation but insignificant

effect on economic growth by taking the effect of FDI and international trade on Ethiopian economic growth from the period of 1992 to 2017 using the method of autoregressive distributed lag model. Ozkan and Dube (2018) by employed the method of vector autoregressive model and Johansson cointegration causality test suggested that, the cointegration of FDI and economic growth is not directly integrated rather through the export performance and export lead strategy of the country. All the above studies do not show the relation of FDI and domestic investment on their analysis.

Berhe (2015), Legese (2018), Tadle (2013), Melak (2018) and Weldekidan (2015), the study result shows the existence of long run cointegration relation between FDI and economic growth. In addition they investigated the causality analysis on granger causality and obtained a causal effect exists running from FDI to RGDP, indicates that FDI doesn't reap economic growth. Again those empirical studies doesn't analysed the linkage between domestic investment (Public investment and Private investment) to economic growth and the linkage of FDI and domestic investment in Ethiopia. In contrast few other studies only analysed the causal relations between FDI and domestic investment (Aboye, 2017). Hence, the finding of this was doesn't show the relation of domestic investment (public and private) on economic growth. This tells us that, in front of present day international competition, innovation and investment should be moves to forward with locally and globally responsible investment strategies and policies. But the scanty of contemporary and conceptual research on the area has still to be serious pitfalls for such policy making and actions to take.

Therefore, this study aimed to inspect how they are connected and to determine the causality of FDI, domestic investment and economic growth nexus in Ethiopia by incorporating a variable of Exchange Rate. Using multivariate time series analysis, in order to check how they are connected and direction of causality. Moreover, the study tried to fill those gabs and distinctiveness by employing the methodology adopted with the analysis of Johansen cointegration, pairwise Granger causality test and Vector Error Correction Modelling (VECM) approach.

1.3. Objective of the Study

1.3.1. General Objective

The general objective of the study is: to analyze the nexus between foreign direct investment, domestic investment and economic growth in Ethiopia.

1.3.2. Specific Objectives

Specific objectives of the study are;

- To investigate the distribution and sectoral contribution of FDI in Ethiopia.
- To analyze the effect of public investment on private investment in Ethiopia.
- To analyze the impact of FDI and domestic investment on economic growth in short and long run.
- To investigate the effect of exchange rate volatility on economic growth in Ethiopia.
- To analyze the nexus between FDI, domestic investment and economic growth in Ethiopia.

1.4. Research Questions/ Hypothesis

1.4.1. Research Questions

- Does the long-run equilibrium exist between FDI, domestic and economic growth in Ethiopia?
- Does FDI bring economic growth or economic growth attracts FDI?
- What is the relation of FDI and domestic investment on economic growth in the country?
- Does the economy have required power to reap the benefit of FDI
- Does FDI have a positive or negative influence to the economic growth of the country mainly through the improvement of domestic investment, human capital development and technological transfers?

1.4.2. Research Hypothesis

The followings are tested in the study: -

Ho: There is no positive and significant relationship between economic growth and private investment.

H1: There is a positive and significant relationship between economic growth and private investment.

H0: FDI and domestic investment and economic growth do not have a positive causal relationship.

H1: FDI and domestic investment and economic growth have a positive causal relationship.

H0: FDI and domestic investment have no a positive effect economic growth

H1: FDI and domestic investment have a positive effect on economic growth

Ho: FDI, DI, ER, have no effect on economic growth

H1: FDI, DI, ER, have an effect on economic growth

1.5. Significance of the Study

Even though, the previous studies highly focus on analyzing a single or two dimension of the subject and related it with FDI and economic growth. But this current study incorporates the three main dimensions (i.e. FDI, domestic investment which is divided into public and private investment and economic growth with their causality effects), which facilitates a clear environment to have a complete knowledge over the subject. The studies in general and FDI in particular mainly focus on mere statistical analysis by using OLS estimation and difficult to get unbiased results, when the observation is less than 30. But this study used Johansen co integration test and Engle and Granger and Vector Error Correction Model (VECM) method to get unbiased result even though we used less than 30 or small observations and as far as the study understands those applied models are the first few instruments applied in the studying of the causality of FDI and domestic investment on economic growth in Ethiopia and this will going to add something to the existing academic knowledge and the study used as a source of inputs to further studies on the same arena.

Further than this, the study will have a brief policy prescriptions regarding the way FDI and domestic investment should be handled and understand to solve the causality effect on economic growth and to exploit maximum potentials that the country should obtained and to reap economic growth in all Ethiopian regions.

1.6. Scope and Limitations of Study

The study conducts to search the nexus of FDI, Domestic Investment and Economic growth in Ethiopia. The paper research covers 27 yearly data period from year 1992 to 2019, the period taken into consideration that Ethiopia carried out major macroeconomic reforms and implemented liberalization programs to promote both FDI and domestic investments. Hence the data employed in this study is limited to the period between 1992 and 2019, in which the period 1992 marks the implementation of the economic and free market reforms and the year 2019 is the recent year where the data for most variables are accessible.

The study also has a number of limitations from different aspects; (1) the availability of adequate and reliable data on the study variable is limited because of scanty knowledge about the subject matters and the inherent data storing and retrieving problem of developing countries like Ethiopia and (2) the study doesn't cover the earlier period because of the absence of complete dataset to FDI and domestic investment.

1.7. Organization of the Paper

This study is organized in to five chapters. The first chapter explains background of the study, statement of the problem, objective of the study, research hypothesis, research questions, and significance of the study, scope and limitations of study. The second chapter contains the literature review of relationship among FDI, domestic investment and economic growth and empirical studies to analyze their relationship in different countries experience. In chapter three research methodologies can be applied, chapter four articulate the result analysis based on the literatures. Conclusion and recommendation can be presented in chapter five. Reference and appendixes are also presented at the end of the paper.

CHAPTER TWO

2. Literature Review

2.1. Theoretical Review

2.1.1. Definitions of FDI and Main Concepts

The theoretical definitions of FDI are derived from traditional transnational transactions of factors of production between different countries to get comparative advantages which are almost similar to trade. FDI is define an investment involving a long-term relationship and reflecting a lasting interest and controlled by a resident entity in one economy (World Bank, 2007).

According to OECD, FDI defined as it is the reflection of the objectives of establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor. FDI is a balance-of-payments concept involving the cross-border transfer of funds (WIR, 2007).

According to EIC (2004) an investment which is done by foreign nationals having invested foreign capital is considered as FDI. FDI on development agenda goes well beyond investment activities by its nature, which brings into the recipient economy resources that are only imperfectly tradable on markets, especially technology, management know-how, skilled labour, access to international production networks, access to major markets and established brand names(UNCTAD,1999). Many different types of FDI are found in the world. These include Greenfield investment, cross border merger and acquisition, and reinvested earnings. Greenfield investment refers to the establishment of a new firm that in turn enables to create productive assets in a host country. Usually, it is financed by capital coming from abroad or investor's country. A transfer of ownership of local productive assets to a foreign investor is referred as international or cross border merger and acquisition. Whereas reinvested earnings refer part or all of the profit that is not repatriated to the investor's country but reinvested in the host country (UNCTAD, 1998).

FDI also can be categorized in to 4 by its motives Market seeking which is attracted by size and growth of national and local markets which is export-oriented market to sell their products in shortage country in abroad and governments also motivated those involved on export-oriented activities by providing different incentive

packages, Resource-seeking which is motivated by low cost of resource, efficiency seeking which are attracted by the productivity of the resources mainly the labour low wage rate and strategic asset seeking for further research and entrepreneurial advantages (UNCTAD, 1999).

2.1.2. Theory of Investment and Economic Growth

An increase or expansion of investment would boost to economic growth (Petting, 2019). According to Keynes (1936) the driving force of an economic growth is the involvement of both private and public investment (spending). The theory of endogenous growth model and the neo-classical economists suggested that investment is one of the principal catalysts for a capital accumulation to bring a steady state economic growth.

Harrod (1939) and Domar (1946) theoretically suggested that, the aggregate supply and aggregate demand in business activities are expands to increases capital stocks through investment to bring a long run economic growth. (Menshikov, *et al.*, 2015) any types of economic growth whether the increase in scale of production (extensive types of economic) growth or the quality (intensive types) are required additional investments and the accessibility of a conducive environment is an engine and controller of economic growth.

Investment spending also makes a direct contribution to economic growth both in the long run and shorty run activities, because it's a very strong nature of investment is a volatile component of GDP.

2.1.3. Theory of FDI, Domestic Investment and its Impact on Economic Growth

According to classical theories of economic growth and development views that, both domestic and foreign investment are a necessary to enable and precedes a developing nation along an economic path. The source of economic growth can be traced by a variety of factors, but a large, FDI and domestic investment that improves of existing physical and human resource, increase the quantity of the same productive resources and raise the productivities of the available resources through invention, innovation and technological progress continually and stimulate economic growth (Todaro and Smith,2012).

Zhang (2001), FDI come up economic growth like, technological advancement, managerial skills and spill over effects to the host countries. Moreover FDI also involves much more than simple transfer of capital, or the establishment of a local factory in developing and developed countries and it is the formation of multinational carry with equipped technologies of production ,tastes and styles of living, managerial philosophy and diverse business practices. Public and private investment is an extension service to increase the productivity of all economic sectors and raise income and results promote economic growth, whereas lower investment in both physically and human capital will reduce the economic growth(UNDP,2018). The influence of FDI inflows on domestic private investment may depends on the domestic investment environment of the host country.

2.1.4. Theoretical Relation of FDI and Economic Growth

There is an ample evidence to show the causality of FDI and economic growth in different era and place. FDI has a number of benefits on a macroeconomic level, particularly for a Third World Nation such as Ethiopia, where inflows of foreign investment can help broaden economic production and growth (Tadle, 2013; Melak, 2018).

According to (Moudatsou, 2003) the impact of FDI on economic growth can be scrutinised through many standard channels, Firstly, it affects capital formation since FDI is a source of financing to determine economic growth, secondly, inward of FDI also increase the host country's productivity and changes its comparative advantages. But when the productivity is based on export-biased, then FDI will affect both growth and export .Thirdly the institutional characteristics of the host country's such as the legal system, enforcement of property right and government structures can influence simultaneously the level of FDI inflows and capital formation in the country. FDI can bring economic growth through by filling in the gaps between the domestically available supplies of savings, foreign exchange, government revenue, and human capital skills (Todaro, 2014).

Zhang (2001) there is growth driven strategy to attract foreign investment to the host countries to achieve sustained rates of economic growth. UNCTAD (2002) the ultimate objectives of governments in developing countries are to attract FDI in order to promote growth and development. According to (Ndikumana and Verick, 2008)

FDI can stimulate economic growth but these growth effects are sustainable only if FDI stimulates the utilisation of domestic factors of production, especially by increasing employment and stimulating private investment.

In Ethiopia the investment climate in general and FDI in particular were not encouraging and an emerging during the Derg- regime. However after the down fall of the regime in 1991 the government realise the importance of FDI and attempt to revise the proclamation and to creating a stringent policy framework to attract and improve the volume of FDI (Melak, 2018).

According to (Legesse, 2018) the liberalization of FDI in Ethiopia paramount to attract foreign investors until now, a number of policies have realized about liberalization, but still further measures aimed at encouraging privatization. Besides, the Ethiopia government should also work by giving priority to stabilizing the political environment, ensuring peace and security to assure sustainable development and to be food secured there is no options to investment. The geographical location and the current relativity peace in the region is also an appetite to foreign investors to invest in Ethiopia.

2.2. Empirical Literatures

There were many empirical researches undertaken by many scholars on the issue of FDI, domestic investment and economic growth both in developed and developing countries. These comprehensive studies can be categorized in to three for our simplicity purpose (1). Studied that conducted globally (2). Studies conducted in Africa (3). Studies conducted in Ethiopia.

2.2.1. Global Studies on FDI, Domestic Investment and Economic Growth

According to Li & Liu (2005) on their studies of FDI and economic growth, suggested that both FDI and economic growth have a strong complementarity relation in developed and developing counties. Moreover, FDI not only directly promotes economic growth in host countries by itself but also indirectly do via interaction terms. As a result of these interactions FDI have strong positive interaction effect with human capital and a strong negative interaction effect on technology gaps). (Alfaro *et al.*, 2004) studied on FDI and economic growth with case of financial markets by using cross country data analysis method from 1975 and 1995. They examined in their studies that FDI and economic growth have a positive relation but this positive

relation can't be sustain without the development of local financial markets. Besides of these positive effect of FDI and economic growth the link between them is casual, which is FDI promotes economic growth through financial markets and compatibility.

Zhang (2001) investigated the impact of FDI on economic growth of East Asia and Latin America by taking 11 countries which is 4 countries from Latin America (Argentina, Brazil, Colombia, Mexico) and 7 countries from East Asia namely (Hong Kong, Malaysia, Taiwan Singapore Thailand Korea Indonesia) and then he examined the finding using the Granger cointegration test to short run causality and ECM test for long run causality. The findings are: Only five countries are (Hong Kong, Colombia, Mexico, Indonesia and Taiwan) FDI and economic growth have a long run positive relations. For the rest countries FDI brings economic growth and the effect of FDI on economic growth depends on the specific characteristics and policies related to FDI. Hence in Latin America more of FDI catches on service sectors at the expense of manufacturing. The result shows that FDI tends to be more likely promote economic growth in East Asia than Latin America.

Prasanna (2010) examined the direct and indirect impact of foreign investment on domestic investment in India. The finding of the result shows that domestic investment is increased due to the inflows of FDI and it was greater than the amount of FDI inflows in to India. And then the relation of FDI inflows has a positive impact on domestic investment. (Mohamed. *et al*, 2013) studied the impact of FDI and domestic investment on economic growth in Malaysia, by applying VAR/VECM models to investigate the dynamic relationship between the variables. The result shows that domestic investment has a bilateral causality with economic growth in the long run. However, no causality was found to exist between FDI and domestic investment on the one hand and between FDI and economic growth on the other hand.

Abubakar and Bala (2016) examined the nexus between domestic investment, FDI and economic growth. By segregating domestic investment into private and public investment results shows that, private investment and FDI have significant positive impact on economic growth in the long run, while public investment is seen to have an insignificant positive impact on economic growth.

Lautier and Moreaub (2012), on their study of domestic investment and FDI in developing countries with the evidence of 68 counties over a long period of time

(1984-2014), the result shows that expanded domestic investment have a strong effect on FDI inflows in the host economy, which is domestic investment is a catalyst for FDI in developing country and many multinational companies do follow economic development of the host countries.

Agosi and Mayer (2014) examine on foreign investment in developing countries (Africa, Asia, and Latin America) Does it Crowd in Domestic Investment? Even though in those countries the effect of FDI on domestic investment depends on the effectiveness of screening policies and administrative capabilities, they suggested that, FDI crowding in domestic investment in Asia, where the investment in that country is strong investment by MNE_s and elicit positive investment response to domestic investment through backward and forward linkages, whereas FDI may crowding in domestic investment in Africa because of the shortage of domestic investment rate in the continent by the effect of technological gap and shortage of capital requirement for the domestic firms. In Latin America FDI crowds out domestic investment because of overall investment are lower and the country gives priority to attract desirable firms.

2.2.2. African Studies on FDI, Domestic Investment and Economic Growth

Africa is endowed with both underutilization and unused immense natural resource and other parameters that makes Africa is hub of investment for both FDI and domestic investment. As a result of these facts, many scholars conducted a research to analyse the causality / relation/ of FDI, domestic investment and economic growth in the continent.

Ndikumana and Verick (2008) in their studies on the linkage between FDI and domestic investment in Sub-Saharan Country Africa (SSA), the results shows that the relation between FDI and domestic investment runs in both sides one is FDI crowds in domestic investment in SSA countries. And in the second way a private investment has a positive impact and driver of FDI in the regions. African countries will have benefited by taking different measures aimed at promoting domestic investment which used as a catalyst sign of high return to capital and then it attracts more foreign capital by considering as a complementarity rather than substitutions. Nketiah and Quaidoo (2017) studied the effect of FDI one economic growth in Ghana. The study employs 30 year from 1983 to 2012 by using time series analysis to see the relation of

FDI and economic growth and the result indicates that FDI brings economic growth in Ghana and have a positive significant effect. Since in Ghana FDI boost economic growth by implementing strict economic policy. Rsoub *et al.* (2017) on the study of the effect of FDI on economic growth in SSA landlocked countries from the period 1995-2013 with the total 234 panel observations, the result of the study is revealed that FDI have a positive and significant effect on economic growth and crowding in effect on domestic investment in this countries, but the characteristics of the host countries (likewise, trade openness, inflation rate, exchange rate, natural resource endowment, human capital) are controlled.

Suleiman (2016), conducted an empirical investigation on the title of factors affecting the inflows of FDI in sub-Saharan Africa, evidence from six among the top ten FDI recipient countries namely, Ivory Coast, democratic Republic of Congo, Ghana, Nigeria, South Africa and Sudan from the period 1980-2011, the researcher employed a method of cointegration Approach and granger causality tests. Based on this empirical investigation the result shows trade openness, infrastructure facilities and market size are the most determinates of the inflows of FDI and that brings economic growth to those stated countries as a group. Ijirshar, *et al.* (2019) in African countries FDI have grease for economic growth in the long run. the sample taken by using pooled mean group and mean group with the title of growth-differential effects of domestic investment and FDI in 41 countries in Africa from 1970-2017 and justified that, not all African countries gets the reap economic growth by FDI, even though the joint effect of FDI and domestic in African are statistically significant, domestic saving and domestic investment is a major source of economic growth and FDI must take as a supplementary to growth of African countries

Eregh (2012), the dynamic linkage between FDI and domestic investment in ECOWAS countries; A panel data cointegration analysis, the result show that the inflows of FDI and the accumulation of domestic investment have a negative and significant effect and hence FDI crowding out the domestic investment in the regions. Ahme, *et al.* (2014) on the title of does inward FDI crowding-out domestic investment?, Evidence from Uganda (1992-2012) they summarized the result in two ways one is by seeing overall economy and gets the result that FDI have a neutral effect on it, secondly, by investigating through different production sectoral levels and they got different results. In Agriculture and construction sector FDI crowding out

domestic investment because of the foreign investors are equipped and superior with technology and which gives competitive advantages over their domestic investor's counterpart. Whereas in mining and wholesales sectors FDI is crowding in domestic investors because it is underinvested by local investors and it brings absorbable technology, better management and new market destinations. In transportation, finance and community services FDI have a neutral effect on domestic investment.

Alessia, *et al.* (2017) on the study of FDI and capital formation in developing economies examined that, most developing countries gives special incentives to foreign investors by considering a better linkage of domestic investors. However, this increase of total investment passes along with a crowding out of domestic investment in all host industry, which means the amount of FDI flows displaces domestic investment more than proportionally, in such cases FDI that causes no productive activities in domestic economy. Wakyereza (2017) suggested that, the impact of FDI on economic growth, employment and poverty reduction in Uganda by employed vector autoregressive and vector error correction model and examined that FDI brings economic growth in the country but the impact of these is not directly rather through the service sector of tourism development as an export facilitator and that spurs economic growth. Meanwhile the empirical investigation results also show the Uganda's local resource such as employment of labour force and human capital play a pivotal role to come up economic growth than FDI.

An empirical study in developing countries in Africa which are middle-income groups the period from 2000-2014 (Dinh, 2019) suggested that, firstly, FDI doesn't bring an economic growth in the short run, even if the relation seems a positive effect on the long run and secondly, giving of credits to domestic investors affect economic growth negatively in the short run, while money supply is determined to have a positive effect in both short run and long run to economic growth.

According to Melak (2018) the contribution of FDI for economic growth; FDI have a positive and insignificant effect on economic growth by creating employment opportunity providing technological know-how, expanding of export amount and used as source of revenue to the government by the tax form, but some remedies are expected to sustain and to get more benefits from FDI by depreciation exchange rate and devaluation of a host countries currency. The devaluation of currency may

increase FDI in in the region but there is a shadow effect and crowding out of domestic investors by making them incompetent and inefficient financially. According to (Muchiri,2019) on the speech of pan African conference on illicit and tax incentives, and suggested that to have a strong economic growth on the host country is the incentives must be provided highly on domestic capital formation than FDI, because some investors need to invest those activities that didn't need more capital and more employment absorbing opportunities like mining , ICT and some manufacturing activities in that case they changed from foreign direct investment to foreign direct exploitation and their contribution to economic growth is insignificant.

2.2.3. FDI, Domestic Investment and Economic Growth in Ethiopia

2.2.3.1. Trends in FDI and Domestic Investment in Ethiopia

In pre 1991 the economy system was discourage market economy and limited private property capital and highly focused on common property and command economy because of in secured, lack of political stability and the nationalization of major industries made the environment unattractive for private investment and the absence of FDI (Borna and Simret,2013). However in post 1991 Ethiopian people Revolutionary Democratic front (EPRDF) come to the power by over thrown of the Derg regime and replaced the command system to free market system and undertaken many macroeconomic reforms (like, amending of regulations or deregulation, privatization, liberalization of foreign exchange markets) and gives special priority to FDI to increase and brings capital accumulation and economic growth in the country.

The country also formulates structural change that transformation of agrarian society (subsistence) to modern industrial community (urbanized manufacturing and service economy). The Policy directions of structuralisms stand for government intervention for enhancing the industrial sector by Import Substitution Industrialization. The development orientation of Ethiopia is Agricultural development will lead to industrialization; gradually to achieve a structural change of the economy from agriculturalist to industrialist nation. It is also expected to strengthen the forward and backward linkages of sectors. Ranging from Micro and small scale enterprises to large-scale investments are given important role in the realization of export promotion and import substitution strategies. Particularly, the export sub sector plays a key role in the economic growth and raising foreign exchange. Promotion of FDI in selected

areas and encouraging domestic investment are efforts of the country for achieving the desired goals (Abebe, 2014)

Ethiopia's fortune and FDI destination began to change around 2012. Since then FDI inflows to Ethiopia have been growing by 50 per cent per year on average, reaching the peak of \$4.1 billion in 2017. While FDI inflow to Ethiopia declined slightly in 2018 in line with the global downward trends and the slowdown in global economic growth.

2.2.3.2. The Economic Implication of FDI and Domestic Investment on Economic Growth

According to (UNCTAD, 2002) the investment and innovation policy review of Ethiopia has taken place at a point when the country is at a watershed of radical change and it emerges from a destructive and costly regional conflict. On the other, it is striving to do so in the context of rapid and fundamental changes in the global economy. In this new and intensely competitive global context, attracting foreign investment requires more than the willingness to host FDI on the basis of a liberal market and macro-policy environment only. Ethiopia emerges the economic growth momentum that it experienced in the post 1992 liberalization period. Key ingredients for renewed growth are increased investment, both domestic and foreign, in supply capacity, including physical infrastructure, the generation of relevant skills and the development of competitive enterprises through local technological and innovative capability building.

Domestic investment in Ethiopia has increased rapidly since the introduction of liberal policies in 1992. However, the gap between domestic investment and savings has remained wide thereby reinforcing the need for FDI in the development of the economy. Between 1990 and 1997, gross domestic investment as a proportion of GDP rose from 11.9 per cent to 19.1 per cent, while gross domestic savings remained at the same rate. A large part of the increase in investment has been attributed to the private sector whose share increased from 2.5 per cent to 13.1 per cent. Public sector investment increased only marginally from 6.4 per cent to 7.4 per cent. It would appear, therefore, that if a high level of private investment is to be maintained, concentrated efforts should be made to promote domestic savings. At present, the

savings gap in Ethiopia is met through investments generated from foreign savings more specifically, development assistance and FDI (UNCTAD, 2002).

FDI provides capital sources from abroad which the country is unable to supply domestically. Foreign investment helps to fill the saving-investment gap caused by the lack of domestic savings converting into investment (Aboye, 2017). Berhe (2015) domestic investment and FDI in Ethiopia requires a rigorous effort that holistically addresses all the main inadequacies of the regulatory, institutional, business, financial and physical infrastructure. But then again the government must be busy to set and build on existing efforts to improve the investment environment and to style the fact that FDI can be the root cause of the success of domestic investment by protecting those infant industries from the big MNEs with enough economies of scale.

According to Mileva, 2008 (cited from Aboye, 2018) FDI contributes at large on domestic investments in the host economies if it engages in the production of goods and service which are not produced by the domestic firm. Contrary to this, foreign company which produces commodities which have been already produced by domestic firms would smash up domestic firm's activities and creates crowding out effects through substituting locally produced goods. FDI also come up with a high technology and ample management practice which are spill over to the local investors, nevertheless, enclose a spill over effects to the host country domestic firms, subsequently enabled them efficient in productivity of goods and services. These spill overs drive domestic firms to invest more and to adopt more efficient production system which is comes crowding in effects.

However as noted by Menamo (2014), the relation of domestic investment and FDI can be true and enthusiastically amenable when the foreign investors are involved in sectors, which are not reserved by domestic investors. This is a huge advantage of FDI in the host country. In other words, more new sectors of investment are made by foreign investors which are difficult to involve by domestic investors. Otherwise, foreign investment in the country seems to exploit the comparative advantage of the country's natural resource and labor in better technology than adding new areas of involvement. Plus to these actions of FDI leads to more investment in fixed capital and some of these goods are produced domestically, and then FDI have a short run demand effect on output.

According to UNCTAD's World Investment Report 2020, FDI inflows in Ethiopia decreased to USD 25 billion in 2019, compared to USD 33 billion in 2018 (-24%), because of instability, the exchange rate volatility and ethnic conflicts in some parts of the country and regions with some industrial parks, this in turns decrease Gross Fixed Capital Formation and economic growth as a whole. Hence FDI can be one of the best instruments to bring economic growth and to balance trade deficit in Ethiopia. But it is not correct always because it needs comfortable and stable macroeconomic policy and political conditions extremely. Otherwise it doesn't incubate economic growth.

According to (Menamo, 2014), impact of FDI on Economic Growth of Ethiopia, a time series empirical Analysis, 1994-2011, she explain the result that by using OLS method, FDI have a positive and statistically significant impact on economic growth when trade is on the way of liberalization but after the trade is highly liberalized the relation of FDI and economic growth is positive but the impact is statistically insignificant. Awel and Weldegiorgis (2014) in their study on FDI-growth nexus in Ethiopia: "Is There Any Causality"? Using a time series analysis from (1974-2010) they couldn't get any causality between FDI and economic growth or vice versa. But they put some implications by concluded those FDI and economic growth have a cointegration ,because at that time the flow of FDI is too small to translate into growth and FDI flow has gone in to sectors that couldn't create linkages and fuels economic growth.

Weldekidan (2015) on FDI and Economic Development in Ethiopia by employed a time series data analysis method and suggested that, the economic impact of FDI on economic growth is positive and statistically significant when the export performance is good and also have a positive relation on spill over effects, even though the impact of FDI one economic growth is insignificant. (Gizaw, 2015) The Impact of FDI on Economic growth, the case of Ethiopia. The study examined that results by using a time series data and a pair-wise granger to test causality and gets a result of strong and stable long run positive relation of FDI and economic growth and there is a unidirectional causality from FDI to economic growth. Getachew (2019) argued that, FDI have a positive relation but insignificant effect on economic growth by taking the effect of FDI and international trade on Ethiopian economic growth from the period of 1992 to 2017 using the method of autoregressive distributed lag model. Ozkan and Dube (2018) by using the method of vector autoregressive model and Johansson co-

integration causality test suggested that, the cointegration of FDI and economic growth is not directly integrated rather through the export performance and export lead strategy of the country.

Merga (2018) empirically investigates the possible factors that determine the inflows of FDI in Ethiopia by taking the time ranges from 1992-2015 and applying vector autoregressive model (VAR) and Vector error correction model (VECM), argued that economic growth and FDI in Ethiopia have a positive relation and statistically significant in the long run whereas the macroeconomic stability, gross fixed capital, external debt trade openness and GDP growth rate have insignificant effect on the impact of FDI. Hundie (2016) examined the causal relationship among saving, investment and economic growth in Ethiopia from 1970 to 2011 employing a multivariate framework and gets a result of causality and a positive cointegration exist between gross domestic saving and economic growth, while a unidirectional granger causality running from investment to saving and from investment and economic growth.

2.2.3.3. The Relation of Domestic Investment and Economic Growth in Ethiopia

According to Ethiopian investment laws and regulation domestic investment can be categorized into two and which is namely, private investment and public investment. After the implementation of investment proclamation, regulation and rules, the share public investment specially in infrastructure alone reached around 20 per cent of GDP (US\$6 billion), which was large relative to the size of the economy and compared to FDI flows to Ethiopia. These massive public investments were helped to fuel domestic demand and enhance the economy's productive potential (EIC, 2019). As Menamo (2014) explains in his study, mostly FDI is interested to invest and to reap the production of the host countries via transfer of technology and spill over effects amid the existence of favourable policy environment in the host countries. But when unfortunately unfavourable policy environment happened in the host country, it may have happened a consequence of capital flight following the policy changes and leads the country shortage of capital or GDP. So intrinsically domestic has been the paramount and source of economic growth at time of policy changes.

CHAPTER THREE

3. Research Methodology

In this Chapter commonly discussed about the source of data, techniques used to variables estimation of the models and the methods that applied to investigate the relationship between gross domestic products (nominal GDP) foreign direct investment (the net inflows of investment), gross capital formation private investment (capital formation by private investment), gross capital formation public investment (capital formation by public investment) and exchange rate (the price of domestic currency in terms of foreign currency).

3.1. Research Design

The study uses a longitudinal research design measure individuals over prolonged period of time, those are observations of with quantitative or qualitative data being collected. This study type is use full to study the relationship of FDI, domestic investment and economic growth in Ethiopia. Because longitudinal approach is applied the study that have univariate (ANOVA) and multivariate (MANOVA) variance analysis, which have an equal interval lengths and normal distributions in all groups (Caruana, *et al.*, 2015). Longitudinal method provides a more comprehensive approach to research, that allows and understanding of the degree and direction of change of the observations over time.

3.2. Data type and Sources

The study entirely used secondary data. An endeavour made to gather a 27 years data on some imperative variables. The study spanning the period from 1992 when the new investment reforms formulated up to 2019, allowing for complete annual data to all variables. The data obtained for this study was from different sources such as, the Ethiopian Investment Commission (EIC), National Bank of Ethiopia (NBE), World Development Indicators (WDI) and African Development Bank Group (ADBG). Those data are purely secondary and linked with prior studies of FDI, Domestic investment and economic growth.

3.3. Method of Data Analysis

The collected secondary data can be summarized and presented using charts, tables and other suitable statistical tools. Then VECM was used together with other appropriate econometric techniques to investigate the nexus between FDI, domestic investment and economic growth in Ethiopia. The model is selected for its simplicity and based on the assumption of consistency, efficiency and unbiasedness.

3.3.1. Descriptive Statistics

In the analysis of descriptive statistics we investigate the regional and sectoral distributions and share of FDI in Ethiopia based on the data that we collect from EIC, which the period covered from 1992 to 2019. Finally the descriptive statistics of GDP, FDI, GCFPRI, GCFPUI and ER are analysed based on their mean, media, maximum, minimum standard deviation and others parameters depending on the output result of Eviews, 8. Thus the result can be presented by using table, graphs and pie charts.

3.3.2. Econometrics Model

An econometrics model is a technique that refined a model to be compatible with the theory of phenomena and to investigate further. So model is estimated based on data pertaining to the phenomena or theory that can be analysed using econometrics techniques to apply and estimate for various purposes including, forecasting, structural development or analysis and finally for policy evaluation (Intriligator,1983)

3.3.2.1 Multivariate Time Series Model Analysis

The study of multivariate time series model is used to explain the relationship among a vector K-time series variables of $X_{1t}, X_{2t} - - - - X_{Kt}$. Multivariate process arises when several related time series are observed simultaneously over times, whereas the multivariate observing a single series, it will be univariate time series analysis. In the investigation of multivariate process a bench-mark is preserves to describe the proportion of the individual series and the cross relationship between the variables (Meslie, 2019). The fundamental benefit of analysing and modelling the series jointly is to know the dynamic relationships over time among the series and to increase the accuracy estimation for each variable.

3.3.2.2 Stationarity of Time Series

One of the important point and that describes the analysis of stationary in time series data through the statistical characteristics of series such as mean, variance and auto covariance over time. When those are constant over time, the series is said to be stationary which means has no unit root, whereas the variance, mean and auto covariance are not constant over time it shows that the series is nonstationary process (has unit root test). Thus before estimating and using of time series data, the parameters and hypothesis must be investigated. Investigation helps to avoid estimating spurious correlation among the variables in a regression process, if that actually happened correlation with time trend rather than meaning full economic relationship (Demeke, 2018).

For stationary series the values of the covariance between the two time periods depends only on the distance or lag between them and not the actual time at which the covariance is computed. In time series such a stochastic process is known as a weak stationary or covariance stationary (Gujarati 2003).

3.3.2.2.1. Testing for Stationary

In most intuitive sense, stationary means that the statistical properties of a process generating a time series do not change over time. But it doesn't mean that the series doesn't change over time, just that the way it changes doesn't itself change over time (Palachy, 2019).

The nonstationarity of a time series influence the behaviour of the series and inferences made unless it is detected (with standard unit root tests) and properly handled. In these processes, the effect of a shock never dies away and it leads to false regressions (i.e., one can regress completely unrelated series as a result; it would get inflated t-ratio which suggests whether a coefficient of one variable is significant or not to explain the other and high R^2 which indicates how good one term is at predicting another) and fake results of standard tests. In order to ensure the condition of stationarity, a series must be integrated with order of zero, $I(0)$ (Meslie, 2019).

There are many different approaches so as to test for stationarity in time series analysis. Among these the most popular procedures are: Time plot (visual inspections) and Unit root tests: such as Augmented Dickey-fuller (ADF) and Phillips-Perron (PP) test.

A. Unit Root Test

We applied unit root test to check the order of integration of variables, which is the ADF test. The ADF in full name Augmented Dickey Fuller test is present in a time series and supported linear regression. The ADF used and makes a fair inference on whether the series is stationary or not. The development of unit root theory, initially proposed by Dickey and Fuller in 1979 (Dickey and Fuller, 1979). This theory is the cornerstone for the methodology used in testing the stationary or nonstationarity of a time series. Nowadays, many of the procedures are standard offerings in econometric software packages like Eviews.

So this study will apply will also use the most common and powerful unit root tests: Augmented Dickey- Fuller (ADF) test due to (Dickey and Fuller, 1979) than the Phillip-Perron (PP) test due to Phillips and Perron (Phillips and Perron, 1988). The test can be evaluated by at level, intercept with trend or at first difference depending on the result of the test. So pre-test of unit root is mandatory to check the series is whether stationary or non-stationary.

3.3.2.3 Cointegration analysis

When two or more series are integrated in time series with their linear combination in lower order of integration, then the series is said to be co-integrated (Granger,1981). The presence of co-integration is an evidence of a long-run equilibrium relationship among variables. Since the Johansen cointegration test is sensitive to lag values, then primarily we have to determine the lag length selection to suit the optimal lag values by using the Var lag exclusion test through the Wald lag exclusion test to check the lag is whether optimal or not.

3.3.2.3.1 Johansen Cointegration Test

Johansen test is a path way to determine if three or more time series are co-integrated. It also used to assess the validity of a cointegrating a relationship by using a maximum likelihood estimates approach. Johansen cointegration can be tested through two ways: one is Trace statistics test and the second one is maximum- Eigen value (Johansen, 1988).Trace statistics shows that the cointegration of the null hypothesis of r -and the alternative of n cointegration relationship, whereas maximum

Eigen value statistics test the null hypothesis of r cointegration relation against the alternative of $r+1$ cointegration relationships.

Johansen cointegration approach is sensitive to the lag length chosen, and then we can precede a series of tests to determine the optimal lag length and select a model lag length.

3.3.2.4. Vector Error Correction Model (VECM)

Vector error correction model is a natural progression from a VAR model representation, particularly, when the level series are nonstationary. If there is a co-integration between the series, and then we can confidently say that there exists long term equilibrium relationship between them. Hence, in this case, VECM shall be a suitable model to articulate the short -run and properties of co-integrated series (Zhang, 2001). An error correction model can be used in multiple time series models, commonly applied to use for data where the underlying variables have a long run stochastic (nondeterministic) trend which is called co-integration.

The most common feature of the VECM is its capability to correct for any disequilibrium that innovate /shock/the system from time to time (Abubakar and Bala, 2016). The error correction term (co-integration term) picks up such disequilibrium and guide variables of the system to back the equilibrium. The error correction term gradually balance the deviation from long-term equilibrium through the series of partial short-run adjustment (Meslie, 2019). When the series have no co-integration the VECM is not required and one may immediately go to use Granger causality test to test the causal link between variables. So we can consider the VECM that integrated variable in the VAR. let take two variables or series x and y are integrated, then there exist a_0 and a_1 , when that $u_t \equiv y_t - a_0 - a_1 x_t$ is $I(0)$. -----1.1

When we take y as dependent variable and x as exogenous repressors, the error correction model in a single cointegration is that: $\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 u_{t-1} + \varepsilon_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 (Y_{t-1} - a_0 - a_1 X_{t-1}) + \varepsilon_t$ -----1.2 is an appropriate specification

All terms in equation 1.1 is $I(0)$.

u_{t-1} , indicates the magnitude which is as y was above or below its long- run equilibrium value in the last period.

The coefficient of α_2 is expected to be negative in sign to represent the amount of correction of this period-(t-1) disequilibrium that happen in the period of t. We can also extend the VECM to two or more multivariate time series variables.

So the Vector Error Correction Model (VECM) is specified as:

$$\Delta Y_t = C + \sum_{i=1}^K \Gamma \Delta Y_{t-1} + \gamma(U_{t-1}) + \varepsilon_t$$

Where, Γ = Short run coefficient matrices

γ = Error correction term/speed adjustment

Δ = short run operation

U_{t-1} = One lag long run equation

ε_t = Error term

Y_t = is a vector of endogenous variables, which is GDP, FDI, GCFPRI, GCFPUI and Exchange rate (Abubakar and Bala, 2016).

3.3.2.5. Model specifications

The selected method for the purpose of the data is multivariate time series Vector Error Correction Model (VECM) model. VEC model is preferred because it is the most successful, simple and commonly used model for the analysis of multivariate time series models. Moreover, the possibility of combining long-run and short-run information in the data by exploiting the co-integration property made it the most important reason why the VEC model continues to use wisely. Vector Error Correction Model an econometric model used to hold the linear inters-relation among multiple time series. It generalizes the multivariate Vector auto Regressive (VAR) models by consisting of more than one evolving variable. Vector Auto-regression model it also helps to analysing the relation between the variables involved using the Granger Causality test (Maitra, 2019). To describes the evolution of a set of N variables (endogenous variables) over the same sample period as a linear combination of their past values. Following the augmented Solow Growth model (Mankiw, 1992) and empirical literature (Acemoglou, 2007), let a country's Real GDP or Aggregate Production function can be represented by the function:

$$Y(t) = f[K(t), L(t), A(t)] \dots \dots \dots (1)$$

Where Y denotes the total amount of production of the final good at time t, K (t) denotes the capital stock, L (t) denotes total employment and A denotes technology at time t , which explains the output growth that is not accounted for by the growth of production specified. Assuming that the capital stock consists of three components: Private Investment (Gross Domestic Capital Formation), Public Investment (Public Capital Expenditure) and Foreign Direct Investment Inflows.

$$K = PUINV + PRINV + FDI \dots \dots \dots (2)$$

Adopting a production function that make output a function of labour, capital (where capital is specified as domestic and foreign owned capital separately), exchange rate , we can have a function:

$$Y = F(A, L, PUINV, PRINV, FDI, ER) \dots \dots \dots (3)$$

Where, ER denotes exchange rate. Assume that the relation among private investment, public investment and FDI as a simple linear type production function.

$$GDP = PUINVt + PRINVt + FDI t + ERt \dots \dots \dots (4)$$

To analyze the causality effect among private investment, public investment, FDI, exchange rate and economic growth we have used and can use various tests and variables.

$$Y = f (PUINV, PRINV, FDI, ER) \dots \dots \dots (5)$$

The functional form of this model is written as by modifying in time series form.

$$LN GDP = \beta_0 + \beta_1 LN PUINVt + \beta_2 LN PRINVt + \beta_3 LN FDI t + \beta_4 L ERt + \epsilon_t \dots \dots (6)$$

Where $\beta_1, \beta_2, \beta_3,$ and β_4 are constant elasticity coefficient of output with respect to $PUINVt, PRINVt, FDI t, ERt,$ respectively, β_0 is a constant parameter and ϵ_t is the error term. The effects of the independent variables on the dependent variable (GDP) are expressed via coefficient estimate, their sign and statistical significance. Whereas the estimation of the Vector Error Correction Model (VECM) can be specified as:

$$\Delta Y_t = C + \sum_{i=1}^K \Gamma \Delta Y_{t-1} + \gamma(U_{t-1}) + \epsilon_t$$

Where, Γ = Short run coefficient matrices

γ = Error correction term/speed adjustment

Δ = short run operation

U_{t-1} = One lag long run equation

ε_t = Error term

Y_t = is a vector of endogenous variables, which is GDP, FDI, GCFPRI, GCFPUI and Exchange rate (Abubakar and Bala, 2016).

GDP = Gross Domestic Product, proxy for economic growth may have a positive or negatively relation among, PRINV = Private Investment (Gross Domestic Capital Formation). PUIINV = Public Investment (Public Capital Expenditure), FDI = Foreign Direct Investment Inflows and ER = Exchange Rate and vice versa. The unit root test is working to find the order of integration. Cointegration analysis can be conducted to test whether the variables have a long run relationship between the variables or not. The variables, causality test and various diagnostic tests are employed. Finally the study uses VECM approach to analyze the cointegration relationship in the long run and short run among public investment, private investment, FDI and economic growth in Ethiopia.

3.3.2.5.1 Descriptions of the Study Variables

Gross Domestic Product (GDP): GDP is the total value of all goods and services produced over specified period of time and it is an indication of the growth of one's country economy. According to World Development Indicator data (2020) sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products is termed as GDP. Hence GDP can be calculated as the total sum of production of goods and services at current price is a measure of economic growth, and it can be used for this purpose in this study.

Public investment (PUIINV_t): public investment is measured as the percentage or share of public investment to gross domestic product. Public investment is seen as one of the major driving forces of economic growth. Those investments that conducted by using the government budgetary funds which are allocated to public service, such as education and health and to subsidies the domestic capital (Demeke, 2018).

Foreign Direct Investment (FDI_t): measures as a log of FDI stock and the net inflow of the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series also shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP (World Development Indicator, 2020).

Private Investment (PRINV_t): Private investment is measured as the difference between total domestic investment and public investment. Private investment is seen as one of the major driving forces of economic growth. Empirically it can be measured as the ratio of private investment to total gross domestic product (Ndikumana and Verick, 2007).

Exchange Rate (ER_t): the ratio of the host country currency to the other countries' currency. In the literature, it is recognized that depreciation of exchange rate has positive contributions for increased exports while real appreciation of the exchange rate is generally associated with a slowdown in exports. Frequently and inconsistently changes in the exchange rate of the domestic currency affect GDP (Legese, 2018).

3.3.2.6 The Granger Causality Testing

Granger has defined the concept of causality which, under suitable conditions, is fairly easy to deal with in the context of VAR model. Therefore, causality has become quite popular in recent years. The idea is that a cause cannot come after the effect. Thus, if a variable X affects a variable y, the former (X) should help improving the predictions of the latter variable (Y). Granger causality measures whether one thing happens before another thing and helps to predict it and nothing else.

It only implies forecasting ability. If X cause y and have a significant effect on it then x is a driven factor, whereas the change or effect of x is because of Y then Y is the driven factor or cause of X and X causes Y and y also causes X then the causality of those are feedback (Zhang, 2001). A pairwise causality and chi-square (Wald) test statistics used to test for the joint significant of all lagged endogenous variables in the model. The null hypothesis test shows that X and Y in the vector of the VAR, X doesn't Granger cause Y, or Y doesn't Granger cause X. Therefore the hypothesis are statistically significant or not, we have check by testing of the lagged values the variables unrestricted VAR.

3.3.2.7 Impulse Response Function and Variance Decomposition Analysis

3.3.2.7.1 Impulse Response Function (IRF)

We can utilize the impulse response function to examine the dynamic causal relationship of the variables. The impulse response function shows the effect of a one-time shock to one of the innovation on current and future values of endogenous variables (Saglam, *et al*, 2011).

We can check the shock of the variables by using the diagonal matrix and moving average matrices.

3.3.2.7.2 Variance Decomposition

The VECM can also shows the dynamic behaviour or long term effects through the response of each variable to the shock of the other endogenous variables. One of the methods that used to arrange total variance based on other variance through by variance decomposition. This also used to estimate how much the contribution of a variable to change the variable itself and other variables in the coming period, where the value is measured by percentage (Silatchom, 2017). Variance decomposition also used to determine which variables are tends to be exhibit long-term permanent shocks, and which one tend to have transitory shocks in the long run

3.3.2.8 Diagnostic Test

Testing of a model is a mandatory task to check the reliability and validity all inference procedures done by VAR and VECM before one going to use these models to analysis and forecast in time series. Thus a range of diagnostic test is ready to check the model assumptions and postulates. Generally there are a number of tests to check future capability and efficiencies of time series.

3.3.2.8.1 Residual Autocorrelation Test

There are a number of tests for residual autocorrelation, but the most common and applied to work is Breusch-Godfrey Lagrange Multiplier (LM) Durbin-Watson h test autocorrelation test(Rois, *et al*, 2012). So we can test the result of the null hypothesis of residual autocorrelation using a scaling matrix.

A. Heteroskedasticity Test

The first assumption of diagnostic test is testing of heteroskedasticity and the assumptions; especially on OLS regression model is to make the variance of the error term constant which is termed as homoscedasticity. If the error terms doesn't have a constant variance it will be and taken as a heteroskedasticity (Knaub, 2007).

B. Autocorrelation LM Test

Autocorrelation LM test is firstly developed by Breusch and Godfrey (Breusch and Pagan, 1980). LM test can be used to check for residual autocorrelation in a VAR (P) process. The K^{th} order of residual autocorrelation can be checked by the LM autocorrelation test. When the null hypothesis (H_0) of the residual is equal to zero, then there is no serial correlation, whereas the alternative hypothesis (H_1) order of the series, at least one is different from zero, there is a serial correlation.

Therefore for our study purpose we applied the LM test to check autocorrelation of the residuals.

C. Normality Test

To test the multivariate normality (Janque-Bera, 1987) is applied. Uniformly a lot of methods are applied in this normality test like Skewness, Kurtosis are available to check normality. But the most plausible and frequently used method is the Janque-Bera normality test. Finally we applied Janque-Bera normality test for our study.

D. Stability Test

After the VECM established the cumulative sum of recursive residual (CUSUM) and the CUSUM of square (CUSUM SQ) test are used to know the parameters stability (Alimi, 2014). The result of stability of the coefficients can be represented by plotting of the CUSUM and CUSUMSQ statistics that falls inside the critical bands of the 5% confidence interval.

CHAPTER FOUR

4. Results and Discussions

The study is used time series data observed from 1992 to 2019. In this chapter the result of the co-integration analysis and vector error correction models are presented. And the discussion also begins by describing the nature of the series and results from the model selection steps. Then finally the results would be interpreted and discussed.

4.1 Descriptive Statistics Results

4.1.1 Description Statistics of variables

In this empirical task, four aggregate series namely, the economic growth measured by Gross Domestic Product (GDP at current price), (FDI) Foreign Direct Investment inflows as values (%GDP), (GCF) Gross Capital Formation totally produced goods and services by domestic investors (%GDP). Gross Capita Formation of private investment (% of GDP) Gross capital formation of public investment (%GDP) and Exchange Rate (relative exchange of foreign currency to domestic currency) were used to as shown by the descriptive statistics presented below.

Table 1: Descriptive Statistics of Variables

Statistics	LNGDP	LNFDI	LNGCFPRI	LNGCFPUI	LNER
Mean	23.70	21.45	21.31	21.57	2.30
Median	23.56	21.84	21.44	21.04	2.16
Maximum	25.27	23.58	22.87	23.94	3.33
Minimum	22.69	17.86	19.26	19.65	0.73
Std. Dev.	0.89	1.63	1.16	1.42	0.62
Skewness	0.37	-0.60	-0.20	0.50	-0.39
Kurtosis	1.68	2.30	1.65	1.76	3.15
Jarque-Bera	2.68	2.26	2.32	2.96	0.75
Probability	0.26	0.32	0.31	0.23	0.69
Sum	663.56	600.65	596.81	603.93	64.51
Sum Sq. Dev.	21.56	71.65	36.26	54.67	10.49

Source: Eviews 8 output

The result of table 1 showed the mean of GDP Growth, FDI(Foreign Direct Investment), Gross Private Capital Formation (GCFPR), Gross Public Capital

Formation (GCFPU) and (ER) Exchange Rate is 23.70, 21.45, 21.31, 21.57 and 2.30 respectively. GDP has the highest maximum value of 25.27 and Exchange rate (ER) has the lowest maximum value which is 0.73 .GDP again has the highest minimum value 22.69. The kurtosis statistics for FDI, GCFPR, and GCFPU are less than 3 this indicates that platykurtic distribution (flatter than a normal distribution with shorter tails) whereas for ER it is about 3.15 shows that the distribution is leptokurtic distribution (A little bite peaked or flat topped).On the other hand, Jarque-Bera test statistics tells us that FDI, GCFPRI, GCFPUI and ER are normally distribute, since the variables p-value is greater than 5% level of significance,

4.1.2 Regional Distributions of FDI in Ethiopia

The figure 1 below shows that the regional distribution of FDI in Ethiopia from the period 1992 to 2019. The distribution of FDI in Ethiopia is diversified almost in all regions, even though it distributed unevenly, highly skewed to Addis Ababa and its surroundings.

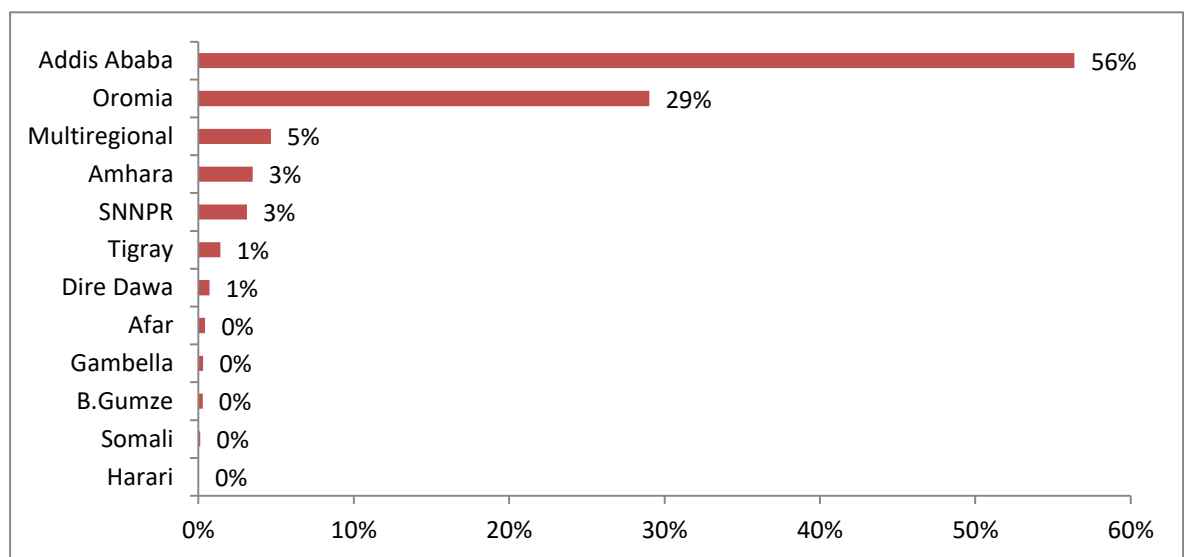


Figure 1: Regional Distribution of FDI (From 1992 to 2019)

Source: Own computation from EIC data, 2020

For the last 27 years starting from 1992 up to 2019 the distribution of FDI was accounted 3235 projects in different regions ,which is the status of investments are operational. Almost above half of the investment of FDI is Addis Ababa (56%) followed by Oromia (29%), Amhara and SNNPR have an equal distribution of FDI by sharing of (6%), Multiregional (5%), Tigray (1%) and Dire Dawa (1%). This distribution of FDI shows that around (85%) of investment is concentrated in Addis Ababa and Oromia.

Unevenly distributions of economics have various explanations, why such agglomeration happens. *Firstly*, even though abundant of cheap land rent are available in regions, investors prefer Addis Ababa to minimize the transportation cost and to ensure relatively peace and security (Abebe, 2014). The international trade route of cargo airport and the newly established Djibouti route and domestic market is very favourable in Addis Ababa and Oromia special zone, which is very workable to the theory of location. *Secondly*, Addis Ababa is relatively the city of wealthier people and this creates proximate demands. *Thirdly*, the availability of small cost of production with the presence of educated and uneducated labour market bring together and create sound technology spill over.

4.1.3 Sectoral Distribution of FDI in Ethiopia

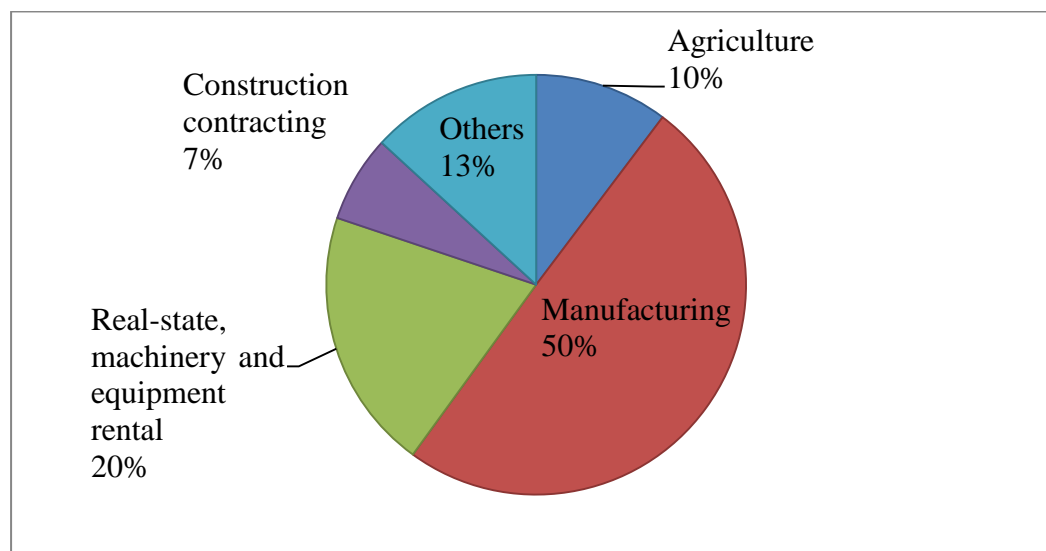


Figure 2: Sectoral Distribution of FDI (From 1992 to 2019)

Source: Own computation from EIC data, 2020

Figure 2 shows the distribution of FDI inflow the economy sectors in Ethiopia. This inflows show a higher growth on manufacturing and real state, machinery and equipment rental which accounts almost 70% of the total share of FDI inflows in Ethiopia starting from 1992 up to 2019, whereas the agriculture sectors scored only 10%. Unlike many African countries Ethiopia doesn't enough petroleum and minerals that in turns the inflows of FDI in mining and quarrying is very small and other sectors like electricity power generation, transmittion, education, health, transport and communication, hotels, lodges, and other entertainments are accounted 13% of total FDI inflows in the sector in Ethiopia.

4.2 Econometrics Results

4.2.1 Stationarity Test

Testing of stationarity is a prerequisite, while working in time series data. If we use data that is not tested its stationarity, we may get a result that is non-stationary time series and may be spurious, that indicates the relation of the variables may not exist. Hence in order to get a consistent and reliable result, we shall transform the non-stationary data in to stationary data by differencing. On the contrary of this, the non-stationary process that the variables variance and mean may not approximately equal or near, or changes the long run mean over time. While the stationarity process returns a round a constant long term mean and constant variance over time.

Mostly stationarity can be tested by using both a graphical sketch of each variable over time which is listed or available on appendix, and ADF test and the Philips and perron test. For my data test i carried out the most widely used and reliable methods of testing stationarity is ADP test and the results are summarized bellows in table 2 and 3. The lag length for each variable is automatically selected by Akaike Info Criterion (SIC) both intercepts and trends are included in test equation for all variables.

Table 2: Unit Root Test at Levels

Augmented dickey fuller unit root test results (at levels)		
	level with intercept	level with intercept and trends
	Test Statistics	Test Statistics
FDI	-2.009046 (0.2814)	-1.816879 (0.6684)
GDP	0.054101 (0.9555)	-4.695310 (0.0047)
GCFPRI	-0.778818 (0.8091)	-3.083349 (0.1301)
GCFPUI	-0.290432 (0.9140)	-1.741890 (0.7042)
ER	1.285047 (0.9978)	-4.657454 (0.0051)
5% Critical values	-2.976263	-3.58753
Decision	Non stationary	Non stationary

The value in bracket is *MacKinnon (1996) one-sided p-values.

Source: Own computation using Eviews 8

The result obtained in the above unit root test (ADF) shows that all the series are non-stationary at levels because their test statistics values are less than the critical values at 5% and the p-values in bracket are also greater than 0.05. From this result we can conclude that the null hypothesis of a unit root is not rejected for all series.

Table 3: Unit Root Test at First Difference

Series	Augmented dickey fuller unit root test results (at first difference)	
	First intercept with difference	First intercept with difference trend
	Test Statistics	Test Statistics
FDI	-7.175619 (0.0000)	-7.873055 (0.0000)
GDP	-3.345605 (0.0229)	-3.724784 (0.0385)
GCFPRI	-6.074888 (0.0000)	-5.953738 (0.0003)
GCFPUI	-5.027246 (0.0004)	-4.954251 (0.0026)
ER	-9.526610 (0.0000)	-9.024166 (0.0000)
5% Critical values	-2.981038	-3.595026

*The values in bracket are *MacKinnon (1996) one-sided p-values.*

Source: Own computation using Eviews 8

The result showed in the above table 3 the unit root test for all series at their first difference. The null hypothesis of a unit root is rejected at the test statistics surpass 5% of the critical values in magnitude and the p-value in the bracket are less than 0.05. Hence, all the series are stationary at first difference (era to era changes).

So the conclusion is that all the series under investigation are integrated of order one or, because the variables are not stationary at levels but rather at first differences. Therefore, cointegration analysis is plausible for those series and it can be tested in the next sections.

4.2.2 Cointegration Test

4.2.2.1 VAR Lag Length Selection Criteria

The first preliminary point in the selection of VAR models and Johansen cointegration analysis is the determination of the lag length that can be optimal suit for the model, because all the inferences in the model depends on the smartness of the lag selection.

Thus, in this investigation determination of optimal lag order for the model is performed by using the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan Quinn Information Criterion (HQ). The criterion of AIC, SC and HQ have suggested that an optimal lag of this study is two with the rule of thumb with a minimum value and the mostly used in many studies applies AIC is preferable and I also used it as an optimal lag point of selection criterion, at 5% level of significant as show in table 4 below.

Table 4: Result of Optimal Lags Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-67.28715	NA	0.000179	5.560550	5.802492	5.630221
1	57.38022	191.7960*	8.74e-08	-2.106171	-0.654521*	-1.688148
2	88.51585	35.92572	6.94e-08*	-2.578142*	0.083216	-1.811767*

* indicates lag order selected by the criterion

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

Source: Own computation using Eviews 8

4.2.2.2 VAR Lag Exclusion Test

To check whether the chosen lag is optimal or not, the Wald lag exclusion test is used. The test carried out suitability and confirmation for each lag selected by the above information criteria. For each lag the chi-square (Wald statistics) of all series are reported separately and jointly below.

Table 5: Lags Exclusion Test Result

Chi-squared test statistics for lag exclusion: Numbers in [] are p-values						
	LNGDP	LNFDI	LNGCFPRI	LNGCFPUI	LNER	Joint
Lag 1	60.81874 [8.23e-12]	14.99400 [0.010388]	12.14986 [0.032791]	8.791999 [0.117654]	15.62291 [0.008007]	165.2373 [0.000000]
Lag 2	24.66471 [0.000162]	5.512782 [0.356546]	8.597278 [0.126246]	1.946043 [0.856560]	13.91123 [0.016183]	65.11872 [1.99e-05]
Df	5	5	5	5	5	25

Source: Own computation using Eviews 8

The above, table 5 result shows that the second lag is optimally selected for all series and the Lag Exclusion Wald Test result also assures that the first and the second is jointly significant.

4.2.2.3 Johansen Cointegration Test Result

Based on our stationarity test results so far, all variables in the study are integrated in the same order one. This reveals that the importance of cointegration test analysis helps to decide the existence of a long term relationship among the variables. When the long run equilibrium relationship of variables doesn't exist, then the variables are not co-integrated and the short run relationship can be carried out only.

To determine the number of cointegration relationships, Johansen (1995) is one of the most widely used test of cointegration. Johansen cointegration test makes use of two statistics, namely, **trace statistics** and **maximum eigenvalues** statistics. Hence these two statistics are compared to their corresponding critical values to determine the number of cointegration vector(s) within the study variables.

Table 6: Johansen Cointegration Analysis Test Results

Hypothesized N ^o of cointegration equation(s)	Eigen values	Trace Test			Maximum Eigen Value Test		
		Test Statistics	5% Critical Values	Prob **	Test Statistics	5% Critical Values	Prob **
None *	0.744630	82.77640	69.81889	0.0033*	34.12603	33.87687	0.0467*
At most 1*	0.568248	48.65036	47.85613	0.0420*	20.99759	27.58434	0.2764
At most 2	0.443689	27.65277	29.79707	0.0867	14.66069	21.13162	0.3134
At most 3	0.264447	12.99209	15.49471	0.1151	7.678316	14.26460	0.4124
At most 4*	0.191481	5.313770	3.841466	0.0212*	5.313770	3.841466	0.0212*

*Trace test indicates 2 co-integrating eqn (s) at the 0.05 level and Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values.*

Source: Own computation using Eviews 8

From the above table 6 results of Johansen co-ntegration test, the null hypothesis is rejected when the test statistics is higher than the 5% critical values. The Trace test statistic indicates that there are two cointegrating relationship and the Maximum Eigen value test indicate the presence of one cointegrating relationship among the

variables. The result also explains that, the Trace test statistics (82.77640) is higher than the corresponding critical value (69.81889) with p-value (0.0033). And also the Maximum Eigen Value test enhances the same conclusion that is (34.12603) is greater than (33.87687) with p-value (0.0467). Thus depicts that the null hypothesis of no cointegration relationship is rejected at 5% level of significant over the alternative hypothesis. So we can infer from the above justification or results that, there exists the presence of long run association among the variables.

Table 7: Result of Normalized Cointegration Coefficient

LNGDP	LNFDI	LNGCFPRI	LNGCFPUI	LNER
1.000000	-0.024746	-0.445054	-0.665506	1.000522
	(0.04513)	(0.06507)	(0.03666)	(0.13801)

Standard Error in Parenthesis)

Source: Own computation using Eviews 8

The above results of Johansen normalized cointegration coefficients are significant at 5% levels. Thus results infer to examine the long run relationship among the variable. The normalized long run relationship among the variables can be showed as follows.

$$\text{LNGDP} = 0.024746\text{LNFDI} + 0.445054\text{LNGCFPRI} + 0.665506\text{LNGCFPUI} - 1.000522\text{LNER}$$

The coefficient of the variables sign is reversed when writing the long run models and all FDI, GCFPRI, GCFPUI have a positive effect on economic growth in Ethiopia in the long run. Specially, FDI, GFCPUI and GCFPRI have significant impact on GDP in the long run; a percentage change in GFCPUI brings 0.66 percentage increase in GDP. GCFPRI also have a strong relation with GDP, a percentage change in GCFPRI leads to a 0.44 percent increase in GDP. Even though the coefficient or magnitude of FDI is very small it has a positive and significant relationship with GDP. We found that private investment has a positive and significant impact on economic growth. This finding is also consistent with the result of (Abubakar and Bala, 2016) who finds a positive relationship between private investment and economic growth. Nketich and Quaidoo (2017) have got the same result that is private investment brought economic growth in Ghana.

Moreover, exchange rate has insignificant negative relationships with GDP in the long run. (Olofsson, 2019) exchange rate and economic growth have bidirectional causal relations, when the exchange rate is stable and on contrary argued that, exchange rate volatility had statistically negative impact on economic growth in different ways, such as establishing trade barriers and creating investment uncertainty. This result also consistent with (Agidew, 2014) unstable macroeconomic environment, which is the occurrence of high external debt and exchange rate movement exhibits unfavourable effect on domestic private investment performance and reduce economic growth by the share of this sectors. This result also consistent with the study of devaluation of local currency or an increase of exchange rate and economic growth in Turkey (Karahan, 2020) and found that, the increase exchange rate or currency devaluation is not appreciated and it doesn't bring economic growth. Since the country economy production structure is based on imported goods or inputs.

In same token here we have got the study result of public investment share of GDP is large, and have a negative impact or crowding out private investment, since public investment activities mostly conducted when the existence of budget deficit it creates unfavourable conditions to private investment through, raising interest rate, limited credit availability and imposing high tax burden. Ambachew (2010) private investment contribution to GDP is less than public investment in Ethiopia, because of the negatively involvement of government activities like macroeconomic uncertainty and political instability. When the increase of public investment is paid by borrowing from the domestic financial market and that creates a financial crowding out and finally brings an incidence of credit rationing to the private investors and this brings limited credit pool in Ethiopia (Wasihun, 2018).

The long run impact of FDI on economic growth is found to be very small positive contribution and this may, as a result of a crowding out effect of domestic investment or low levels of human capital in the country (Kedir, 2012). Muchiri (2019) also found that the influence of FDI on economic growth in Africa is insignificant. She argued that when the FDI involves sectors which is not required more capital and employment engaged like mining, ICT and some manufacturing activities, immediately they become or changes from foreign direct investment to foreign direct exploitation.

Zhang (2001) suggested that the interaction of FDI and human capital have a crucial effect on economic growth and he argued that countries may need a minimum requirement or threshold stock human capital in order to experience positive effect of FDI. The absorptive ability and managerial know how may shows the variation in economic growth effects of FDI across countries.

Discovering other elements that may explain the relation between FDI and economic growth, we can see the political stability of Ethiopia. Which is lagging behind? Politically stable countries are more benefited by the effect of FDI on economic growth than unstable countries (Ould, 2015). Therefore the researcher gives a positive emphasize to the importance of political stability, strong public institutions and low government involvement in business in Mauritania to reap the positive benefit of FDI on economic growth.

FDI have a positive impact on economic growth in most Asian, Latin America and African countries (Elboiashi, 2015) but the magnitude is depends on the host countries conditions and suggested that institutional quality, performance of domestic investment, financial market and infrastructure development are the effect of FDI on economic growth.

Public investment, which is mainly the expenditure of governments have a positive impact on and it also statistically significant. This revealed that the importance of public investment for economic growth in Ethiopia. The existence of strong public power may results to reduce the involvement and competition of private investment. Hence redirection of public investment from non-infrastructure sector to social developmental is required to bring better economic growth in the country (Menber, 2015). The pairwise Granger causality result showed that, both private and public investment have no relationship in the short run, it indicates that their effect substitution effect not complementary.

4.2.3 The Vector Error Correction Model (VECM) Analysis

After we dedicatedly estimated the VAR models of testing results of the variables are cointegrated, then the immediate response is to analyze the short run behaviour and the adjustment of long run models that is mostly represented by Vector Error Correction Model. The VEC models form is:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 u_{t-1} + \varepsilon_t$$

Error Correction Term

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 (Y_{t-1} - \beta X_{t-1}) + \varepsilon_t, \text{ where, } u_{t-1} \text{ is equal to } Y_{t-1} - \beta X_{t-1}$$

α_1 Short-run impact of Y on X, β shows Long runs impact of Y on X and α_2 Speed of adjustment.

When we take the first difference of regression models we will get the dynamic relations, which is α_1 quantifies the short run impact of X on Y, β quantifies long-run impact of X on Y

The residual u_{t-1} is the one-period lagged equilibrium error of the cointegrated long-run equation and is used as an error correction term.

The absolute value of the coefficient of the error correction term (α_2) measures the speed of adjustment, that is, the proportion of short-run disequilibria (or shock) that will be adjusted within the same period of time (e.g., within the same year). Therefore, the VECM contains the information on both short-run and long-run adjustment of the variables at time (t). The response of LnGDP, LnFDI, LnGCFPRI, LnGCFPUI, and Ln ER to short-run movements is captured by the coefficient matrices of α_2 .

Table 8: Vector Error Correction Estimate Result (Long-run Model)

Cointegrating Eq:	CointEq1
LNGDP(-1)	1.000000
LNFDI(-1)	-0.024746 (0.04513) [-0.54831]
LNGCFPRI(-1)	-0.445054 (0.06507) [-6.83934]
LNGCFPUI(-1)	-0.665506 (0.03666) [-18.1541]
LNER(-1)	1.000522 (0.13801) [7.24988]
C	-1.577454

The coefficient estimation of VEC model is shown in table 8 above. The result of estimation are contains two components, the first part puts together the coefficient of vector(s) which is the long term equilibrium equation with their corresponding standard error and t-statistics by normalizing the natural logarism of the dependent variables which is GDP (LnGDP). Hence, based on the previous equation that indicated in the above the model can be written as follows.

$$\text{LnGDP}=1.577454+0.024746\text{LnFDI}+0.445054\text{LnGCFPRI}+0.665506\text{LnGCFPUI}-1.000522\text{LnER}.$$

From this equation we can concluded that there is a positive long-run relationship among Economic growth, FDI, Gross Capital Formation of Private Investment and Gross Capital Formation of Public Investment and Exchange rate have a negative long run relationship to Economic growth. This finding is consistent with the study of (Abubakar.A and Bala.A, 2016).

Table 9 Short-run Error Correction Term Result

Error Correction:	D(LNGDP)	D(LNFDI)	D(LNGCFPRI)	D(LNGCFPUI)	D(LNER)
CointEq1	-0.481456 (0.25679) [-1.87489]	-0.783341 (2.21740) [-0.35327]	-1.578528 (0.73920) [-2.13547]	1.634207 (1.09357) [1.49438]	-0.016392 (0.15803) [-0.10373]
D(LNGDP(-1))	0.876326 (0.28422) [3.08328]	1.152094 (2.45423) [0.46943]	1.189015 (0.81815) [1.45331]	0.612096 (1.21037) [0.50571]	-0.033502 (0.17491) [-0.19154]
D(LNGDP(-2))	-0.352790 (0.28425) [-1.24112]	-4.428267 (2.45452) [-1.80413]	-1.131660 (0.81824) [-1.38304]	0.008440 (1.21051) [0.00697]	0.450697 (0.17493) [2.57649]
D(LNFDI(-1))	-0.037916 (0.03116) [-1.21687]	-0.412289 (0.26906) [-1.53233]	-0.073731 (0.08969) [-0.82203]	0.146490 (0.13269) [1.10397]	-0.004579 (0.01918) [-0.23878]
D(LNFDI(-2))	-0.031666 (0.02921) [-1.08405]	-0.294704 (0.25224) [-1.16836]	-0.148095 (0.08409) [-1.76122]	0.149237 (0.12440) [1.19968]	0.000562 (0.01798) [0.03126]
D(LNGCFPRI(-1))	-0.194193 (0.16260) [-1.19432]	1.951161 (1.40403) [1.38969]	-0.530963 (0.46805) [-1.13441]	0.029683 (0.69243) [0.04287]	-0.111201 (0.10006) [-1.11133]
D(LNGCFPRI(-2))	0.105584 (0.12909) [0.81790]	1.249215 (1.11470) [1.12067]	0.007403 (0.37160) [0.01992]	0.380927 (0.54975) [0.69292]	-0.101356 (0.07944) [-1.27585]
D(LNGCFPUI(-1))	-0.128679 (0.15656) [-0.82193]	0.434817 (1.35187) [0.32164]	-0.517627 (0.45066) [-1.14859]	0.230051 (0.66671) [0.34505]	-0.089888 (0.09634) [-0.93299]
D(LNGCFPUI(-2))	-0.002985 (0.09300) [-0.03210]	1.106175 (0.80304) [1.37748]	-0.011274 (0.26770) [-0.04211]	0.262759 (0.39604) [0.66347]	-0.105477 (0.05723) [-1.84303]
D(LNER(-1))	1.140539 (0.39791) [2.86630]	0.737808 (3.43599) [0.21473]	2.282990 (1.14543) [1.99313]	0.392388 (1.69455) [0.23156]	0.042424 (0.24487) [0.17325]
D(LNER(-2))	-0.225616 (0.45321) [-0.49781]	-4.237146 (3.91351) [-1.08270]	-0.805244 (1.30461) [-0.61723]	0.109071 (1.93005) [0.05651]	0.536882 (0.27890) [1.92496]
C	0.025344 (0.05236) [0.48404]	-0.001030 (0.45213) [-0.00228]	0.182519 (0.15072) [1.21095]	-0.115292 (0.22298) [-0.51705]	0.045783 (0.03222) [1.42086]
R-squared	0.612558	0.654802	0.543000	0.437587	0.527151
Adj. R-squared	0.284723	0.362712	0.156308	-0.038301	0.127049
Sum sq. resids	0.108307	8.075744	0.897456	1.964203	0.041017
S.E. equation	0.091276	0.788169	0.262745	0.388706	0.056171
F-statistic	1.868493	2.241779	1.404218	0.919516	1.317540
Log likelihood	32.54730	-21.34833	6.114869	-3.676100	44.68466
Akaike AIC	-1.643784	2.667866	0.470810	1.254088	-2.614773
Schwarz SC	-1.058724	3.252927	1.055871	1.839148	-2.029712
Mean dependent	0.103200	0.043200	0.144000	0.152400	0.063200
S.D. dependent	0.107924	0.987306	0.286051	0.381470	0.060119

The result of the above table 9 indicates the short-run and the error correction terms (CointEq1) for the integration vector(s). As we already explained the term Error Correction is known as Speed Adjustment or the adjustment of coefficient. This articulates and helps to measure the short run adjustment of the deviation of the independent variables from their long run values.

So the Error Correction term model in (CointEq1) result shows the speed of adjustment to the equilibrium. Theoretically, the Error Correction term should lie between zero and one, but according to (Narayan and Smyth, 2006) examination, the Range of Error Correction coefficient is from zero to less than 2 (with negative sign and significant).

Therefore from the output of the adjustment coefficients of Economic growth, FDI, Gross Capital Formation of Private Investment, Gross Capital Formation of Public Investment and Exchange rate are, -0.481456, -0.783341, -1.578528, 1.634207 and -0.016392 respectively with their t-statistical values. Finally, those figures can be interpreted as the previous period deviation from the long run equilibrium is corrected in the recent period by showing the speed adjustment for each endogenous variable. In other words, those indicated values give information on the short run disequilibria percentage adjustment within each period of time (annually in this case).

Therefore, we can interpret the results that show in the above as follows: The adjustment coefficient of Economic growth is -0.481456 that implies the departure from the long-term equilibrium path due to a certain shock/innovation/ is adjusted by 48% over the next year and the complete adjustment will take almost 2 years.

In the same token, the adjustment coefficient of Foreign Direct Investment is -0.783341 it shows that the disequilibrium in the long run path due to a certain shock's adjusted by 78% this disequilibrium is corrected in 1 year and the 22% will be adjusted in the next time (2 years). whereas the adjustment of the long run effect on Gross Fixed Capital Formation of Private Investment by a certain innovation it will be adjusted by 157% which is almost 1 year and half years. Exchange rate has very long time to adjust the shock in the long-run which is almost 1.6% will be adjusted in this year and the rest 98.4% will be adjust for coming years. so the response of exchange rate to this shock is awkward.

In the short run columns in the above the adjustment coefficient of the causality relationship of the endogenous variables which is, private investment and Exchange rate have a positive short-run impact on Economic growth in least square estimation in the appendix (table14A2). Thus the Economic growth of Ethiopia is significantly affected by difference of two period lag values of private investment and Exchange rate in the short run. The coefficients of estimated values of two periods lag difference of LnGCFPRI and one period lag of Exchange rate (LnER) 0.106 and 1.140 respectively. This result indicates that, for a 1% increase in private investment and Exchange rate lead to Economic growth increase by 0.106% and 1.140% respectively, other things remain constant. Therefore, the result implies Private investment and Exchange rate have a greater short-run impact on Economic growth in Ethiopia. This finding is also assured by (Meslie, 2019).

Generally from the above short-run and long- run causality results, we can conclude that the causality running from Private investment to Economic growth is positive in both long run and short run. This is coinciding with Abubakar and Bala (2016) and Meslie (2019).

4.2.4 The Pairwise Granger Causality Test

In time series analysis of Vector Auto Regressive and Vector Error Correction Model the test of causality is an important thing in some sense. The test primarily pioneered by Granger (1969), and every academia and scholars referred it Granger causality.

The Granger causality test was proposed to investigate the existence of bidirectional causality as introduced by Granger. Granger causality test output shows that the lagged values of the series have a significant role in articulating the current, and hence the effect happens in both directions in some of the cases.

Here I present the main results obtained from the Pairwise Granger causality analysis done in the study. Sixteen pairs of variables were used as seen table 10

Table 10: Results of Granger Causality Test

Paire wise Hypothesis	Obs	F-Statistics	P-Value	Decision	Types of causality
LNFDI does not Granger Cause LNGDP	26	4.31416	0.0269	Reject H ₀	Bi-directional causality
LNGDP does not Granger Cause LNFDI	26	7.21894	0.0041	Reject H ₀	Bi-directional causality
LNGCFPRI does not Granger Cause LNGDP	26	4.97208	0.0171	Reject H ₀	Uni-directional causality
LNGDP does not Granger Cause LNGCFPRI	26	1.12268	0.3442	DNR H ₀	Uni-directional causality
LNGCFPUI does not Granger Cause LNGDP	26	4.54795	0.0229	Reject H ₀	Uni-directional causality
LNGDP does not Granger Cause LNGCFPUI	26	3.27257	0.0579	DNR H ₀	Uni-directional causality
LNER does not Granger Cause LNGDP	26	24.6580	3.E-06	Reject H ₀	Bi-directional causality
LNGDP does not Granger Cause LNER	26	34.2789	2.E-07	Reject H ₀	Bi-directional causality
LNGCFPRI does not Granger Cause LNFDI	26	4.88751	0.0181	Reject H ₀	Uni-directional causality
LNFDI does not Granger Cause LNGCFPRI	26	1.05788	0.3650	DNR H ₀	Uni-directional causality
LNGCFPUI does not Granger Cause LNFDI	26	0.74736	0.4858	DNR H ₀	No causality
LNFDI does not Granger Cause LNGCFPUI	26	0.68410	0.5154	DNR H ₀	No causality
LNER does not Granger Cause LNFDI	26	4.02569	0.0331	Reject H ₀	Uni-directional causality
LNFDI does not Granger Cause LNER	26	1.67899	0.2107	DNR H ₀	Uni-directional causality
LNGCFPUI does not Granger Cause LNGCFPRI	26	0.90960	0.4180	DNR H ₀	No causality
LNGCFPRI does not Granger Cause LNGCFPUI	26	3.22617	0.0600	DNR H ₀	No causality

Decision rule: reject if $p\text{-value} < 0.05$.

DNR: Do no reject

Source: Own computation using Eviews 8

Bi-directional causality exist between FDI and Economic growth, Uni-directional causality exist between Gross Capital Formation of Private Investment and Economic growth, Uni-directional causality exist between Gross Capital Formation of Public Investment and Economic growth, Bi-directional causality exists between Exchange rate and Economic growth, Uni-directional causality exists between Gross Capital Formation of Private Investment and FDI, No causality exists between Gross Capital Formation of Public Investment and FDI, Uni-directional exists between Exchange rate and FDI and finally, No causality between Gross Capital Formation of Private Investment and Gross Capital Formation of Public Investment.

More specifically, we can see the Bi-directional and Uni-directional causality exists between some selected economic indicators: Gross capital formation of private investment Granger cause GDP, Gross Capital Formation of public investment Granger cause GDP, Gross capital formation of private investment Granger cause FDI and exchange rate Granger cause FDI. Bi-directional causality results are: FDI Granger cause GDP, GDP Granger cause FDI, Exchange rate Granger cause GDP, GDP Granger cause Exchange rate. Here the result confirms earlier cointegration test that depicts we have at least two cointegrated equations in the study. And these Bi-directional and Uni-directional Granger causality test result tells us to discuss with some Economic theory and Postulates. Having this theory and postulates let's see the relation of FDI and GDP, the effect of FDI on GDP is positive, as increase of FDI capital formation results higher level of output, as Aggregate Demand increases, furthermore rise in FDI results economic boost and growth. When we see the Bi-directional Granger causality of Exchange rate and GDP, if the host countries' currencies are depreciated relative to other countries then it will attract more FDI and boost economic growth other things remain constant(*ceteris paribus*) (Melak, 2018).

4.2.5 Impulse Response Functions (IRF)

The Impulse Response Function (IRF) shows the response of a variable to a unit standard deviation shock to itself and other variables in the model. It shows how a variable respond in to time horizon to shock (a sudden unexpected change) in the variables and other variables in the model (Abubakar and Bala, 2016). The following figure shows the shock Response of GDP to FDI, Private investment, public investment and exchange rate.

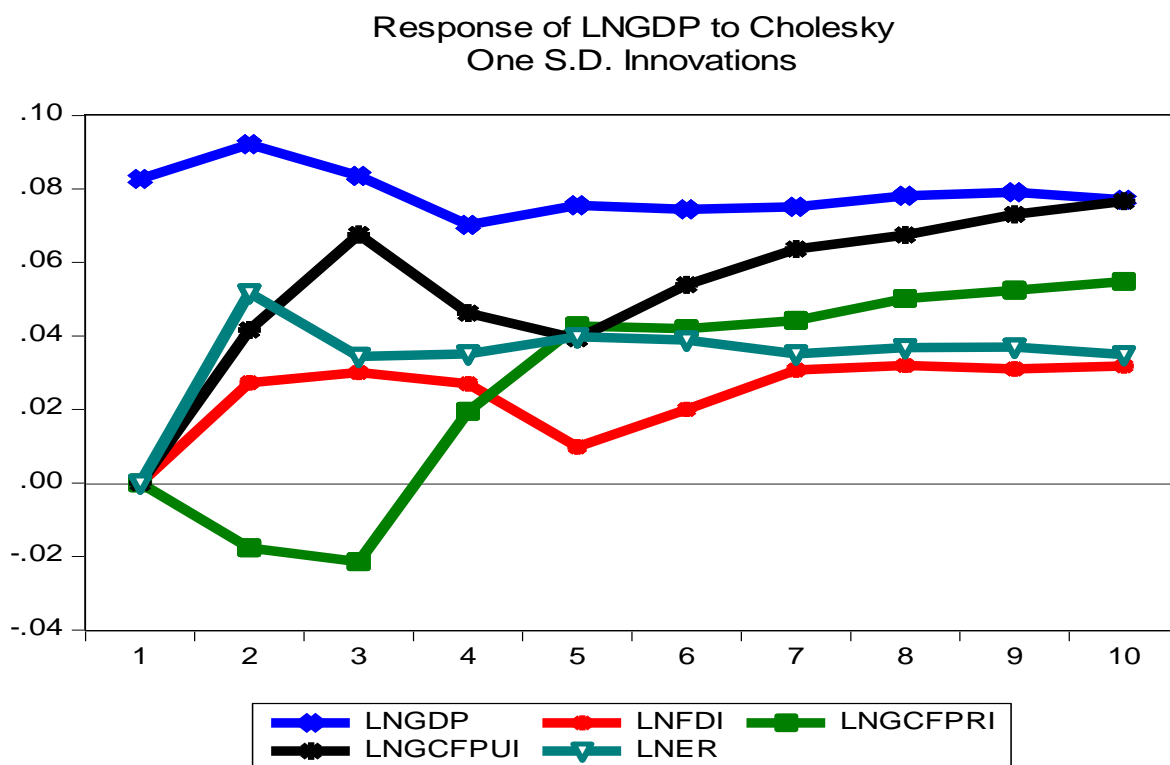


Figure: 3 Response of LnGDP, to cholesky one S.D Innovation
Source: Own computation using Eviews 8

From the above figure 3 we can infer that a one gap or shocks to FDI, Gross capital formation, Gross capital formation of public investment and exchange rate are getting positive response from Economic growth which is proxy LnGDP, initially a smooth relation a constant points in the first period, while the shock rise and downs in the positive and negative regions as stated in the figures. Especially Gross capital formation of private investment negatively response up to 3rd period and later have a positive responses. So, Gross capital formation of public investment, Gross capital formation of private investment, FDI and exchange rate have got better and positive response from economic growth. Generally economic growth responds to all variables positively and the impacts of those variables except some period almost all have a positive impact on GDP. The private investment, public investment and exchange rate have a positive response to shock of economic growth appendix (8B). But FDI and private investment have a positive response to economic growth at first period and latter decreasing.

4.2.6 Variance Decomposition Analysis

The decomposition is used to know the share of the fluctuation in a series explained by its own shocks versus shocks from other variables. Therefore one may expect a variable to explain almost all its forecast error variance at short horizons and smaller proportion at longer horizons (Meslie, 2019). So, the decomposition results of LnGDP for Economic growth is shown in table below

Table 11: Result of Variance Decomposition of LnGDP

Period	S.E	LNGDP	LnFDI	LnGFCPRI	LnGCFPUI	LnER
1	0.082732	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.144246	73.70945	3.581156	1.503075	8.330984	12.87533
3	0.186827	63.92528	4.720715	2.210232	18.07490	11.06887
4	0.210497	61.47737	5.359140	2.597299	19.05732	11.50887
5	0.234662	59.83493	4.488116	5.409045	18.13116	12.13675
6	0.259206	57.28897	4.272662	7.054237	19.18697	12.19715
7	0.284628	54.47990	4.709205	8.264252	20.90902	11.63763
8	0.310753	52.02848	5.008959	9.537333	22.25640	11.16883
9	0.336528	49.88574	5.120873	10.56180	23.69884	10.73275
10	0.360990	47.91195	5.229848	11.48713	25.10630	10.26476

Cholesky Ordering: LNGDP LNFDI LNGCFPRI LNGCFPUI LNER.

Source: Own computation using Eviews 8

The result of the variance decomposition analysis of LnGDP in the above table 11 explains that, the variability in current Economic growth is highly a result of variability itself, which is at the first period variation of LnGDP, is explained only by its own shock. The second period (year in this case) 73.7% of the variability in the LnGDP fluctuation is explained by its own shock and the remaining 26.3 is explained by LnFDI, LnGFCPRI, LnGCFPUI and LnER. In 10th period 25.1% and 11.48% of GDP variance is explained by public and private investment respectively. This indicates public investment and private investment have a great impact on economic growth in Ethiopia.

4.2.7 Diagnostic Tests of Results

After a VEC-model has been estimated, it is a central task to see whether the residuals attested the model assumption checking of the models diagnostically is a compulsory step before forecasting in time series analysis. To escalate the models and underlying the assumptions performance to check the stability and conformity is the crucial task to tests and to go further forecasting. Consequently, we must check the absence of serial correlation, homoscedasticity (constant variance of residuals) to correct the shocks of multivariate normal distribution.

4.2.7.1 Test of Residual Autocorrelation and Heteroskedasticity

In table 9 below shows the result Lagrange Multiplier (LM) test of the whole VEC model autocorrelation or residual serial correlation and Heteroskedasticity.

Table 12: The Result of Residual Autocorrelation and Heteroskedasticity Test.

Tests	Values	Probability	Decisions
LM-Test of Autocorrelation lags	26.20159	0.3969	Do not reject H_0
1 and 2	15.04259	0.9404	
Heteroskedasticity	343.4437	0.2938	Do not reject H_0

**Null Hypothesis: No serial correlation at lag order H and Homoskedasticity*

Source: Own computation using Eviews 8

From the above table result of LM Residual autocorrelation and Heteroskedasticity test confirms that no problem of residual autocorrelation and residual Heteroskedasticity. Residual Autocorrelation and Heteroskedasticity *p-values* are greater than 5% level of significance, this creates a confidence of we cannot reject the null hypothesis of no residual Autocorrelation and the residuals are Homoskedastic.

4.2.7.2 Normality Test

The normality test is required in order to bearing single or joint hypothesis test about the model parameters. The most commonly applied test to check the normality is the Jarque-Bera (JB) test. Here the graph/Histogram/ below shows the normality of the model jointly.

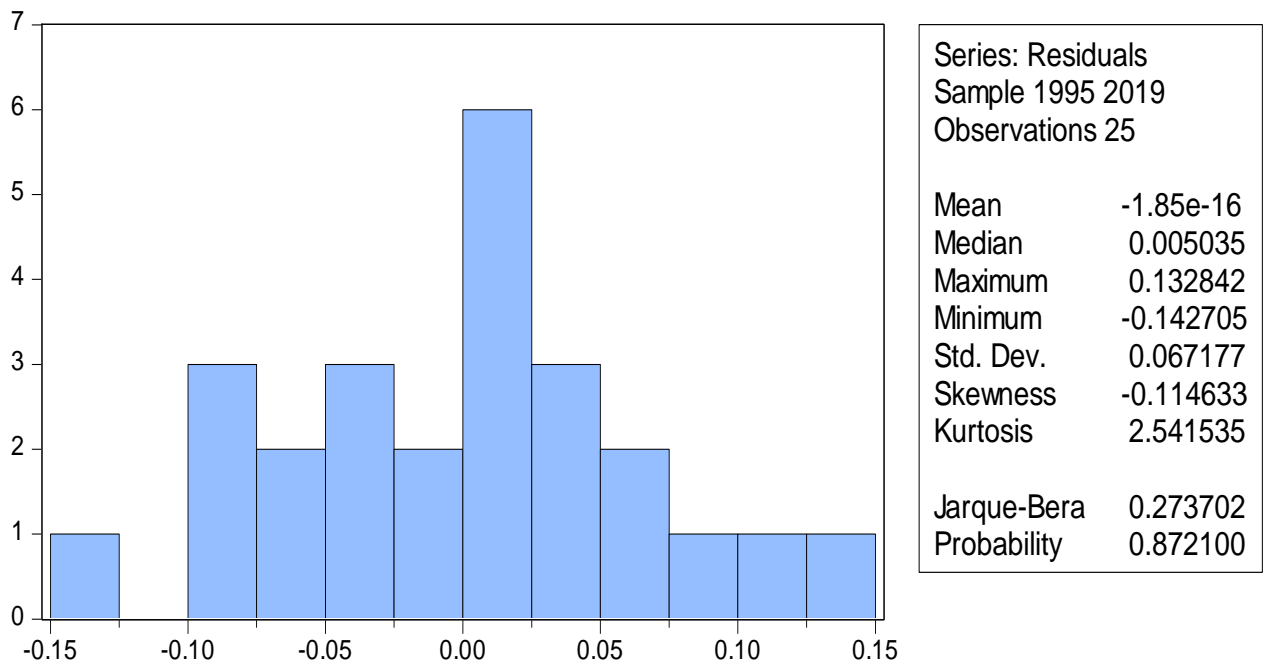


Figure 4: Jarque-Bera Normality Test Result (Histogram)

Source: Own computation using Eviews 8

From the graph in the above, Jarque-Bera test is inferred that the residual satisfied the normality assumption and the result also indicates the residuals are normally distributed and p-value is greater than 5% level of significance. Therefore, the finding fails to reject the null hypothesis of the error terms are normally distributed.

4.2.7.3 Stability Test

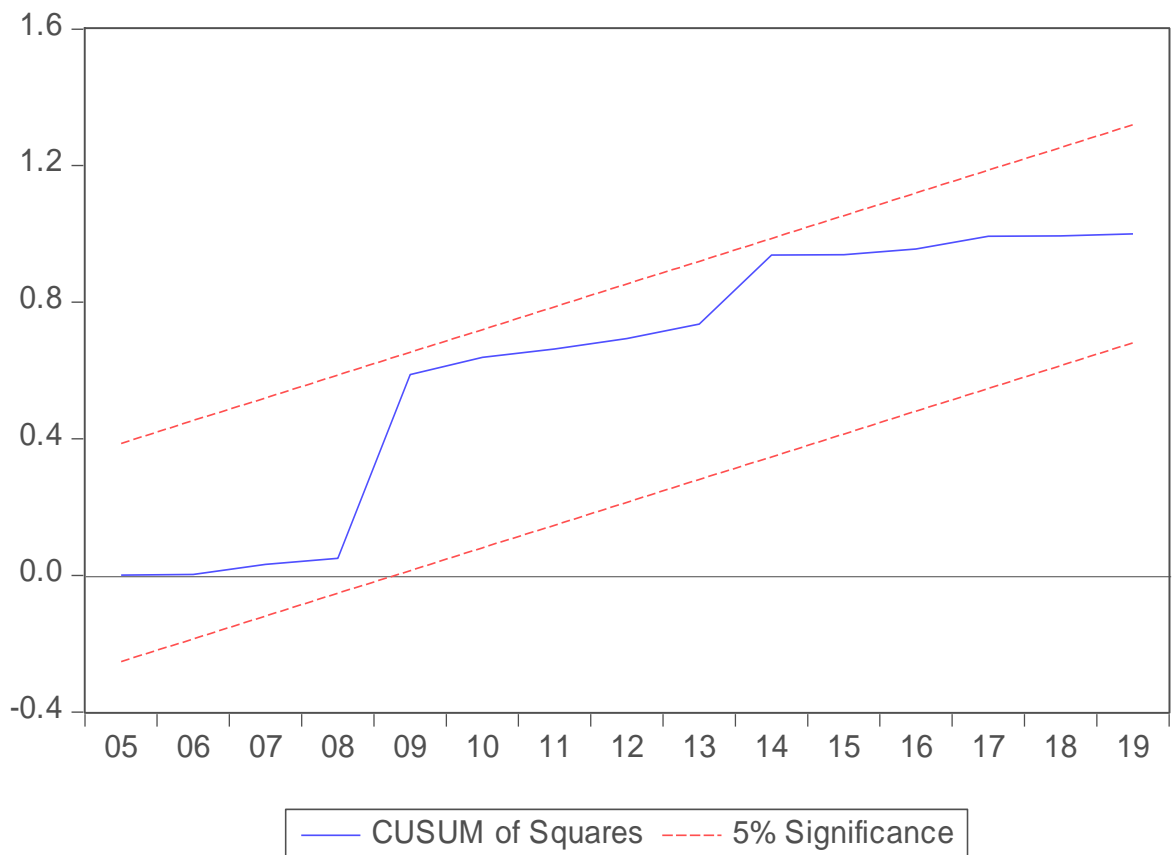


Figure 5: Stability Test Result

Source: Own computation using Eviews 8

The above figure 5 shows the absence of any instability of the coefficients. Because the plotted line of the CUSUM and CUSMSQ statistics fall inside the critical bands of the 5% confidence interval of the variables are stable (Alimi,2014). Finally the above figure of CUSUM test confirms there is long-run relationship among FDI, Private investment, public investment and economic growth and also shows the stability of the coefficients.

CHAPTER FIVE

5. Summary, Conclusion and Recommendations

5.1. Introduction

This chapter consists of a summary of the study, conclusion, recommendations and area of further researches of the study. Discussion and conclusion of the study of findings are also forwarded with their recommendations.

5.2. Summary of Major Findings

In the review of FDI and domestic investment in Ethiopia have a preliminary to bring economic growth in Ethiopia. However the share of FDI to economic growth and total investment of the country is limited and highly participated in and around Addis Ababa that cannot reap the expected economic growth from foreign investors. Meanwhile the private and public investment is a more powerful impact to bring economic growth, but their contribution to the economy is based on the substitutions effect not by complementary effects.

The econometrics results revealed that, even though the magnitude and contribution of FDI to economic growth is very small, it has a positive significant impact on economic growth in Ethiopia. While public investment has a positive significant impact and huge share of the country GDP is gained by the government expenditures. Exchange rate has a negatively insignificant effect to economic growth, since the structure of the country economy and production depend on the import of materials and machineries that hinders and creates crowding out effect on private investment with many interrelated macroeconomic problems.

5.3. Conclusion

The main objectives of this study was to apply a time series model to examine the nexus between FDI, domestic investment and economic growth in Ethiopia by segregating domestic investment in to private and public investment. Over the period of time considered, all four series were stationary at first difference and nonstationary at levels. So all the series are integrated of order one by the method of ADF test. The optimal lag length selection criteria for the VAR model is two and the test of optimally (lag exclusion test) assures the selected lag order.

The Johansen cointegration analysis revealed an evidence for the existence of long-run relationship between economic growths, FDI, Private investment, public investment and exchange rate in Ethiopia with the time considered. Hence, it purely shows that VECM is an appropriate model to fit data than any other else. From the result of VECM we can be a witnessed that economic growth is significantly affected by two periods lagged value of private investment and one period lagged exchange rate in the short run. Moreover, 48% of the short run disequilibrium in economic growth is adjusted within one year. From the pairwise Granger causality test, FDI and Exchange rate exhibited bidirectional causality to economic growth in Ethiopia. Therefore, FDI and exchange rate gives information to predict future values of economic growth of the country. The result of impulse response function analysis explained that economic growth has a positive response one SD innovation to all FDI, public investment and private investment and exchange rate. On the contrary, except FDI positive decreasing response, all private investment, exchange rate and public investment have a positive response to a shock in economic growth.

Variance decomposition result shows that the variation of the first time horizon for each variables explained by their own shock. Yet, the longer time horizon of economic growth shocks by the variation of FDI, private investment public investment and exchange rate. The shocks to public and private investment lead to a significant response for economic growth in Ethiopia. And, finally the estimated VECM have passed all diagnostic testing.

5.4. Recommendations

Encourage and formulate sound macroeconomic policies to maximize the benefit of FDI in the growth process, through the production of capital goods than consumer goods to enhance more domestic capital formation.

The government and the concerned body (it may be experts and service provider's offices) should create investment opportunities to initiate both FDI and private investors to raise economic growth of the country.

The rules and regulation of investment should govern with stable and predictable and certain to both FDI and domestic investors in all region of Ethiopia. Since the distribution of investment in the country is disparate among all regions that makes

Addis Ababa and around Addis Ababa have a lion share of investment that conducted in Ethiopia.

Forwarding public investment in a way that could remove pitfalls that undermine private investment, with adequate attentions to its negative or adverse effect of crowding out, and thus competition of public expenditure to private investment could be with a complementarity effect to bring a meaning full economic growth in Ethiopia.

A policy frame work of exchange rate is required to complement with the existing inflation rate in Ethiopia. Even thought, exchange rate stabilization is a paramount to economic growth; unsystematic exchange rate policies may bring economic instability and lastly creates series of interrelated problems towards economic development and slack of macro-economic.

5.5. Areas of Further Research

This study embraces on the nexus between FDI, domestic investment and economic growth in Ethiopia the period from 1992 to 2019. The researcher will suggest that for future studies on this work, by incorporating additional prone to powerful variables, such as interest rate with domestic investment to economic growth, FDI and export performance on economic growth.

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Appendix

Table: 13 A1 Raw- Data

Years	GDP values	FDI values	GCF values	GCFPRI	GCFPUI	ER	lnGDP	lnFDI	lnGFC	lnGCFPRI	lnGCF	lnER
1992	20896630000	153876100	681930000	341640000	340290000	2.07	23.76	18.85	20.34	19.65	19.65	0.73
1993	15270600000	87657600	758420000	374310000	384110000	2.80478	23.45	18.29	20.45	19.74	19.77	1.03
1994	7147530000	309399400	785670000	230850000	554820000	5.7744	22.69	19.55	20.48	19.26	20.13	1.75
1995	7586840000	57276229	1386870000	417110000	969760000	6.2505	22.75	17.86	21.05	19.85	20.69	1.83
1996	8235650000	400475520	1401150000	448720000	952430000	6.3178	22.83	19.81	21.06	19.92	20.67	1.84
1997	8521560000	986532526	1567610000	526740000	1040880000	6.5007	22.87	20.71	21.17	20.08	20.76	1.87
1998	7726620000	870014000	1511590000	479870000	1031730000	6.8817	22.77	20.58	21.14	19.99	20.75	1.93
1999	7328480000	451131100	1494880000	523410000	971470000	7.5111	22.72	19.93	21.13	20.08	20.69	2.02
2000	7851210000	928901580	1592230000	1206370000	385860000	8.1426	22.78	20.65	21.19	20.91	19.77	2.10
2001	7763250000	2512446352	1671280000	1025460000	645820000	8.3279	22.77	21.64	21.24	20.75	20.29	2.12
2002	7667120000	530099029	1849160000	1010040000	839110000	8.5425	22.76	20.09	21.34	20.73	20.55	2.15
2003	8401050000	1347782767	1865360000	1094310000	771060000	8.5809	22.85	21.02	21.35	20.81	20.46	2.15
2004	9935630000	3893186243	2883650000	1580040000	1303610000	8.6197	23.02	22.08	21.78	21.18	20.99	2.15
2005	12163590000	3005150803	3162660000	1803650000	1359010000	8.6518	23.22	21.82	21.87	21.31	21.03	2.16
2006	14983300000	10497683712	4133070000	2303170000	1829900000	8.681	23.43	23.07	22.14	21.56	21.33	2.16
2007	18991960000	7103020089	4598170000	3219390000	1378790000	8.7943	23.67	22.68	22.25	21.89	21.04	2.17
2008	25608610000	7172112785	6266420000	4308550000	1957870000	9.2441	23.97	22.69	22.56	22.18	21.40	2.22
2009	28194200000	11518733391	7009920000	5493730000	1516190000	10.4205	24.06	23.17	22.67	22.43	21.14	2.34
2010	26311300000	8820301817	7106590000	4738330000	2368250000	12.8909	23.99	22.90	22.68	22.28	21.59	2.56
2011	30479410000	14977058406	9786250000	2379720000	7406530000	16.1178	24.14	23.43	23.00	21.59	22.73	2.78
2012	42210450000	5383311577	15659230000	3975650000	11683580000	17.2536	24.47	22.41	23.47	22.10	23.18	2.85
2013	46542030000	11727144147	15862020000	4465280000	11396740000	18.1947	24.56	23.19	23.49	22.22	23.16	2.90
2014	54162990000	6472631305	20572160000	5338910000	15233250000	19.0748	24.72	22.59	23.75	22.40	23.45	2.95
2015	63078710000	8297972846	24863770000	6486160000	18377600000	20.0956	24.87	22.84	23.94	22.59	23.63	3.00
2016	72157680000	7434149088	26949990000	7786310000	19163680000	21.1059	25.00	22.73	24.02	22.78	23.68	3.05
2017	76784800000	17458634225	29522870000	8529660000	20993220000	22.4137	25.06	23.58	24.11	22.87	23.77	3.11
2018	80292470000	3124787730	27402220000	7946640000	19455580000	26.1082	25.11	21.86	24.03	22.80	23.69	3.26
2019	94249360000	911841492	33442700000	8502920000	24939780000	28.0543	25.27	20.63	24.23	22.86	23.94	3.33

Source: ADBG, WDI, NBE and EIC.

Table: 14A2 Least Square Estimation from VEC Model

Dependent Variable: D(LNGDP)
Method: Least Squares
Included observations: 25 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.481456	0.256792	-1.874889	0.0834
C(2)	0.876326	0.284218	3.083283	0.0087
C(3)	-0.352790	0.284252	-1.241119	0.2365
C(4)	-0.037916	0.031159	-1.216868	0.2453
C(5)	-0.031666	0.029211	-1.084052	0.2980
C(6)	-0.194193	0.162597	-1.194317	0.2537
C(7)	0.105584	0.129091	0.817901	0.4282
C(8)	-0.128679	0.156557	-0.821929	0.4259
C(9)	-0.002985	0.092998	-0.032102	0.9749
C(10)	1.140539	0.397914	2.866295	0.0132
C(11)	-0.225616	0.453215	-0.497814	0.6269
C(12)	0.025344	0.052360	0.484037	0.6364

R-squared	0.612558	Mean dependent var	0.103200
Adjusted R-squared	0.284723	S.D. dependent var	0.107924
S.E. of regression	0.091276	Akaike info criterion	-1.643784
Sum squared residuals	0.108307	Schwarz criterion	-1.058724
Log likelihood	32.54730	Hannan-Quinn criter.	-1.481513
F-statistic	1.868493	Durbin-Watson stat	1.648868
Prob(F-statistic)	0.141480		

Table: 15A3 Residual Serial Correlation LM Test

Null Hypothesis: no serial correlation at lag order h

Included observations: 25

Lags	LM-Stat	Prob
1	26.20159	0.3969
2	15.04259	0.9404

Probs from chi-square with 25 df

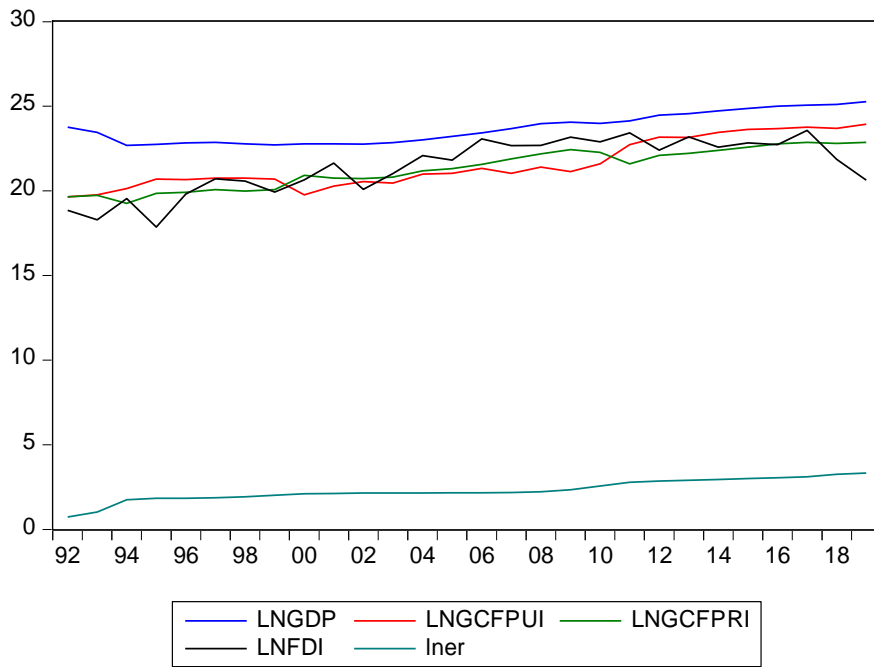


Figure: 6 B Descriptive Statistics

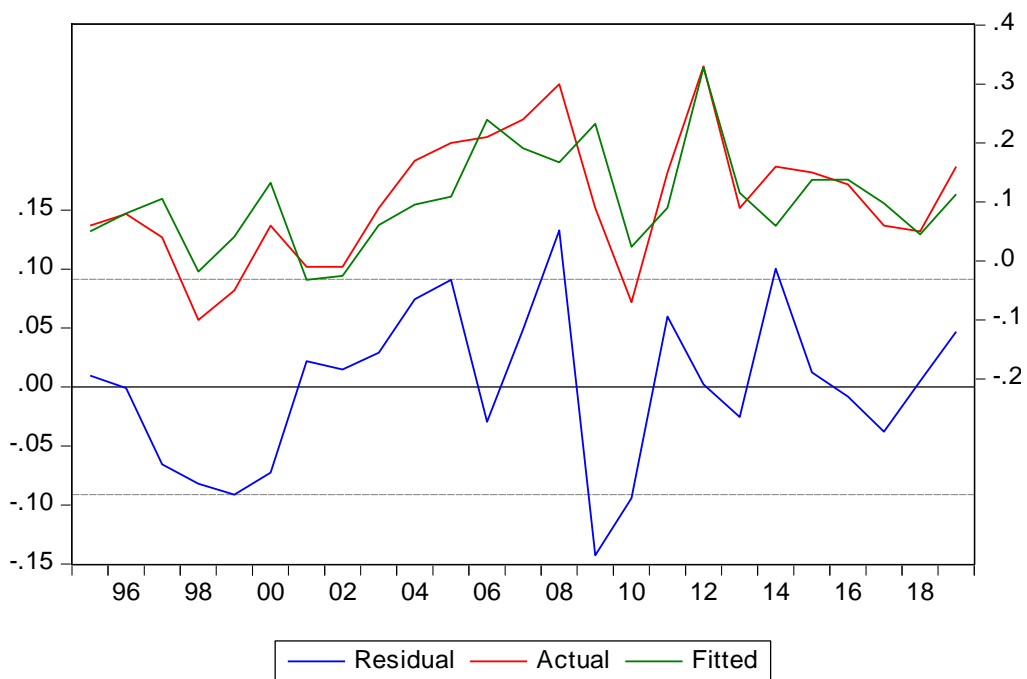


Figure: 7B Actual, Fitted and Residual of LnGDP

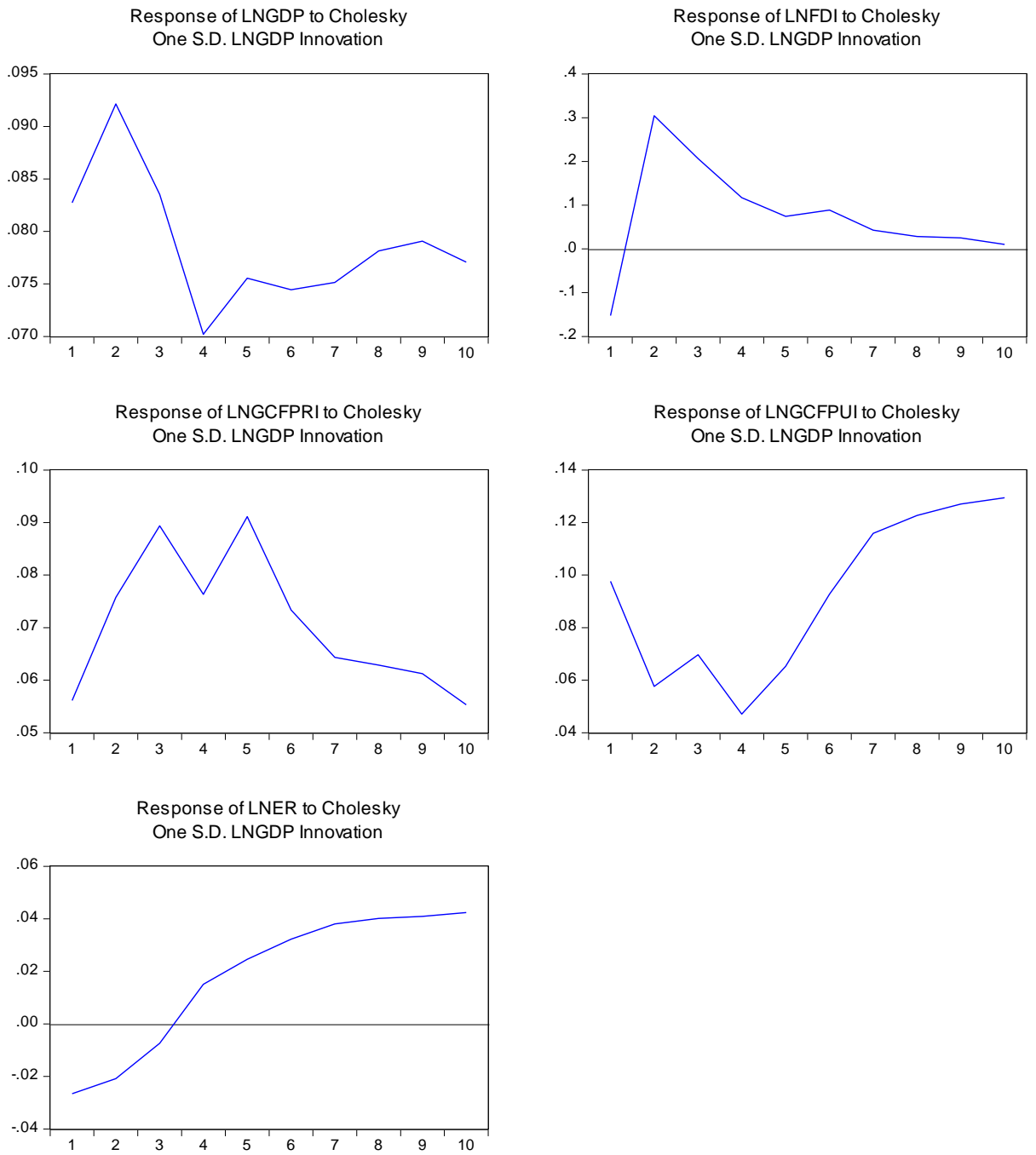


Figure: 8B Impulse Responses of FD I, GCFPRI, GCFPUI and ER to GDP