Impact of Foreign Direct Investment on Economic Growth in Ethiopia: Empirical evidence

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Abstract

This article analyses the impact of foreign direct investment (FDI) on Ethiopia's economic growth. For this purpose, it uses Vector Autoregressions (VARs) model for the period comprised by years 1981-2017. It finds that FDI had a significant positive impact on Ethiopia's economic growth for both the short and long-run periods. Adequate human capital and stable macroeconomic environment have catalysed the contribution of FDI to economic growth. Gross fixed capital formation and government consumption exerted a negative and significant effects on economic growth during the period of interest. Moreover, the study reveals that there is no causal relationship between FDI and economic development. Ethiopia needs to open up the economy and restructure the financial sector to attract foreign multinational companies (MNC), especially in the manufacturing and agro-industry sectors. Human capital investment should be strength to absorb more foreign direct investment and transform the agricultural-based economy to a modern one. Effective budgeting system and prioritisation of government consumption will support a more rapidly growing economy.

Keyword: Economic growth, Foreign Direct Investment, VECM, Ethiopia

JEL Classification: O41 - F23 - O55

Resumen

Este artículo analiza el impacto de la inversión extranjera directa (IED) en el crecimiento económico de Etiopía. Para ello, utiliza el modelo de autorregresiones vectoriales (VARs) para el período comprendido por los años 1981-2017. El estudio encuentra que la IED tuvo un impacto positivo y significativo en el crecimiento económico de Etiopía tanto a corto como a largo plazo. Un capital humano adecuado y un entorno macroeconómico estable han catalizado la contribución de la IED al crecimiento económico. La formación bruta de capital fijo y el consumo público tuvieron efectos negativos y significativos sobre el crecimiento económico durante el período de interés. Además, el estudio revela que no existe una relación causal entre la IED y el desarrollo económico. Etiopía necesita abrir la economía y reestructurar el sector financiero para atraer empresas multinacionales extranjeras, especialmente en los sectores de manufactura y agroindustria. La inversión en capital humano debería ser la fuerza para absorber más inversión extranjera directa y transformar la economía basada en la agricultura en una moderna. Un sistema presupuestario eficaz y la priorización del consumo gubernamental respaldarán una economía de crecimiento más rápido.

Palabras clave: Crecimiento económico, Inversión extranejra directa, vectores autoregresivos, Etiopía

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Introduction

Foreign direct investment (FDI) has been one of the salient features of the literature in economic growth and development in the past decades. Many studies have been conducted both in developing and developed countries to examine the several channels affecting economic growth (Akinlo, 2004). The fast growth of FDI over the last decade has intrigued prominent economists and policymakers to examine FDI's impact on economic growth. Empirical findings for the effect of FDI on economic growth show a positive result for most recipient countries. The main benefits include spillover knowledge such as packages of capital, technical skills, managerial and organisational know-how (Astatike & Assefa, 2005). FDI is a crucial component to developing countries and provides access to resources and technology that otherwise would not be available.

FDI contributes to economic development and poverty reduction while creating jobs, new supply, and a better business competitive environment. As a result, it will eventually improve the economic growth of the recipient country. FDI is an amalgamation of a bundle of capital stock and technology that can enrich the existing knowledge in the host economy (Xiaoming, 2003). Economists assumed the decisive role of FDI on economic growth in developing countries due to increasing employment opportunities, technical know-how in the domestic market, and enabling environment for business competition to enhance productivity and export (Ghatak & Halicioglu, 2007). Another critical feature for today's globalisation is to consider FDI's as an engine for their economic growth. Therefore, facilitating technological advancement for a country to achieve higher sustainable economic growth becomes the critical economic priority to attract FDI as an essential economic development source (Akinlo, 2004; Ayanwale, 2007).

In Africa, attracting FDI is one of the government's main priorities for economic growth, predominantly in Sub-Saharan Africa. FDI attraction in Africa was limited due to the inadequate infrastructure, political instability, oscillating of the exchange rate, and unpredictable inflation (Ayanwale, 2007). African record in FDI is smaller than other regions, and multinational companies' presence was minimal, until the recent China's involvement in the continent, with 2.9% of the world FDI. A continent with a significant market and sizeable young population attracting this minimal share of FDI is a puzzle, in which it becomes relevant to look for the root of the shortage of FDI. Ethiopia is not an exceptional country from the rest of the continent, although it is one of the top FDI recipients in this decade. Likewise, FDI is crucial for Ethiopia's economic growth as an essential source of capital and knowledge split over, so it is vital to finance growth and development (Astatike & Assefa, 2005).

Therefore, examining the effect of FDI on economic growth in Ethiopia has its importance. FDI has played an essential role in Ethiopian economic growth and attracted multinational companies. Studies about the contribution of FDI inflows and their relationship to economic growth are not well explored in Ethiopia. Therefore, this study assumes to fill this gap and better understand the relationship between FDI and Ethiopia's economic growth.

The paper is organised as follows. After this introduction, the following section reviews the relevant literature, both theoretical and empirical. After this review, the methodological framework is presented. A series of test are show to assess the sensibility of the model. The discussion of the results is presented. Finally, some conclusing remarks are shown.

Theoretical review of foreign direct investment

Recently, FDI research has evolved through hostility to encouragement in developing countries (Imoudu, 2012). First, FDI was regarded as an impeding factor for the development of domestic industries for export promotion. According to Athukorala (2003), FDI provides critical resources to developing countries such as technology, capital, managerial skills, entrepreneurial ability, brand, and access to markets essential for developing countries to industrialize. In general, FDI is considered to drive economic growth in developing countries. It contributes to the recipient country's development process by solving the constraints of inadequate domestic savings and investment and foreign exchange shortages (Dauda, 2007).

Many international companies open branches or subsidiaries in foreign countries to absorb the advantage of cost minimisation or increase market share. The traditional international trade theory can be restricted to analyse MNCs establishment abroad through FDI. The main limitation of classical trade theory is the lack of analysis on the reasons why multinational companies are operating in foreign countries. The view of the portfolio investment has attempted to overcome this limit on traditional trade theory. The financial theory assumed that the countries' interest rate differentials are the leading causes of why multinational companies operate abroad. The theory's assumption is that capital movement is a response to a change of interest rate between countries. Although the theory assumes interest rate is a crucial factor of preference in different markets, it fails to account for the cross-movement of capital across countries (Mason & Harrison, 2000).

The product life cycle theory of Vernon offers an alternative explanation of FDI. The idea examines the role of innovation and economies of scale in determining trade arrangements. The theory states that FDI is a stage in a new product's life cycle from its invention to maturity. The products are first manufactured in the home country for domestic consumption. When the domestic market is saturated, the product is exported to other countries. When the new product reaches maturity and loses its speciality, similar competitors become strong. The theory establishes how market seeking, and companies' cost reduction motives lead to FDI. Furthermore, the theory analyses multinational companies' behaviour and how they take advantage of different countries at varying economic development levels. Moreover, it has noted that Vernon's view remarks FDI as an alternative competition strategy by firms to keep in their existing market share (Dunning & Lundan, 2008).

Following Vernon's theory, Knickerbocker contends a follow-the-leader type of defensive FDI exclusively in industries characterised by oligopoly. His argument relies on the uncertainty and risk aversion behaviour of oligopolists. This theory suggests that firms go abroad because of oligopolistic reaction, which is an interactive kind of corporate behaviour by which competitive industries composed of a few large firms counter one another's moved by making similar moves by themselves to compete in new markets production (Knickerbocker, 1973). However, this theory does not explain why FDI is more efficient than exporting or licensing for expanding abroad.

Study on multinational companies' draws attention to international companies' role as global industrial organisations. Hymer's significant involvement was to change the direction from financial theory. His argument has based on the need to exercise control over the operation as a primary desire for FDI rather than simple capital flow. Capital used to facilitate FDI rather than an end in itself. The author suggested that for firms to engage in cross-border activities they must possess some monopolistic control. The monopoly has resulted from a foreign company's ownership of patents, know-how, and managerial skills unavailable to local companies (Hymer, 1976).

Dunning identified three factors that must be satisfied before engaging in cross-border activities. The ownership advantages are firm-specific since it is assumed as a right reserved to the owner firm. These gains arise from multinational companies possessing proprietary technology or other unique intangible assets and the firm's ability to coordinate complementary activities, i.e., manufacturing and distribution (Astatike & Assefa, 2005). Therefore, foreign firms have more comparative advantage over their local counterparts. Internalisation advantages refer to the firm's ability to internalise its activities, which can do through market transactions. Regarding internationalisation, it refers to the firm capability to minimise its transaction costs. However, it can retain exclusive rights to its assets, and it maintains its monopoly. The advantages of strategic selection for location include host countries' natural resource endowments, superior infrastructure, and macroeconomic stability.

These location advantages determine the profitability with which the firm's advantage and internalisation advantage should combine. From these three advantages, if the firm only meets one, then firms will rely on exports, licensing, or the sale of a patent to foreign service markets. Thus, the general theory's predictions are that a firm can only capture a foreign market through FDI if it can simultaneously exploit all three advantages.

In Dunning's eclectic theory, the ownership and internalisation gains are firm-specific features, while the location advantages are country-specific characteristics that the recipient country can directly influence. Generally, countries that lie in a strategic location can attract more FDI. Nevertheless, firms do not undertake FDI only for the presence of location-specific advantages in the host country. The strategic location in a country could alter the profitability that the owner can gain from internationalization. To attract more FDI the following policy frameworks have been considered: economic, political and social stability, and rules regulating entry and operation of FDI. Better policies include the standard of treatment of foreign affiliates, guidelines on functioning and structure of the markets, an international agreement on FDI, privatization policy, trade policy, and tax policy (UNCTAD, 1998). Business facilitation implies removing barriers for businesses operation in the recipient country. The primary FDI incentives include investment promotions and incentives, hassle costs related to corruption, and administrative efficiency. Development of financial institutions, the enforceability of contracts, protection of property rights, and quality of life have also served as elements to attract foreign investment.

Empirical literature

Two main theories elaborate on FDI impact in economic growth in the host country: the modernisation and dependency theory. The modernisation theory based on neoclassical and endogenous growth theories suggests that FDI could promote developing countries' economic growth. While the dependency theory is based on a fundamental economics principle, economic growth requires capital investment (Adams, 2009).

FDI's impact on economic growth in developing countries, mostly in African countries, has shown that both private and foreign capital has a small effect on economic growth. Akinlo (2004) has argued that FDI in extractive industries is not integrated with economic growth. The study found that export and financial development had a positive and negative impact, respectively, on economic growth. The possible explanation for the negative and significance of financial development is the country' capital flight. Labour force and human capital positively impact economic growth, which implies that the country desperately needs to create human capital to attract FDI.

Adams (2009) has examined the impact of foreign direct investment and domestic investment on economic growth in sub-Saharan African countries. He found that FDI and domestic investment correlated with economic growth, with FDI having a positive and significant effect. He found that FDI initially crowded out domestic investment; therefore, the magnitude of the current and lagged FDI coefficient suggested a net crowding out effect. He argued the lack of positive impact of FDI might be due to the low level of financial development in Sub-Sahara Africa (SSA). FDI in Nigeria contributes positively to economic growth, although the overall effect on FDI in economic growth may not be significant (Ayanwale, 2007). The result shows that FDI on communication has the highest potential to grow in the economy, while FDI has negatively affected economic growth. The factors that influence FDI in South Africa's financial service firms are most strongly influenced by the host country's political and economic instability and profitability (Luiz & Charalambous, 2009). Studies undertaken in the West African Monetary zone has indicated that FDI depends on the markets per-capita income size and growth rate (Udoh & Obiora, 2006). They found that there is no two-way relationship between economic growth and FDI. The threshold of FDI to affect economic growth is to develop infrastructures, macroeconomic, and political stability, promoting the flow of FDI in the region. Foreign capital improves the economy through knowledge transfer to the domestic capital (Bogetić & Fedderke, 2006).

Furthermore, research findings show that the relationship between foreign and domestic capital has been horizontal rather than vertical. It is stated that economic growth is supported by market size, moderate wage, low corporate tax rate, and full integration of the South African economy to the world. Astatike & Assefa (2005) have conducted research examining the determinants of FDI in Ethiopia, finding that the growth rate of real GDP, export orientation, and liberalisation positively impact FDI. Macroeconomic instability and poor infrastructure hurt FDI. Their findings have shown that a stable macroeconomic and political environment is a precondition to attract FDI. FDI's effect is via human capital interaction, and the technological gap has negatively impacted economic growth in recipient countries (Li & Liu, 2005). Countries that pursued an outward-oriented trade policy have absorbed FDI, contributing to economic growth (Balasubramanyam, Salisu, & Sapsford, 1996). There is a vibrant relationship between FDI and other economic growth determinants (Almasaied, Baharumshah, & Rashid, 2008). Their finding confirmed that domestic investment, FDI, human capital, and financial intermediation are significantly affected by economic growth. According to Jajri (2009), the effect of FDI on economic growth found that it has a significant impact on its growth rate. FDI is determined by the exchange rate, export, current account balance, and public expenditure.

Studies on FDI and economic growth worldwide for the period between 1991 and 2001 founded a positive and statistically significant relationship between real per-capita GDP and FDI in many countries (Ghatak & Halicioglu, 2007). The determinants of FDI in Malaysia found that market size and real GDP positively impact FDI inflows (Ang & McKibbin, 2007). It indicates that increasing the level of financial development, infrastructure development, and trade-openness promotes Malaysia's FDI from a policy perspective. Bengona & Sanches-Robles (2003) analysed the relationship between economic freedom, FDI, and economic growth in 18 Latin American countries from 1970 to 1999 and found that economic freedom has a positive effect on FDI inflows and economic development. The study indicates that the precondition needed from the recipient countries to attract FDI is to have adequate human capital, economic stability, and that free markets are necessary for Latin American countries.

Yao & Wei (2007) built a theoretical framework to study the role of FDI on economic growth, and showed that it positively affects production. Simultaneously, technological progress played an essential part in China's economic growth. A quantitative assessment for the effect of various capital

flow types on East Asian countries' growth process, including China, shows that domestic saving contributes positively to long-term economic growth (Baharumshah & Thanoon, 2006). Other research findings show that clustered geographical industries should transfer technology and contribute to economic growth more than dispersed industries (Thompson, 2002). From the analysis of german companies' propensity to invest abroad it was found that the net effect on domestic jobs in Germany was positive. The analysis indicates that German industries hurt domestic jobs (Tüselmann, 1999). The impact of FDI and equity foreign portfolio investment (EFPI) suggest that lagged FDI and equity foreign portfolio do not have direct, unadulterated positive effects on growth (Durham, 2002).

In addition, some data are consistent with the view that the impact of FDI and EFPI is contingent on the host country's absorptive capacity with particular respect to financial or institutional development. Farrell, Gaston, & Sturm (2004) identified the main determinants of Japan's FDI and found that the host country's market size is vital for some industries. Furthermore, the result shows that imports and Japannese FDI are positively correlated. FDI is related to the type and comparative advantage of invested sector/industries to the host economy. Other researchs findings have raised the effect of a trade barrier to the supported country. It revealed that foreign capital was responsible for more than one-third of the manufacturing sector's productivity growth (Goss, Wingender Jr, & Torau, 2007).

The analysis of sector-specific impact of FDI on economic growth in developed countries found that FDI has a significant and positive effect on economic growth (Vu & Noy, 2009). The authors found that the impact on economic growth is not equally distributed across countries and sectors. FDI test on economic growth found that it is essential while transferring technology, and contributed more to grow faster than domestic investment (Borensztein, De Gregorio, & Lee, 1998). However, the study added that FDI stimulates economic growth if the recipient country has a minimum human capital stock level. Economic integration enables FDI, leading to the expansion of research and development (R&D) activity in industrial and economic growth across the world (Gao, 2005). Basu & Guariglia (2007) studied the interaction between FDI, inequality, and growth using a panel data of 119 developing countries and found that FDI encourages both inequality and growth and tends to reduce the share of agriculture to GDP in the host country. A research on the impact of FDI on productivity growth in Mexico found that FDI contributes to private capital financing and development (Ramirez, 2006). This study was conducted thourgh a growth model which explicitly incorporates either positive or negative externalities associated with changes in the stock of FDI per worker. Likewise, the effects are slightly more apparent from growth to FDI instead of FDI to growth. He also investigated gross domestic investment (GDI) and conclude that GDI does not Granger-cause economic growth, suggesting strong positive associations between economic growth and FDI inflows (Choe, 2003). The bilateral FDI between the European Union and eight Central and East European countries shows that the key determinants of FDI inflows are the recipient country's size, recipient country risk, labour costs, and openness (Janicki & Wunnava, 2004). They revealed that if the government needs to use FDI inflow that foreigners offer, it must adjust its economic and political plan to fit the investors' needs. Bajo-Rubio & Montero-Muñoz (2001) analysed the empirical relationship between outward FDI and exports. They found that the export and outward FDI were co-integrated and that the relationship between both variables is positive and significant. Further, their finding has discovered that the Granger causality from outward FDI to export found only in the short-run. They concluded that in the long-run, Granger causality is to run both directions.

A study for the endogenous relationship between FDI and economic growth using panel data from 23 OECD countries for 1975-2004 concluded that FDI positively affects economic growth (Turkcan

& Yetkiner, 2010). Likewise, it revealed that economic growth stimulates the growth rate of FDI inflow. An analysis on the impact of trade and FDI inflows and economic growth in the EU-15 for both the Union's new candidate members focused on the influence of potential channels called investment-led technology and technology-led- change. The results did not support that for EU-15 capital formation led-growth, but they revealed that the new EU member has significant growth and intensifies the impact (Borota & Kutan, 2004).

Agiomirgianakis et al. (2003) have examined the empirical relevance between FDI and its determinants in 20 OECD countries for 1975-1997. Their findings show that certain variables like human capital, trade regime, and availability of infrastructure, education, and training workforce are highly significant. Other variables, such as labour cost and political factors, shed more insights into flexible FDI. Federico & Minerva (2008) assessed the impact of Italy's outward foreign direct investment on local employment growth between 1996-2001. Their results showed that FDI is associated with faster regional employment growth relative to the national industry average. The study findings did not support the idea that FDI is detrimental to local employment growth in the home country (Federico & Minerva, 2008). Moore (1993) examine the economic factors that would explain German FDI patterns found that it is sensitive to the host-country size, market labour cost, and unobserved. The investment seems to be more sensitive to differentials among potential host countries. Moreover, geographical proximity to the German market might be an essential factor in determining investment flows.

According to Chowdhury & Mavrotas (2005), GDP causes FDI in Chile and not vice-versa. They found strong evidence of bi-directional causality between GDP and FDI in both Malaysia and Thailand. A study on Granger-causality analysis between FDI and economic growth in Turkey has shaw that the causality is uni-directional from FDI to economic growth (Afşar, 2008). According to Ludoşean (2012), in his study in Romania between 1991-2009, FDI has not caused economic growth but economic growth initiated FDI. A similar survey conducted in Namibia shows that economic growth was a leading factor in foreign investment in the country (Ingo, 2015). Agbloyor et al. (2016) investigated institutional development's influence on FDI nexus growth in Sub-Saharan African countries for 1996-2010 by employing a linear interaction model. Their finding does not show any moderating effect of institutions in FDI and growth nexus. Other study conducted in southern Africa indicates that FDI's growth-enhancing result becomes more potent in democratic institutions and high economic freedom (Malikane & Chitambara, 2017). Adewumi (2006) examined the contribution of FDI to economic growth in Africa thorugh regression analysis, using data from the entire continent -and for eleven countries within the continent-. The data covered the period from 1970 to 2003. The result showed that the contribution of FDI to growth is positive but not significant.

In Ethiopia a few studies have addressed the relation between FDI and economic growth. Asmelash (2015) analysed FDI in Ethiopia employed co-integrated VAR model over the period 1975-2014. The study looks for the determinants of FDI in Ethiopia including infrastructure development, the domestic market size and growth potential, macroeconomic stability, human capital development, openness, and external debt. The study findings have revealed that all the variables are positively affected and statistically significant except inflation which has a negative and significant sign. In the short-run the study shows a negative relation between gross capital formation and inflation, and they are statistically significant. GDP has found a positive relation with FDI.

Methodolog & data

In order to analyze the impact of FDI on Ethiopian economy a Vector Auto Regression (VAR) model is used in this study. The VAR model is used to forecast a system of interconnected time series and analyse the dynamic impact of random disturbance on variables. The VAR model is useful in this situation as it is less restrictive compared to other models. The VAR model introduced by Sims (1980) can be written as follows*:*

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + BX_t + \varepsilon_t$$

Where y_t *is* the *k* vector of endogenous variables, X_t is a *d* vector of exogenous variables, $\boldsymbol{A_1}$, .., A_p, and *B* are the coefficients matrices to estimate. ε_t is a vector that may be contemporaneously correlated but are uncorrelated with their own lagged values and the right-hand side variables. This study used the VAR model for the cointegration test. After a rigorous search for the literature on the subject, we derived the most used variables in Africa: FDI, growth rate (Gross domestic per-capita income), human capital, inflation, government consumption, and gross fixed capital formation. The gross domestic per-capita income rate will be our dependent variable. The model presented as follows:

$$\text{Log } y_t = \alpha + \beta_1 \text{Ln}FDI + \beta_2 \log INF_t + \beta_3 \text{Lngcf} + \beta_4 \text{Ln}HC_t + \beta_5 \ln Cg + \varepsilon_t$$

Where;
$\log Y_t$: the natural logarithm of Gross Domestic Product per capita growth.
$\ln FDI_t$: the natural logarithm of foreign direct investment as share of GDP.
$\log H_t$: the natural logarithm of human capital.
$\log INF_t$: the natural logarithm of the inflation rate.
$\log Cg_t$: the natural logarithm of government consumption as share of GDP.
logGFC: the natural logarithm of gross fixed capital formation as share of GDP
e: error term.

Unit root test

As the nature of time-series data, the first step is to test the unit root for examining whether time series data are stationary at levels or difference. It has investigated the unit root test for each variable in the model. The Augmented Dickey-Fuller test used to test for the stationary of the variables. After determining each time series' order, the variables integrated of the same order, the cointegration test employed to study the long relationship between the real growth rate and the other independent variables in the model. The study probed whether the variables are co-integrated, followed to estimate the Vector Error Correction Model for the short-run dynamics. Finally, the study has conducted the Granger causality tests based on the Vector Error Correction model to determine whether FDI does Granger causes the economic growth rate or whether other independent variables influence Ethiopia's economic growth**.**

Econometric tests

Time series data in economic are not stationary due to containing a time trend; therefore, to avoid spurious regressions, the first step in time series econometrics a regression analysis is to resolve whether all variables are stationary. Hence to know whether the series are stationary or not, it has tested by the Dicky-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests since they are one of the

most consistent unit root tests. In this study, we used for Augmented Dickey-Fuller test to know whether the time series is stationary at a level or has a unit root. If the series is stationary at the level, it integrates order 0, $y_t \sim I(0)$. However, if the series has a unit root, we will then take the f series' first difference and repeat the unit root test. If it is stationary at the first difference, then the series is integrated of order 1, $y_t \sim I(1)$. In general, a series y_t said to integrated of order d, that is $y_t \sim I(d)$ after it has to be differenced d times to attain stationary.

For a general rule, non-stationary time series variables should not use in a regression model as it can lead to spurious correlation. However, if the time series variables in the regression model are individually non-stationary at levels, they integrated the same order (d). Moreover, there exists a linear combination of them that integrated a lower order I(d−b) where b > 0, then these variables said to be co-integrated of order (d−b). In other words, if the variables are all I (1) and a linear combination of them is I (0), then the variables are co-integrated, that is, CI (1, 1). Cointegration means that these variables have a long-run relationship. Johansen (1988) and Johanson-Juselius (1990) have developed an approach to determine a long-run relationship between the regression model variables. In this paper, used for the Johansen-Juselius cointegration test. The Johansen-Juselius procedure based on the vector autoregressive model and the lag length is determined using the Akaike Information Criteria.

The vector autoregression model that allows for the cointegration process can write as follows:

$$Y_t = \mu + \sum_{k=1}^{p} \Pi_k Y_{t-k} + \varepsilon_t$$

Where;

Y_t is a p-vector of first-order variables, μ is a p-vector of constants, and ε_t is a p-vector of residuals with zero mean and constant variance. For our research model, the regression model is supposed to have k = 7 variables with six independent variables and one dependent variable.

The Johansen process is based on two tests: the trace test and the maximum eigenvalue test. The following equation shows the trace test:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{p} \ln(1-\lambda_i)$$

Where λi is the Largest Eigenvalue of the Π matrix, r is the number of cointegration vectors, p is the number of variables, and T is the number of observations. Under this test, the null hypothesis is that there are less than or equal to r co-integrating vectors, and the alternative hypothesis is a general one.

H_0: $r \leq 1$ (there is at most one co-integrating vector) against

H_1: $r \geq 2$ (there are at least two co-integrating vectors)

If the test statistic is higher than the critical value, H_0 will be rejected.

After the trace test, we proceeded with the maximum Eigenvalue test, which has written as follows:

$$\lambda_{max}(r, r+1) = -T \ln(1-\lambda_{r+1})$$

This test's null hypothesis is that there are r cointegration vectors against the alternative hypothesis of r+1 co-integrated equations.

Granger Causality

Granger causality is an incident in which a one-time series variable consistently and predictably changes before other variables. Granger causality allows analysing which variable precedes the other; such leading variables are extremely useful for forecasting purposes.

When we make sure that there is cointegration among variables, the Granger causality procedure based on a vector error correction model will be used. The vector error correction model is a mean of reconciling the short-run behaviour. The vector error correction model is a restricted vector autoregression model with a cointegration. Engle & Granger (1987) have shown that causality must run in at least one direction if the variables are co-integrated. The direction of Granger causality, both short-run and long-run causality, detect through the vector error correction model from the long-run cointegration equation.

$$y_t = \sum_{i=1}^{k} \alpha_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{t-i} + u_{1t}$$

$$x_t = \sum_{i=1}^{n} \lambda_i x_{t-i} + \sum_{i=1}^{n} \theta_i y_{t-i} + u_{2t}$$

There is a uni-directional causality running from x to y if the estimated coefficients on the lagged values of x are statistically significant from zero as a group in equation one. Moreover, the set of estimated coefficients on the lagged values of y in the second equation is not significantly different from zero. Suppose there is at least one cointegration vector among the variables of the model in this study. In that case, we will proceed with the estimation of the vector error-correction model (VECM) to investigate the short-run temporal causality. On the other hand, if there is no long-run relationship (no cointegration) between the model variables, the VAR model will examine the variables' short-run causality.

The vector error correction model is a particular form of the VAR for I (1) co-integrated variables. The vector error correction (VEC) model allows us to capture both the short-run and long-run relationships.

Diagnostic test

This study used other diagnostic tests such as serial correlation, heteroscedasticity normality and stability test. The Cusum test and Cusum square test of parameter stability are used. These tests are appropriate for time series data. It is based on the cumulative sum of recursive residuals. A cumulative sum plot with critical lines helps to find parameter instability if the cumulative sum goes outside the area between the two essential lines.

Specification of variables and source of data

The empirical analysis employs data sets for the period 1981-2017 for all the variables. We analysed the time-series data from the Finance and Economic Development Ministry, Ethiopian economic association CD-ROM, Word Development Indicators, African Development Bank database, and Ethiopia's National Bank.

The dependent variable is the GDP level of the country at 2005 constant prices. The level forms are preferred to the growth rates in a time series framework mainly due to the stationarity nature of growth rate time series. Foreign direct investment will be a yearly inflow measured as FDI/GDP. Human capital will use tertiary education as a proxy. Openness equal export plus import/GDP. Hence the model can be stated as:

$$GDP = f(INFL, H, FDI, GCF, GC)$$

Empirical result

The empirical analysis aims to examine the impact of FDI on economic growth in Ethiopia. The study attempted to address the long-run relationship between economic growth, FDI, and other macroeconomic variables in the model. Unit root test: granger causality tests require stationary time-series data (Eng, 1994; Huang, 1995). The unit root test conduct to test the stationarity of data. The unit root test is the pre-condition to check whether variables are stationary or non-stationary to avoid spurious regression. Therefore, the Augmented Dickey-Fuller test results are presented in Table 1.

Table 1: ADF test of a unit root test with level and first difference

Variables	Level	First difference
Inf	0.1977	0.0000***
lfdi	0.0075**	0.0000***
lngc	0.7342	0.0000 ***
lngcf	0.9508	0.0000***
lngdp	0.9738	0.0001***
Lnhc1	0.7301	0.0079**

Source: Author's Computation (eviews9)

The results above show that all variables are not stationary at level except FDI, but all other variables become stationary at first difference. Therefore, cointegration should beperformed.

Johansen co-integration: Estimating the optimal lag order

After the stationarity test, Johansen cointegration is conducted due to the sensitivity for the number of optimal lags to include for the endogenous variables in the VAR model. To determine the optimal lags in the model is necessary to test before the cointegration test. Therefore, there are five lag length selection models: Akaike information criteria (AIC), Hanaan –Quinn Criterion (HQC), Likelihood ratio test statistics(LR), Schwarz Criterion (SC), and Final prediction error (FPE), which are presented in Table 2.

Table 2: Lag order Selection for the VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-26.70102	NA	1.48e-06*	3.582915*	5.182702*	4.135161*
2	2.484907	38.35865	2.55e-06	3.972291	7.171864	5.076783

* indicates lag order selected by the criterion

Source: Author's compilation

The above table has selected the maximum lag to consider in this study's VAR model and fixed lag two after performing the lag exclusion test.

Co-integration test

The study used the Johansen cointegration test to determine the long-run relationship between the variables under study. It may help policymakers, academicians, and multinational companies understand how long-run economic equilibrium converges and economic realities to consider in Ethiopia's context.

Table 3: Cointegration test: Johansen cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.787152	142.6725	95.75366	0.0000
At most 1 *	0.728251	90.06847	69.81889	0.0005
At most 2	0.422774	45.77065	47.85613	0.0775
At most 3	0.357737	27.08693	29.79707	0.0995
At most 4	0.230955	12.03319	15.49471	0.1553
At most 5	0.087267	3.104613	3.841466	0.0781

Trace test indicates 2 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

As reported in Table 3, both trace test and maximum Eigenvalues statistics show that VAR for Ethiopia has five co-integrating vectors. It implies that a long-run relationship exists among variables understudy in this model.

Long-run relationship and short-run dynamics

The study has confirmed the long-run relationship among the variables under the investigation in the Ethiopian economy. Therefore, after the test of co-integrating vectors, the author has implemented a vector error correction model (VECM) to get the long-run and short-run relationships between economic growth and foreign direct investment with controlled variables in this model.

Table 4: Vector Error Correction Estimates

Variables	Coefficients	Standard Errors	T-statistics
LnGDP	1.000000		
LNGC	0.988722	(0.11481)	[8.61181]
FD0I	-0.020239	(0.00748)	[-2.70574]
INF	0.018230	(0.00212)	[8.59905]
LNGCF	0.512038	(0.11092)	[4.61628]
LNHC1	-0.503559	(0.03418)	[-14.73256]
C	0.007186	(0.01155)	[0.62200]

Source: Authors' Computation

In this study, we infer that all variables are statistically significant, looking for t-statics. The paper finds that foreign direct investment has impacted positively and significant in the long-run. This study in Ethiopian economic growth and FDI found that variables are moving together in a long-run economic performance, among other explanatory macro-economic variables.

$$Lngdp = 0.7186 - 0.98872lngc + 0.02023lnfdi - 0.018230inf + 0.5036lnhc1 - 0.5120lngcf - (2)$$

Our variables lngdp, lngc, lnfdi, inf, lnhc1, and lngcf indicate a long-run equilibrium relationship from the above regression model. The coefficient shows that a 1 per cent increase in government consumption results in the long-run decreases by 0.98 of economic growth, and this change is statistically significant. Lnfdi coefficient is positive and highly significant, indicating that an increase in FDI by 1 per cent has a positive impact on economic growth by 2%, keeping other variables constant. Inflation and gross fixed capital formation have a negative and significant impact on economic growth. Unexpectedly, gross fixed capital formation has negatively affected the economic development in the long-run in Ethiopia. However, human capital shows a positive relationship and statistical significance; a 1 per cent increase in human capital leads in the long-run increases by 50% of Ethiopia's economic growth. Therefore, the study confirms that FDI positively impacts economic growth in the long-run. Human capital, macroeconomic stability has also significantly contributed to the economic growth in Ethiopia.

Short-run dynamics

The short-run dynamics adjusted through individual coefficients of the differenced terms. These coefficients are called adjustment coefficients. The coefficients of the error correction for the equation are negative and significant. It implied that there is a quick adjustment toward a long-run steady state.

Table 5. The error correction method

Dependent variable: LNGDP			
Error correction	Coefficient	Standard Error	t-value
Cointeq1	-0.344553	(0.12745)	[-2.70335]
LNGC(-1))	0.988722	(0.11481)	[8.61179]
LNFDI(-1))	-0.020239	(0.00748)	[-2.70597]
INF(-1))	0.018230	(0.00212)	[8.60961]
LNHC1(-1))	-0.503559	(0.03418)	[-14.7326]
LNGCF(-1))	0.512038	(0.11092)	[4.61635]

R-squared	0.693155	0.460073	0.682969	0.580699	0.626907	0.356533
Adj. R-squared	0.493706	0.109120	0.476900	0.308153	0.384397	-0.061721
Sum sq. resids	0.047113	0.218672	0.469084	0.212534	2577.852	22.21398
S.E. equation	0.048535	0.104564	0.153148	0.103086	11.35309	1.053897
F-statistic	3.475352	1.310924	3.314262	2.130649	2.585075	0.852433
Log likelihood	63.64282	37.54731	24.57276	38.03132	-121.8259	-41.00805
Akaike AIC	-2.920166	-1.385136	-0.621927	-1.413607	7.989758	3.235768
Schwarz SC	-2.291665	-0.756634	0.006574	-0.785106	8.618259	3.864269
Mean dependent	0.024833	-0.004989	0.031827	0.080136	0.309518	0.081165
S.D. dependent	0.068211	0.110783	0.211747	0.123935	14.46984	1.022806

Determinant resid covariance (dof adj.)	3.28E-07
Determinant resid covariance	1.36E-08
Log likelihood	18.48258
Akaike information criterion	4.206907
Schwarz criterion	8.247273

Source: Authors' compilation

The short-run relationship between gross domestic per-capita and other explanatory variables has shown a positive except foreign direct investment, indicating a negative. In the short-run, the relationship between gross fixed capital formation and economic growth reveals a positive and significant effect. Implies that gross fixed capital formation on Ethiopia's economic growth has a substitute effect on FDI.

Government consumption, human capital, and inflation findings show a positive and statistically significant short-run to economic growth effect. All the variables show a negative and insignificant relationship between economic growth and foreign direct investment. The magnitude of the error correction model (ect_{-1}) indicates the speed of adjustment from short-run disequilibrium towards the long-run equilibrium state. The error correction coefficient (ECM) shows that whenever the system is disequilibrium, it is restored with a speed of about 34 per cent.

Granger causality

Next, the establishment of the cointegration test and normalisation for the long-run relationship between economic growth and independent variables, the Granger causality is undertaking.

Table 6: VEC Granger causality/Block exogeneity Wald tests

Dependent variable: D(LNGDP)			
Excluded	Chi-sq	df	Prob.
D(LNGC)	4.318371	2	0.1154
D(LNHC1)	5.597082*	2	0.0609
D(LNGCF)	2.046373	2	0.3594
D(INFL)	18.28738***	2	0.0001
D(FDI01)	1.945637	2	0.3780
All	31.98788	10	0.0004
Dependent variable: D(LNGC)			
Excluded	Chi-sq	df	Prob.
D(LNGDP)	0.451446	2	0.7979
D(LNHC1)	2.141704	2	0.3427
D(LNGCF)	5.201835*	2	0.0742
D(INFL)	1.556006	2	0.4593
D(FDI01)	0.259432	2	0.8783
All	10.48646	10	0.3989
Dependent variable: D(LNGCF)			
Excluded	Chi-sq	df	Prob.
D(LNGDP)	5.042305*	2	0.0804
D(LNGC)	4.295141	2	0.1168
D(LNHC1)	1.791328	2	0.4083
D(INFL)	6.978342**	2	0.0305
D(FDI01)	3.406322	2	0.1821
All	15.50425	10	0.1147

Source: Authors' compilation

The Granger causality in Table 6 confirms no directional relationship between FDI and growth. The result in table three indicates a uni-directional causality running from human capital and inflation to economic growth. There is strong evidence that causality is from economic growth and inflation to gross fixed capital formation.

Table 7: Diagnostic tests in model

Residual	**measurement**	**Chi-square**	**DF**	**Probability**
Serial LM test	LM-Stat	34.96961	36	0.5174
Normality test	Jacque-Bera	7.578871	14	0.9101
Heteroskedasticity	No cross-terms	562.4919	546	0.3035

Source: authors' compilation

The estimated VECM model passed all the residual diagnostic tests.

Discussion

This study's findings show crucial elements of the Ethiopian economy evolution and the impact of FDI during the studied period. FDI has contributed positive and significant to economic growth in Ethiopia. These findings supported by recent literature Iamsiraroj (2016) for 124 developing countries, Chanie (2017) & Gizaw (2015) for Ethiopia. The positive influence of FDI on economic growth was emparked by the good macroeconomic stability, cheap labour force, and less market

competition from domestic investment. Government consumption has negatively associated with economic growth and its statistically significant. The negative contribution of government consumption on Ethiopia's economic growth is due to the lack of prioritisation and inefficient government consumption. The result is in line with Teshome (2014) findings for Ethiopia.

Gross fixed capital formation is found to have a negative and statistically significant to impact per capita income growth. Ethiopia is the country with the highest share of GDP in gross fixed capital formation globally, i.e., 39% in 2017, mainly in public infrastructure. The negative contribution has been caused mostly due to low institutional quality and inefficient administration, and inadequate public investment quality. Therefore, it negatively affects it in the long-run. The study finding is supported by other results such as Dereje (2012) and Nketsiah & Quaidoo (2017). Human capital is an essential variable in this model and positively affected economic growth in Ethiopia. The effect of human capital on growth multiplied by the presence of FDI. The study is consistent with the previously available literature, including Muli et al. (2017) & Kedir (2012). The contribution of human capital is mainly from the manufacturing sector were FDI is primarily concentrated. High skill human capital with low earning wages relative to other countries attracted FDI inflow in Ethiopia.

There is a negative association between economic growth and inflation. The study revealed that inflation has negatively impacted Ethiopia's economic development. It implies that every one per cent increase in inflation have decreased a certain amount in the growth. Macroeconomic stability with a low nominal interest rate attracted FDI, which positively affected Ethiopian economic growth. Findings are consistent with other studies such as Amna et al. (2010), Javaid (2016), Andinuur (2013), and for Ethiopia Kedir (2012). It implies that the Ethiopian government has implemented sound macroeconomic management to boost investment and development. Low inflation and stable inflation have maintained until recently, but now the country is experiencing high inflation.

In the short-run analysis, FDI is positive and statistically significant, implying that FDI positively affected Ethiopia's economic growth. All other variables are positive contributions to economic development. Inflation is positive and significant in the short-run, a warning sign to healthy economic growth. It implies that the prices and cost of living increases, the exchange rate depreciates, and the foreign reserve is drying up.

Previouly presented equation (2) confirms the existence of a long-run relationship between economic growth and foreign direct investment, and other macroeconomic and policy variables. In this result, we know the long-run impact of FDI on the real per-capita GDP found to be positive and significant. It implied that every 1 per cent increase in FDI would lead to a 0.093 per cent increase in real per-capita GDP. Foreign direct investment on the gross domestic per-capita growth rate in Ethiopia is positive and significant, confirming previous studies conducted in Ethiopia (Chanie, 2017; Gizaw, 2015). Ethiopian economic growth is slowed by government consumption, which shows that every 1 per cent increase in government consumption will lead to a 0.98% decrease in gross domestic product per-capita income. The negative relationship between government consumption and economic growth is consistent with other existed literature in Ethiopia (Muhammed & Asfaw, 2014). Ethiopia's government has highly controlled every sector's economic activities and monopolises telecommunication, electricity, postal service, air industry, and the financial industry. Therefore, the source of growth is government-led growth, will not be sustainable in the long-run.

The other explanatory variables in the study's VAR model revealed a positive and significant relationship to Ethiopia's economic growth except for inflation, which is negative and significant. Human capital and political risk in the country has a particular interest and meaningful theoretical

interpretation. Tertiary education has positively and significantly affected the country's economic growth in the long-run and shows the spillover of foreign direct investment on economic development through improvement. Gross fixed capital formation has exerted negative and significant to economic growth. Political stability has attracted foreign direct investment and increases gross-domestic per-capita growth in Ethiopia while creating employment opportunities and backward linkage to raw material producers.

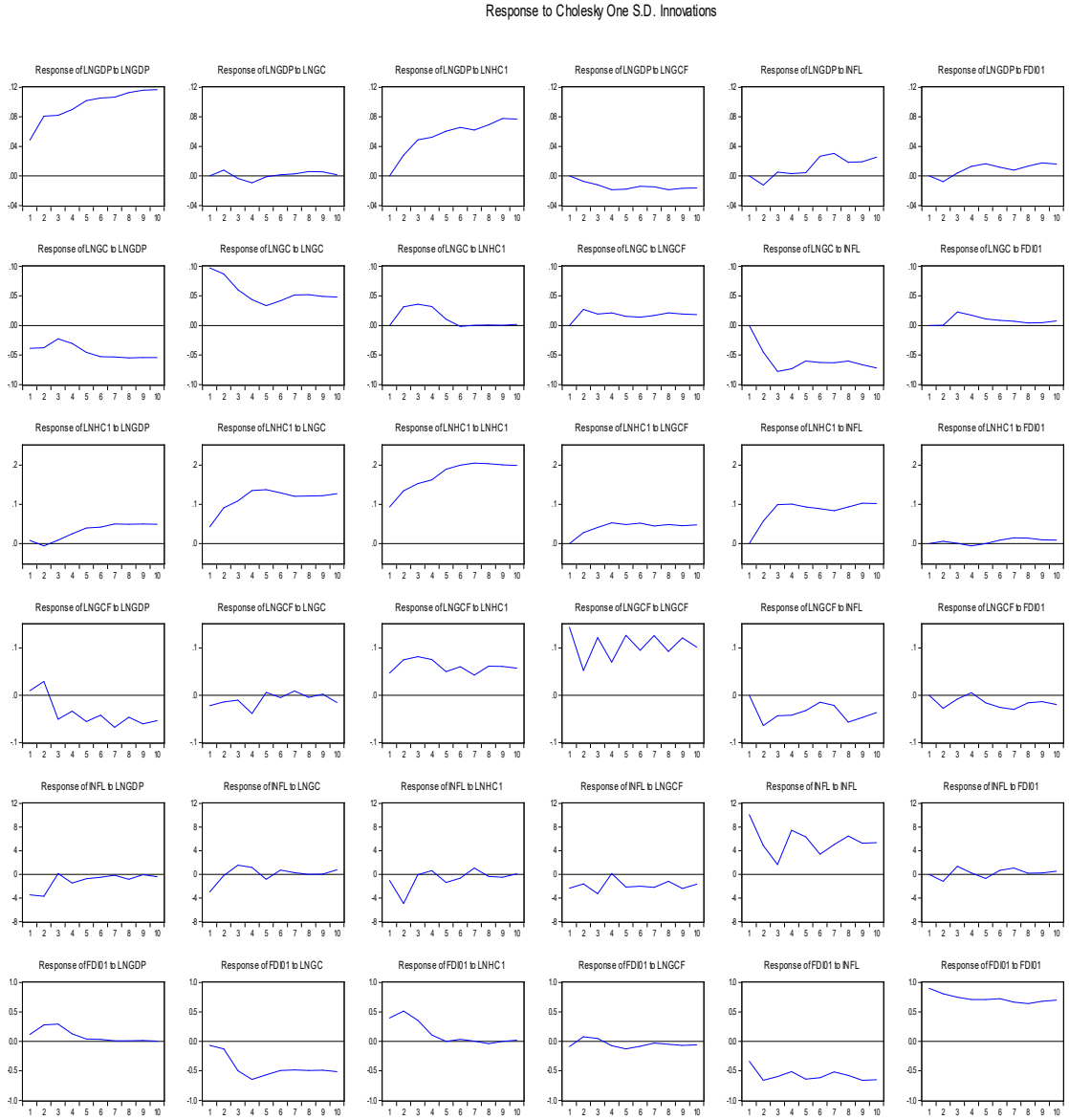
Impulse response function

The impulse response function is any dynamic system's reaction to some external change (Peng & Bao, 2006). The impulse response function used to evaluate a policy change's effectiveness says increasing a rediscount rate. The impulse response function's primary purpose is to know each variable's shock against other variables and their relationship. In this paper, the results of the impulse response function are shown in Figure 1 below.

The impulse response function (IRF) estimation results can see by employing the shock of each variable's standard deviation value. The lngdp response to lngdp shows positive results in the whole period, but the reaction of lngdp to lngc fluctuates, starts positively in the first two and half years then declines into negative. Implying that government consumption has positively impacted growth for the short-run period, but it turns into negative before returns to zero in the long-run. The impulse response of lngdp to fdi01 shows positive results in the whole period. The reaction of lngdp to human capital is positive and continuously increasing, which shows the channel that human capital contributes to Ethiopia's growth rate. The impulse response of lngdp to infl starts a negative for the first three years and becomes positive then. The positive sign of inflation on economic growth implies macroeconomic instability in recent years. Finally, the impulse response of lngdp to lngcf shows a negative for the entire forecast period.

On the other hand, the impulse response of fdi01 to lngd shows a positive in the whole period. The reaction of fdi01 to lngc revealed a negative for the entire forecast period. Implying that government consumption, in general, distorts foreign investment, this may be the low institutional quality or tax administration system, red tape, and other governmental activities. The impulse response of fdi01 to lnhci, infl, and lngcf have responded differently. Human capital has decreased and derailed in the tenth year; inflation shows a negative, and lngcf is oscillating from positive to negative.

Figure 1. Impulse response function



Source: Authors' computation

Conclusion

FDI has become an alternative source of economic growth in developing countries. The knowledge split-over of FDI has boasted human development and living standard in Ethiopia. This study used data from 1981 to 2017, obtained from World Development Indicators (WB), IMF, and the Ministry of Finance and Economic Development in Ethiopia. The result shows the long-run relationship between FDI and economic growth, adopting the VAR model and Johansen multivariate to cointegration test. Findings indicated a positive and statistically significant relationship existed between FDI and economic development in the long-run. Gross fixed capital formation, and government consumption has negatively and significantly impacted long-run economic growth in Ethiopia. It implies misalignment for utilising domestic investment, mainly in infrastructure and public investment, financing through debt and grants. Lack of prioritisation and poor budgeting execution have negatively affected the growth rate. Macroeconomic stability and human capital contribute to FDI economic growth in the long-run. The short-run relationship between economic growth and controlled variables is positive and statistically significant.

There is no causal relationship between economic growth and FDI. It implied the sectoral concentration of FDI, employment creation, and spillover of knowledge and skills into domestic firms. FDI in Ethiopia is recent and specific to the manufacturing sector, contributing the smallest to economic growth. The major drivers of economic growth in this model are human capital and macroeconomic stability. Government consumption is the leading cause of the following in the FDI in Ethiopia.

The impulse response function confirmed that FDI's shock against economic growth is positive for the whole period. It has established the long-run relationship between economic growth and FDI in Ethiopia. Growth's response to government consumption shows high fluctuation from positives in the first year to negative in the second to the fourth year.

Policy implied that FDI to reach the threshold to affect economic growth significantly, it should widely open the economy and liberalise the critical economic sectors. The government's sole responsibility for economic development will bring fiscal pressure that would not sustain economic growth; therefore, further economic liberalisation will support the government's effort to reduce poverty. Strengthening technical and tertiary education could boast the following of FDI in the country.

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