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The Impact of Foreign Direct Investment on Economic Growth. The case of Ethiopia

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Abstract
This study examines the impact of foreign direct investment on economic growth of Ethiopia using yearly time-series data for 1974 through 2013. Economic growth is proxies by real per capita gross domestic product and foreign direct investment proxies by the inflow of foreign direct investment. Other control variables such as gross domestic saving, trade, government consumption and inflation have been incorporated. In order to fully account for feedbacks, a vector autoregressive model is utilized. The results show that there is a stable, long-run relationship between foreign direct investment and economic growth. The variance decomposition results show that the main sources of Ethiopia economic growth variations are due largely own shocks. The pair-wise Granger causality result show that there is a unidirectional causality that run from FDI to economic growth of Ethiopia. Hence, the researcher therefore recommend that, FDI facilitate economic growth, so the government has to exert much effort in order to attract more FDI into the country.
Keywords: Real per capita GDP, FDI, Co-integration, VECM, Granger causality.

1 Introduction

Foreign Direct investment(FDI) is an increasingly important channel for resource flows between the industrial and developing countries. Several real and potential benefits discernible from these flows that include technological spillovers, job creation, improved managerial skills and productivity(Blomstrm and Kokko, 1997). Given the capital deficient nature of least developed countries and the benefits accruable from these activities, FDI is essential for growth and development.

Considering the benefits of FDI for growth and development, most African countries have undertaken varies policy reforms to create conducive investment environment in order to attract a considerable amount of FDI. According to OECD, the policy frameworks for FDI of Africa countries on average are not restrictive than other developing countries (OECD, 2005). However, although the African continent has made notable efforts to attract FDI, the inflows of FDI are very small compared to other developing nations. For instance, among the FDI inflows to developing countries between the periods 2005 to 2010, African share was only around ten percent and also characterized by uneven distribution among countries in the region (UNCTAD, 2011).

In order to supplement the gap between saving and investment, the Ethiopian government did a lot so far by identifying a number of economic sectors as priority FDI areas and also has made a broad range of policy reforms in order to create conducive investment environment in the country. By doing so, the FDI that are coming into the country has shown an improvement from year to year. However, there are contrasting views about the benefits of FDI to the host country. On one hand, there is an argument that the benefits derived from FDI to recipient countries can only be realized when the host countries reached a certain level of development and sufficient absorptive of advanced technologies that FDI brings is available in the host country. On the other hand, some argue that although FDI has a positive impact on economic growth, the size of its impact may vary from country to country and from economy to economy depending on, for instance the level of human capital, domestic investment, infrastructure, macroeconomic stability and investment policies(Beatrice and Mansur, 2010). Therefore, this study tried to investigate the impact of foreign direct investment (FDI) on economic growth of Ethiopia in concurrence of four other core macroeconomic variables that include domestic investment, Inflation, government consumption and trade.

2 Foreign Direct Investment in Ethiopia

The figure (1) depicts the FDI trend of Ethiopia from 2004 to 2013. Although FDI has shown an increasing trend over the last ten years, still the country economy is young with a vast untapped resources and a range of investment opportunities for foreign direct investments. The country has comparative advantages in agriculture, agro-processing, leather and leather products and, textile and garments.

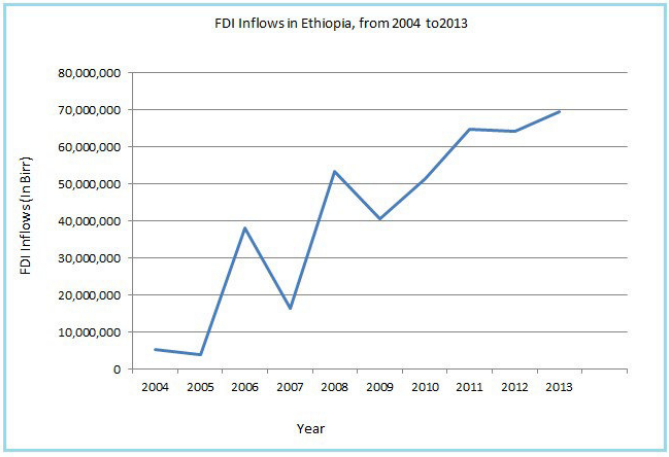

Figure 1: FDI inflows in Ethiopia, from 2004 to 2013

2.1 Sectoral Distributions of FDI

In Ethiopia foreign investors are encouraged to invest in all economic sectors except those currently reserved for domestic private and state investment, with the domestic private investor category including foreign nationals who are permanent residents in Ethiopia. However, the prioritize area of investment open for private investors are in the area of manufacturing sector, agricultural sectors, mining, tourism and health sector.

The distributions of FDI among major economic sectors of the country: agriculture, manufacturing & mining, and service sectors, where agriculture includes all kinds of agriculture related activities, manufacturing sector includes all types of industries and the service sector includes all kinds of service provided. The agriculture sector accounted for about 24 percent of total FDI inflows to Ethiopia in2013. The manufacturing and mining sector together accounted for around 50.22 percent while service sector accounted for about around 25.36 percent as depicted in the figure (2).

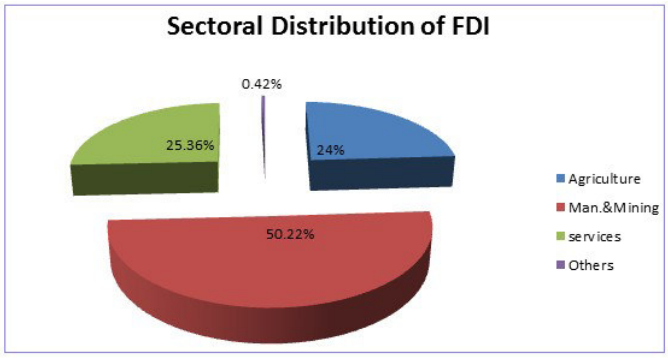

Figure 2: Sectoral Distribution of FDI, 2012/13

2.2 Regional Distribution of FDI

The current government of Ethiopia (i.e. EPRDF) is organized into nine region(i.e. Amhara, Afar, Benishangule Gumuz, Gambella, Harari, Oromia, SNNPR, Somali, Tigray) and two city administrations(Addis Ababa and Dire Dawa). FDI is very much unevenly distributed across the region. Majority of the FDI is taken by Oromia region followed by the Capital city Addis Ababa. Out of the total inflows of FDI into the country from 1992 to 2013, Oromia has taken 35.04%, Addis Ababa 31.4% and Amhara 13.47%. Other regions like Afar, Benshangul Gumuze, Gambella Harari Somali, and Tigray were able to attract very few and insignificant amount. This happened may be due to distance from the capital city and/or due to the shortage of infrastructures like road in these region.

The figure (3) demonstrate the distribution of foreign direct investment across the region and two city administrations from August 22, 1992 to March 26, 2014 based on data obtained from Ethiopian Investment Agency(EIA).

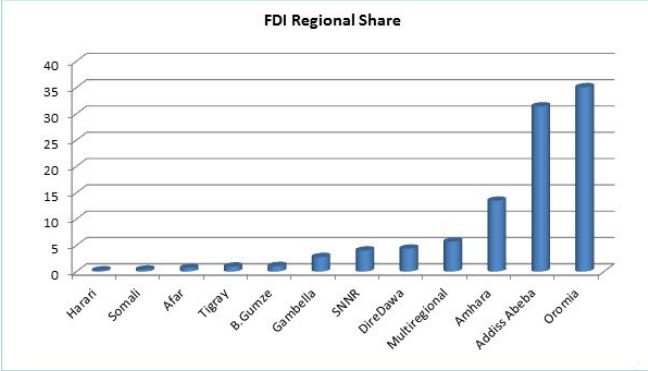

Figure 3: FDI Regional Distribution

2.3 FDI Inflows by Countries of Origin

The major FDI source countries to Ethiopia are: Turkey, India, China, Sudan, Saudi Arabia, USA, and Germany to list some of them and as shown in the figure (4). FDI inflows to the country in the year 2011/12, was hugely dominated by two countries: Turkey and India. Contrary to what many people might think, Turkey and India took 58.75 per cent of the total FDI capital registered in the specified fiscal year. If we see the data of only the top 10 countries in their total capital FDI inflows, the two countries contribution is more than 81 per cent. Though the Ethiopian Investment Agency should be credited for facilitating the Turkish and Indian investment to grow, the need to diversify sources of FDI is equally important. Huge dependency on few countries will create its own problem in the long-run.

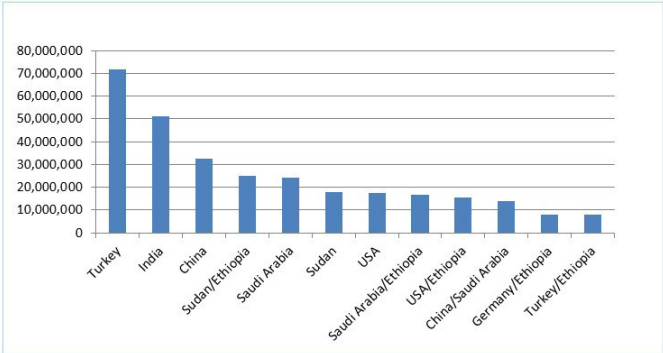

Figure 4: Top 12 FDI Inflows by Countries of Origin

3 Foreign Direct Investment and Economic Growth: Theory and Empirics

Foreign direct investment can be distinguished as market seeking and resource seeking. Market seeking purpose of FDI is to ensure access to market for their products and services in the destination countries while resource seeking FDI is made to ensure more reliable supplies of natural resources(Scholars such as Jones,1998). However, the contribution of FDI to economic growth is debatable. Neoclassical economists (such as Solow) argue that, FDI will only be growth advancing if it affects technology positively and permanently. Accordingly, they argue that FDI affects economic growth in the short term, on condition that the decrease in marginal productivity of capital, the host economy converges to steady state and FDI had no permanent impact on economic growth of the host economy. Contrary to the neo- classical economists, the endogenous growth model argue that FDI is considered to be an important sources of human capital, technological diffusion, new management practices, marketing knowledge and organization which can affects growth endogenously. The new growth theory also highlights that it is the knowledge transfer through FDI to the developing countries that are important. The theoretical link between FDI and economic growth can be also found in modernization and dependency theory. According to modernization theory, FDI could serve as an engine to economic growth by contributing to capital accumulation and by increasing total factor productivity (Mamun and Nath, 2005). Quite the opposite, the dependency theory suggests that if a nation depends on foreign investment, then its economic growth would face a negative impact. This is because FDI creates monopolies in the industrial sector, which consequently results in under-utilization of domestic re- sources (Adams, 2009). Consequently lead to an implication that the economy is mainly dominated by foreign investors and does not experience growth. Therefore, the multiplier effect is weak and leads to stagnant growth in developing countries.

3.1 Foreign Direct Investment and Economic Growth: Empirical Evidence

A number of empirical studies have been carried out on the relationship between FDI and economic growth across different parts of the World with different methodological frameworks. Many empirical studies used time series method while some other used a cross-country approach to study the relationship between the variables. Most studies focused strictly on the relationship between FDI and economic growth while others added additional variables in concurrence such as human capital or labor, exports, technology gap, financial development, exchange rate, expenditure, education, economic freedom and so forth. Majority of the literature used foreign direct inflows as a proxy variable for foreign direct investment and real per capita as a measure of economic growth to test the hypothesis of positive relationship between foreign direct investment and economic growth. Most of the empirical results reported have supported the proposition that foreign direct investment do indeed stimulate economic growth and development.

Among the more important time series studies, the following studies may be mentioned: Mori Kogid et.al(2010), Louzi et.al(2010), P.P.Awasantha (2003), Oyatoye et.al (2011), Najia Saqib et.al(2013), Soltani Hassen and Ochianis(2012), Kyuntae Kim and Hokyung Bang(2008), Sarbapriya Ray(2012),and Getinet and Hirut(2005). Mori Kogid et.al(2010) investigated the empirical relationship between economic growth and foreign direct investment for Malaysia using secondary time series data that cover the period from 1971 to 2009. The study considered FDI net inflows as an indicator for FDI and real Gross Domestic Product (RGDP) as indicator to economic growth. The methodology used is time series vector autoregressive model. The study result shows, the existence of long-run co-integration relationship between FDI and real gross domestic product (RGDP). In addition, they investigated the causality analysis based on Granger causality and found a causal effect exists running from FDI to RGDP, implying that FDI does influence economic growth.

Egwaikhide Christian Imoudu (2011) investigated the impact of foreign direct investment on Nigeria's economic growth using a time series data running from 1980 to 2009. The study applied Johansen Cointegration technique and Vector Error Correction methodology in which FDI is disaggregated in to various components namely: agriculture, mining, manufacturing and petroleum, and telecom sectors. The re- searcher concluded that the impact of the disaggregated FDI on economic growth of Nigeria are very little with the exception of the telecoms sector which had a good and promising future especially in the long-run.

Kyuntae Kim and Hokyung Bang (2008) investigated the impact of foreign direct in- vestment on economic growth of Ireland. The study applied bound testing approach to cointegration for the data covered the period from 1975 to 2006. The result indicate that foreign capital (FDI) is statistically significant in both the long-run and the short-run having positive effects on economic growth in Ireland. The causality analysis also suggests that, there is a bi-directional Granger causality between GDP and FDI, and thus , conclude that the FDI-led growth hypothesis is valid for the Irish economy.

Soltani Hassen and Ochianis (2012) analyzed the relationship between foreign direct investment and economic growth in Tunisia using a cointegration approach. A time series analysis over the period 1975 to 2009 is used for the analysis using a

cointegration Error Correction Model. The research result suggests that FDI could help boost the process of long-term economic growth. Among the important cross-country studies, we may mention those under taken by: E.Borenszteina et.al(1997), Shiva S.Makki(the World Bank), B.Seetanah and A.J.Khadaro.

B.Seetanah and A.J.Khadaro analyzed the relationship between foreign direct investment and growth: new evidences from Sub-Saharan Africa countries. The paper investigated the impact of foreign direct investment on economic growth for a panel of 39 Sub-Saharan African countries for the period 1980 – 2000. Results from the analysis suggest that FDI is an important element in explaining economic performance of Sub-Saharan African countries, though to a lesser extent as compared to the other types of capital. Moreover, the study confirms the presence of important endogeniety in FDI growth relationship as FDI is not only seen to lead growth but to follow growth as well.

Shiva S.Makki (the World Bank) investigated the impact of foreign direct investment and trade on economic growth based on cross-sectional data of a sample of 66 developing countries over three decades. The result indicates that FDI interacts positively with trade and stimulates domestic investment. Sound macroeconomic policies and institutional stability are necessary pre-conditions for FDI -driven growth to materialize.

E.Borenszteina et.al(1997) analyzed how foreign direct investment affect economic growth in a cross-country regression framework, utilizing data on FDI flows from industrial countries to 69 developing countries over the last two decades. The study result suggests that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment. However, the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. And concluded that FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host country.

To summarize, there have been various empirical evidences that investigated the impact of foreign direct investment on economic growth and shows mixed finding. For instance, the study by Baharumshah and Thanoon, 2006; Mithani et.al, 2008) shows that FDI has a positive impact on economic growth of a host country but the size of its impact may vary from country to country depending on for instance the level of human capita, domestic investment, infrastructure, macroeconomic stability and investment policy. Beatrice and Mansur (2010) also recognized that the benefits derived from foreign direct investment to recipient countries can only be realized when those countries have reached a certain level of development. Furthermore, some views belief that it is not the FDI only that directly promote economic growth but its interaction with, for instance, human capital, technology and infrastructure. For instance, the study by (such as Li and Liu, 2005, Vu and Noy 2009) found that FDI with human capital has a strong positive effect on economic growth but FDI with technology gap has a significant negative impact. Despite these some empirical studies found a negative impact of FDI on economic growth.

4 Methodology

The selected method for the purpose of analyzing the data is multivariate time series Vector Auto-Regressive (VAR) model. VAR model is selected because it is the most successful, flexible and easy model for the analysis of multivariate time series. VAR model does not require differentiating the variables as endogenous or exogenous. 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 VAR model continues to receive interest. Vector Auto-Regression is an econometric model used to capture the linear inter- dependencies among multiple time series. It generalizes the univariate

Auto Regression (AR) models by allowing more than one evolving variable. A VAR model describes the evolution of a set of k variables (endogenous variables) over the same sample period as a linear combination of their past values.

Let $Yt = (Y1,t , Y2,t , Y3,t , ..., Yk,t)t$ denotes a $k \times 1$ random vector of time series variables.

A VAR model with p-lag, denoted VAR (p), is given in the form:

$$Yt = v + A1Yt-1 + A2Yt-2 + ... + Ap\, Yt-p + \varepsilon t \qquad (1)$$

Where the i-periods back observation $Yt-i$ is called the i-lag of Y, v is a $k \times 1$ vector of constants(called intercepts), Ai is the time invariant $k \times k$ matrix, $t = 1, 2, ..., T$, and $\varepsilon t = (\varepsilon 1t , ..., \varepsilon kt)t$ is a $k \times 1$ white noise or error term satisfying the following properties.

- Every error term has a mean of zero ($E(\varepsilon_t) = 0$) and independent white noise process with time invariant.
- Positive definite Covariance Matrix ($E(\varepsilon_t \varepsilon_t')$ = Ω, where Ω is $k \times k$).
- $E(\varepsilon_t \varepsilon_{t-k}) = 0$ for any non-zero k, meaning that there is no correlation among the errors across time , in particular, no serial correlation in individual error terms.

4.1 Data

This study is based on secondary data. Data on real per capita gross domestic product, foreign direct investment, gross domestic saving, government consumption, GDP deflator, and trade were collected from Ethiopia Ministry of Finance and Economics Development(MoFED), Ethiopian Investment Agency(EIA), National Bank of Ethiopia(NBE), and Central Statistical agency(CSA). The study is based on annual time series data observed from 1974/75 to 2012/13. The base year for the measurement of real per capita GDP used is 1999/2000 and the unit of measurement is birr, which is the Ethiopian currency. The study covers 39 years data. The software programs used for analysis where STATA and EVIEWS.

4.2 Specification of the Model

Following the augmented Solow production function(Mankiw, 1992) and empirical literature(such as Egwaikhide Christian Imoudu, (2012), etc.), let a country's production function can be represented by the function:

$$Y = f (A, L, K) \qquad (2)$$

where Y denotes output (or gross domestic product), L denotes labor force, K de- notes capital and A denotes total factor productivity, which explains the output growth that is not accounted for by the growth in factors of production specified. Assuming that the capital stock consists of two components: domestic owned capital measured by Gross Domestic Investment (GDS) and foreign owned capital measured by Foreign Direct Investment (FDI).

$$K = GDS + F DI \qquad (3)$$

Adopting a production function that make output a function of labor, capital (where capital is specified as domestic and foreign owned capital separately), trade deficit, inflation and government consumption, we can

have a function:

$$Y = F(A, L, GDS, F DI, I N F, T R, GCons) \quad (4)$$

where T R denotes trade deficit, GCons denotes government consumption and I NF denotes inflation. Assuming that the relation follows a simple Cobb-Douglas type production function, we can write the model as 1

$$RPGDP = A_t GDS_t AFDI_t AINF_t ATR_t AGCons_t \quad (5)$$

where output(Y) is measured by real per capita Gross Domestic Product (RPGDP)
and the subscript t represents respective variables at time t.
After taking the natural logs of equation (5) both sides an explicit estimable function is specified as follows:

$$LnRPGDPt = \beta 0 + \beta 1\ lnGDSt + \beta 2\ lnF\ DI\ t + \beta 3 lnI\ N\ F\ t + \beta 4 lnT\ RT + \beta 5 lnGConst + \varepsilon t \quad (6)$$

where β1, β2 , β3 ,β4 and β5 are constant elasticity coefficient of output with respect to GDSt , F DI t , I N F t , T Rt and GConst respectively, β0 is a constant parameter and t is the white noise error term. The effects of the independent variables on the dependent variable (lnRPGDP) are expressed via coefficient estimate, their sign and statistical significance. The variables of interest in the given model are lnRPGDPt and lnFDIt.

5 Econometric Results

5.1 Summary of Descriptive Statistics Results

Table 1 below presents the summary statistics of the variables under study. From the table for instance, we can see that, in the study period the average value of real per capita gross domestic product is around 1252 birr and it has a minimum value of around 762 birr in the year 1984/85 and has an ever maximum value of 2322.58 birr that occur in the year 2012/13 while the average share of Foreign Direct Investment (FDI) to Gross Domestic Product is around 2.37 and it has an ever maximum value of around 11.8 in the year 2010/11.

1 Here I dropped the variable L(labor) from the model because it is implicitly incorporated in the dependent variable real per capita GDP(RPGDP)

Table 1: Summary Statistics of the Variables

Variable	Mean	St.Dev.	Min.	Max
RPGDP	1251.955	378.6953	762.2457	2322.58
FDI% GDP	2.37359	3.144543	0	11.8
GDS % GDP	6.559055	4.562892	1.356787	17.3
TR %GDP	0.15199	0.2006	0.0027	0.748268
INF	98.47986	74.9149	27.68955	314.03
GCons %GDP	13.37949	3.23941	8	19.4

(Source: Own computations based on the available data)

5.2 Unit Root Test Results

The result of the Augmented Dickey Fuller test is summarized in table 2. We can understand from the table that all variables are non-stationary at level with only intercept included, and with both intercept and trend included at 5% level of significance except Gross Domestic Saving (GDS) which is stationary at level with both intercept and trend included at 5% level of significance.

Table 2: The Results of ADF Test at Level

Variable	Intercept only		Intercept & Trend	
	ADF Statistic	P-value	ADF Statistic	P-value
lnRPGDP	0.634	0.9884	-0.703	0.9730
lnFDI lnGDS lnTR	-0.815	0.8148	-3.275	0.0704
lnINF lnGCons	-1.640	0.4621	-4.861	0.0004
	-0.503	0.8914	-2.765	0.2099
	0.924	0.9934	-1.102	0.9288
	-2.073	0.2555	-2.154	0.5160
Crit. Value (5%)	-2.964		-3.548	

The analysis of unit root test continued with the first, second and so forth differences of the series until the null hypothesis of unit root is rejected and obtained a stationarity in the series. As summarized in the table (7) both the ADF and PP test illustrates the stationarity of the variables at level with only intercept included at 5% level of significance.

Table 3: The Results of ADF and PP Test at First Difference

Variable	Intercept only		Phillips-Perron(PP)		Remark
	ADF Statistic	P-value	PP statistics	P-value	
D(lnRPGDP)	-4.760	0.0001	-4.745	0.0001	Stationary
D(lnFDI) D(lnGDS)	-6.620	0.0000	-7.090	0.0000	Stationary
D(lnTR) D(lnINF)	-9.183	0.0000	-9.864	0.0000	Stationary
D(GCons)	-5.940	0.0000	-6.201	0.0000	Stationary
	-4.831	0.0000	-4.824	0.0000	Stationary
	-3.907	0.0020	-3.716	0.0039	Stationary
Crti. Val (5%)	-2.966		-2.966		

5.3 Johansen Co-integration Test Results

5.3.1 Estimating the Optimal Order

The Johansen co-integration test results are highly sensitive to the number of lags included for the endogenous variables in the VAR model. Therefore, the determination of an optimal lag order prior to the test of co-integration test is required. The criteria used in practice for lag order selection are Likelihood Ratio test statistics [LR], the Final Prediction Error [FPE], Akaike Information Criterion (AIC), Hannan-Quinn Criterion (HQC) and Schwarz Criterion (SC). The best fitting model is the one that minimize LR or FPE or AIC or SC or HQC. All the five lag length selection criteria are just different in striking a problem. The model with the smallest value is considered most desirable. The result of the optimal lag order selection criteria is summarized in table (4). According to the result given in the table (4) all lag selection criteria chooses an optimal lag of one at 5% level of significance.

Table 4: Lag Order Selection for the VAR Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-67.07036	NA	2.33e-06	4.059465	4.323384	4.151580
1	108.8405	283.4119*	1.01e-09*	-3.713361*	-1.865922*	-3.068555*
2	141.9400	42.29387	1.42e-09	-3.552225	-0.121267	-2.354729
3	180.6528	36.56205	2.02e-09	-3.702934	1.311543	-1.952747

Note: * Denotes the order selected by the criteria

5.3.2 Cointegration Test

Johansen co-integration test is implemented using the two likelihood ratio tests namely: trace test and maximum eigenvalue test. Both tests are conducted successively step by steps. First, the null hypothesis of zero co-integration or no relationship among variables against the alternative hypothesis of the presence of one or more co-integration among variables is tested. If we fail to accept the null hypothesis, we continue to test the null hypothesis of one cointegration against the alternative hypothesis of presence of two or more cointegrating vectors. The process continues until we get a cointegration among the variables. There is cointegration means that, there is long run association among variables.

Results of trace and maximum eigenvalue test are reported in table (5). According to the result reported in the table, we can understand that the number of cointegration reported by both trace statistic and maximum eigenvalue statistic is one.

Table 5: Cointegration Test using Trace and Max Eigenvalue statistic

Hy.Co	Eigenval	Trace Statistic		Max Eigenvalue Statistic	
		t-Statistic	Crti.value	t-statistics	Crti-value
None*	NA	98.4421	94.15	41.7762	39.37
At most 1	0.66692	56.6659	68.52	25.8993	33.46
At most 2	0.49417	30.7666	47.21	16.4180	27.07
At most 3	0.35082	14.3486	29.68	8.9045	20.97
At most 4	0.20890	5.4441	15.41	4.3471	14.07
At most 5	0.10810	1.0970	3.76	1.0970	3.76

Both tests indicate 1 cointegrating equation at the 0.05 level.

* Denotes rejection of the hypothesis at the 0.05 level

5.4 Long-Run Relationships and Short-Run Dynamics

5.4.1 Long-Run Relationships

Since there exist a cointegration among our variables, we can run a vector error correction model. By running VECM we can get information about the long-run as well as the short-run relationship among our co-integrated variables. The result of the long-run relationships among the variables is given below in table (6).

Table 6: VEC Estimates for Long-Run Model
(Dependent Variable: lnRPGDP)

Variables.	Coefficients	Standard Error	t-statistics
lnRPGDP	1.0000		
lnFDI	-0.857	(0.24042)	[-3.56666]
lnGDS	-1.073	(0.48876)	[-2.19564]
lnTR	1.755	(0.31999)	[5.48373]
lnINF	-2.865	(0.91104)	[-3.14538]
lnGCons	-3.047	(0.71131)	[-4.28408]
C	20.52		

Looking at the t-statistics we would see that all coefficients are statistically significant as ($|t| > 1.96$). If we denote the stationary series by C T then using the results obtained from the table (6) we have the equation:

$$C\,T = LnRP\,GDP - 0.86LnF\,DIt - 1.07LnGDSt + 1.76LnT\,Rt - 2.87LnI\,N\,Ft - 3.05lnGConst + 20.5 \quad (7)$$

The C T is stationary despite the fact that all the six series are non-stationary. The CT equation (7) shows that, the variables tend to move together in the long run.

$$LnRP\,GDP = -20.5 + 0.86LnF\,DIt + 1.07LnGDSt - 1.76LnT\,Rt + 2.87LnI\,N\,Ft + 3.05lnGConst \quad (8)$$

Equation (8) describes the long run relationship between real per capita Gross Domestic Product and the five variables (i.e., FDI, GDS, TR, INF and GCons). This equation shows that in the long-run, real per capita GDP in Ethiopia can be explained by Foreign Direct Investment(FDI), Gross Domestic Saving(GDS), Trade deficit(TR), GDP Deflator(INF) and Government Consumption(GCons). Short run deviations however could occur due to shocks to any of the variables.

From the equation (8), we can understand that, the long-run impact of foreign direct investment on real per capita gross domestic product is found to be positive and significant. That is, a 1 percentage increase in foreign direct investment will lead to a 0.86 percentage increase in real per capita gross domestic product.

5.4.2 Short-Run Dynamics

Table (7) contains the result of the CointEq1 equation in the error correction model. The short run dynamics are captured through the individual coefficients of the differenced terms. These coefficients are called the adjustment coefficient. The coefficient of the error correction term for the equation is negative as expected but it is not significant at 5% significance level. This tells us that there is a reasonable adjustment towards the long-run steady state. This guarantee that although the actual real per capita gross domestic product may temporarily deviate from its long run equilibrium value, it would gradually converge to its equilibrium. The error correction term −0.014974 shows that about 1.497 percent of the deviation of the actual real per capita GDP from its equilibrium value is eliminated every year.

Table 7: Short run coefficients

Dependent Variable: RPGDP				
Error Correction	Coefficient	Standard Error	t-value	p-value
CointEq1	-0.014974	0.02026	-0.73916	0.4658
D(LnRPGDP(-1))	0.335322	0.18628	1.80008	0.0823
D(LnFDI(-1))	0.008223	0.03678	0.22355	0.8247
D(LnGDS(-1))	-0.011782	0.03377	-0.34892	0.7297
D(LnTR(-1))	0.026490	0.05463	0.48492	0.6314
D(GCons(-1))	-0.060212	0.09884	-0.60916	0.5472
D(LnINF(-1))	0.465821	0.17420	2.67411	0.0122
C	-0.020586	0.01778	-1.15789	0.2564
R-squared	0.312720	Mean	dependent var	0.015222
Adjusted R-squared	0.146825	S.D.	dependent var	0.084756
S.E. of regression	0.078287	Akaike	info criterion	-2.068064
Sum squared resid	0.177736	Schwarz	criterion	-1.719757
Log likelihood	46.25917	Durbin	-Watson stat	2.168401

As can be seen from the above result given in the table 7, FDI is insignificant indicating that it doesn't have a major impact on real per capita GDP in the short run . The gross domestic saving and government consumption have a negative and insignificant coefficients while trade deficit has a positive and insignificant coefficient in the short-run. But GDP deflator has a positive and significant coefficient.

5.5 Pairwise Granger Causality Test Results

In order to determine whether real per capita GDP and FDI affect each other over time, pairwise granger causality tests is performed. The result of pairwise Granger causality test is shown in the table (8). The result illustrates the existence of a unidirectional causality between the variables that runs from foreign direct Investment to real per capita gross domestic product. Implying that FDI does influence economic growth but real per capita gross domestic product doesn't affect foreign direct investment

Table 8: Pairwise Granger causality Wald tests

Null Hypothesis:	F-Statistic	Prob.	Decission
lnFDI does not Granger Cause LnRPGDP	5.66368	0.00784	Reject
LnRPGDP does not Granger Cause LnFDI	0.32008	0.72839	Not-Reject

5.6 Results of Forecast Error Variance Decomposition

Variance decomposition examines how important each component of the shocks is in the overall (unpredictable) variance of each of the variables over time. Table (9) presents the variance decomposition of RPGDP since we are concerned with the impact of FDI to real per capita GDP. We can infer two things from the variance.

Table 9: Variance Decomposition of RPGDP

Period	S.E	RPGDP	FDI	GDS	GD	TB	GCons
3	0.168904	74.85822	0.017190	0.170723	24.65418	0.275507	0.024179
5	0.243052	63.34428	0.019562	0.258692	34.58579	1.292901	0.498782
8	0.326351	59.09542	0.032026	0.318990	37.28799	2.016670	1.248906
10	0.370826	58.13945	0.034700	0.336129	37.90092	2.166212	1.422585

decomposition table (9). That is, the short run and the long run relationship or contributions. We can see that in the short run , for instance in year three, impulse or innovation or shock to real per capita GDP accounts for 74.86 percent variation or fluctuation in real per capita GDP (or own shock). Meaning that the shock in real per capita GDP can cause 74.86 percent variation or fluctuation in real per capita GDP while shock to FDI can cause 0.0172 percent fluctuation in real per capita GDP. In the long run, for instance in the tenth year, the shock to real per capita GDP accounts for 58.12 percent fluctuation in real per capita GDP (own shock) while the shock to FDI can cause 0.0347 percent fluctuation in real per capita GDP. We can see from the table that the forecast error variance of FDI increases throughout the whole forecast period in very small amount. Hence, this implies that FDI has very small impact in the short-run but its impact increases or has a long-run impact on economic growth of Ethiopia.

5.7 Impulse Response Function Analyses

The impulse response function is a shock to a VAR system. It identifies the responsiveness of the dependent variables (endogenous variables) in the VAR system when a shock is put to the error terms. It is also defined as the unit shock applied to each variable in the system and sees its effect on the VAR system. Impulse response function further strength the short run analysis

The result of the impulse response analysis between real per capita GDP and FDI is illustrated in the fig (5) below. From the figure we can see that a positive shock to real per capita GDP results in a positive response of real per capita GDP but a negative response of FDI for the whole forecast period. A positive shock to FDI results in a positive response to itself in the whole forecast period but results in a positive response of real per capita GDP after the fifth year.

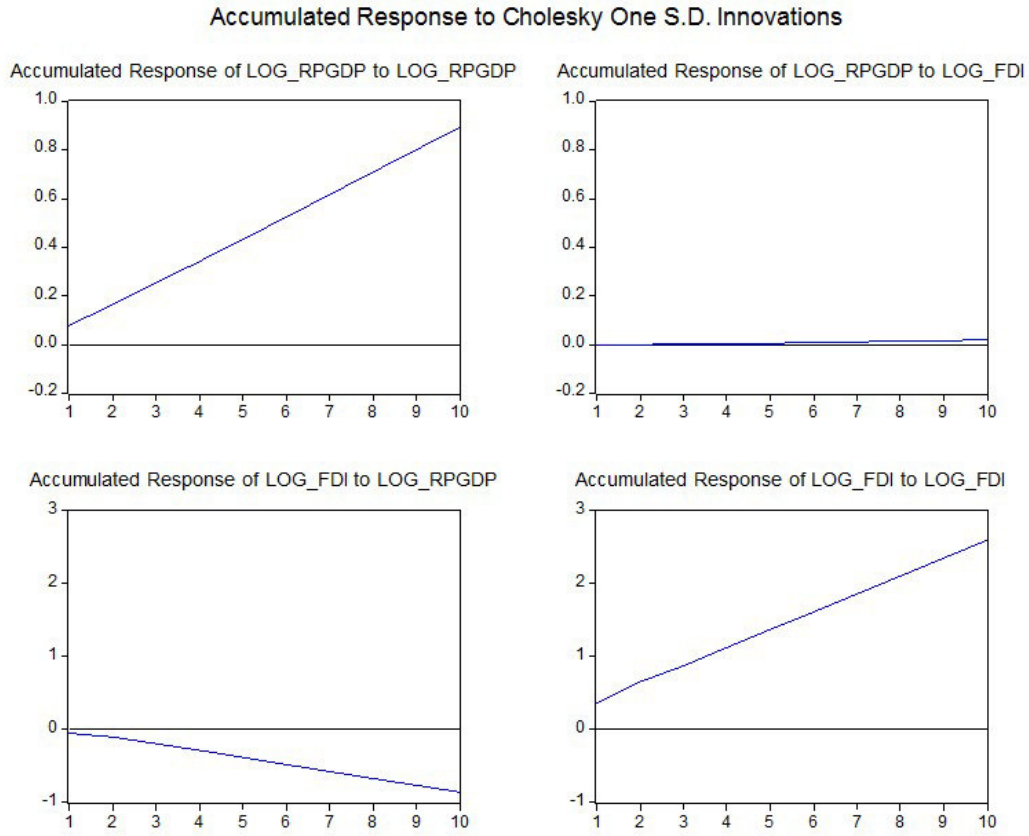

Figure 5: Impulse Response Analysis

5.8 Summary, Conclusion and Policy Recommendations

This study investigates the impact of foreign direct investment on economic growth in Ethiopia using Vector Autoregressive methodology. Four other variables namely: gross domestic saving, trade deficit, government consumption and GDP deflator have been included in as a control variable in concurrence. The results of the unit root tests (using both ADF and PP statistics) showed that all variables are stationary at first difference. The Johansen co-integration test (using trace and maximum eigenvalue statistics) showed that a stable long-run relationship between the variables. The Granger causality tests also showed that there is a unidirectional causality be- tween foreign direct investment and economic growth that run from foreign direct investment to economic growth. Implying that FDI does influence economic growth of Ethiopia.

The short-run analysis of vector error correction model suggested that, in the short- run FDI has an insignificant contribution to economic growth. This result is also supported by the impulse response and variance decomposition analysis. The impulse response analysis suggested that a positive shock to FDI results in a positive response to itself in the whole forecast period but results in a positive response of economic growth only after five years. The variance decomposition analysis also shows that FDI contribute very little to the forecast error variance of economic growth in the short run but its contribution increases somehow in the long-run.

Therefore, the researcher recommends testament policy in favor of foreign direct attraction should be encouraged because foreign direct investment accelerates economic growth.

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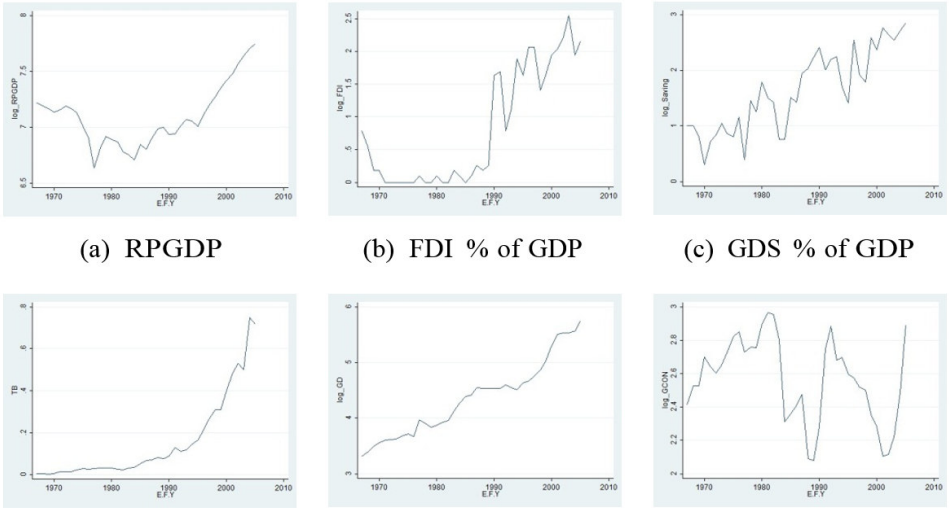
Appendices

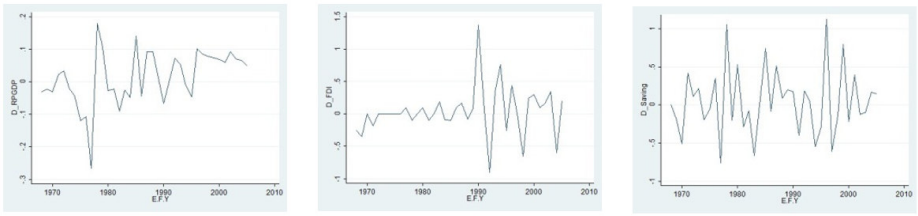
Appendix A: Time Series Plots



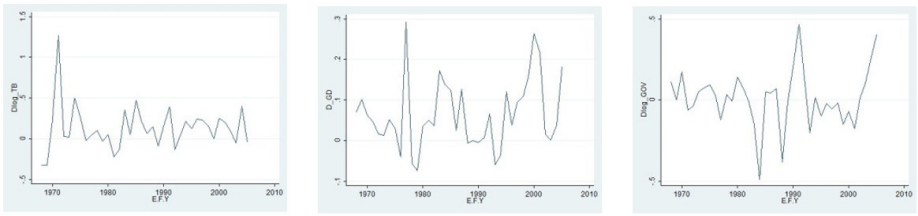
(a) RPGDP (b) FDI % of GDP (c) GDS % of GDP

(d) Trade Deficit (e) GDP Deflator (f) Government Cons

Figure 6: Time series plot of variables under study



(a) Differenced RPGDP (b) Differenced FDI (c) Differenced Saving



(d) Differenced Trade Deficit (e) Differenced GDP Deflator (f) Differenced Government Cons

Figure 7: Time series plot of First Differenced variables under study

Appendix B: Diagnostic Tests

Stability Test

Table 10: Eigenvalue Stability Condition

Eigenvalue	Modulus
1	1
1	1
1	1
1	1
1	1
.173428	.173428

The VECM specification imposes 5 unit moduli.

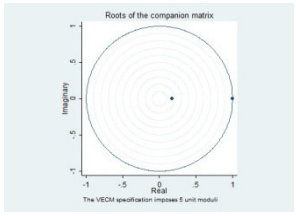


Figure 8: Roots of the characteristics Poly.

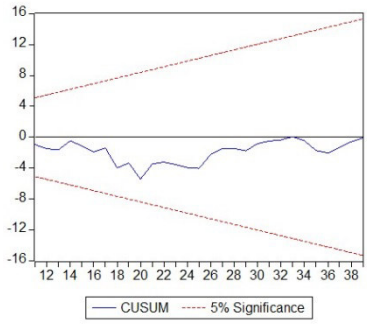


Figure 9: Stability Test graph

Normality Test

Table 11: Test for Residual Normality

Component	Jarque-Bera	df	Prob.
1	2.105635	2	0.3490
2	3.204826	2	0.2014
3	0.569057	2	0.7524
4	4.554362	2	0.1026
5	10.73059	2	0.0047
6	0.643777	2	0.7248
Joint	21.80825	12	0.0397

Autocorrelation Test

Table 12: Residual Autocorrelation Tests

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob	LM-Stat	Prob.
1	12.11539	NA*	12.45193	NA*	35.70821	0.4824
2	42.3630	0.2155	44.42802	0.1581	30.75526	0.7161
3	76.11175	0.3477	81.15456	0.2154	39.90935	0.3005
4	107.2323	0.5028	116.0473	0.2811	31.02196	0.7042

*The test is valid only for lags larger than the VAR lag order

Hetroskedasticity Test

Table 13: Joint test

Chi-sq.	df	Prob
307.6976	294	0.2797

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