The Determinants of External Indebtedness of Ethiopia: An Econometric Analysis Using Johansen Co-Integration Approach

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The concern about determinants of external debt has attracted significant interest from researchers and decision makers in both developing and developed countries. Even though Ethiopia is one of the Heavily Indebted Poor Countries (HIPC), there is a lack of country-relevant empirical studies. Therefore, this study examined the determinants of external indebtedness of Ethiopia. The results show that current account deficit, fiscal deficit, capital flight, debt service and the interest rate all contributed to external indebtedness. However, appreciation of the terms of trade is negatively and significantly affects the external indebtedness of Ethiopia. Furthermore, the study recommends that Ethiopia should apply appropriate fiscal policies, monetary policies, supply side policies, while creating a conducive political, social, and economic environment remains essential.

Keywords: Determinants, External Indebtedness, Johansen cointegration, Ethiopia

1. Introduction

The goal of any country is to attain rapid and sustainable economic growth. However, the African economic growth problem can be a composite of interrelated factors of both an internal and external nature (WB 1994). These factors are responsible for the African debt crisis.

The causes of the external indebtedness of developing countries have generated debates in academic circles, policymakers, and in the broader international community from the beginning of the debt crisis in August 1982 (Menbere 2004). Different authors as cited by Ajayi (1991) have emphasized various aspects of the causes for the external debt crisis. For example, Cline (1985) focuses on global macroeconomic considerations in the case of developing countries. Sachs (1984), however, stresses not only the global shocks but also country-specific factors, and Greene (1989) combines both the external and internal elements in his description of the causes of Sub Saharan Africa (SSA) debt.

Africa's external debt, between 1970 and 1999 and especially on June 1998, exploded to unsustainable levels. Starting with just US$ 11 billion, it rose to over US$ 120 billion during the oil shocks of the early 1980s. The debt situation worsened in the 1980s and early 1990s when Structural Adjustment Programs (SAP) were introduced. The year before the launching of the HIPC initiative, the debt stock reached a peak of about US$ 340 billion. During the 1970s Africa's average external debt stood at US$ 39 billion, but it exploded to more than US$317 billion by the late 1990s (UN 2004). Even during the early 2000s average external debt was US$ 298 billion. Currently, according to the UN (2016) report, between 2011 and 2013 the annual average foreign debt stock of Africa amounted to US$443 billion.

Ethiopia is one of the HIPC (IMF 2015). The size of external debt profoundly increased after 1975. It was US$ 371 million during 1975 (Teklu 2000). Besides, on average, it rose to more than thirteen times that between 1980 and 1990 and reached US$ 5,172 million. Surprisingly, due to the current government coming to power in May 1991 and a fragile macroeconomic environment, the external debt of Ethiopia also rose in the 1990s, showing an average of US$ 9,814 million between 1991 and 1997 (WB 1999). Currently, according to Africa Zeal (2017), in Ethiopia the magnitude of external debt as well as per capita debt is increasing continuously.

Currently, in both developed and developing countries, the issue of the causes of foreign debt has attracted great interest among researchers, but there is a lack of country-relevant empirical studies in the case of Ethiopia – even though the state is one of the HIPC. This has resulted in a knowledge gap in the literature, thus necessitating the need for a systematic examination. Moreover, the sources of debt accumulation differ from one developing country to another. Thus, identifying the primary sources of external indebtedness of Ethiopia requires a precise empirical analysis. Hence, the primary objective of the study is to examine the determinants of external indebtedness of Ethiopia from 1981–2012 using Johansen co-integration approach.

The study is organized as follows: The next part presents the theoretical and empirical literature. The third section offers the methodology and estimation techniques of the research. The fourth section displays the trend and growth of external debt. The fifth part examines and discusses the empirical findings, and the final part presents the conclusion of the study, as well as policy recommendations and suggestions for future research.

2.   Literature Review

In this section, both theoretical and empirical literature are discussed in detail. Under theoretical literature, different theories are discussed that explain the causes of external debt of a given country or group of countries. Besides that, different empirical studies are presented in the empirical literature which describe the determinants of external debt.

2.1. Theoretical Literature Reviews

In this s literature dealing with determinants of external indebtedness is presented. Generally, both domestic as well as external causes of external indebtedness of developing countries and Sub Sahara Africa (SSA) countries are presented. Since Ethiopia is one of developing countries and SSA countries, we used theories of developing countries and SSA countries as a benchmark for the case of Ethiopia.

The debt accumulation of African nations attributed to several factors ranging from home policies to external shocks (Ajayi 1991, Edo 2002, Habimana 2005). According to Edo (2002), the tendency of most governments to develop an over-ambitious plan, without having enough domestic resources to speed up the process of growth and development, is one factor which has led to massive external borrowing. The borrowing, which used to be done on international capital markets, where interest rates were low at that time, expanded in value because of rising interest rates. The

second domestic factor is the fiscal irresponsibility of these countries. They incurred massive and rising budget deficits which had to be covered by domestic and foreign borrowing. Another internal aspect is the over-valuation of local currency, which encouraged the importation of goods and services but hampered exporting. The sizeable current account deficits ensuing from trade deficits have been financed via borrowing from foreign banks on a short-term and medium-term basis. Moreover, the external factors which aggravated the debt problem include oil price shocks, deterioration of terms of trade and rising interest rates in international capital.

Furthermore, according to Habimana (2005), the factors behind the increase in the external debt burden in most of the crisis countries are different and interrelated. The combination of both internal and external factors, which led to the rise in the debt are unfavorable terms of trade, adverse weather conditions, non-concessional lending and refinancing policies (terms and conditions) of creditors, high-interest rates, inadequate debt management reflected in abandoned borrowing at unfavorable terms, civil war and social strife (Menbere 2004, Habimana 2005).

While all sources are closely linked, the reasons of the external debt accumulation fall into two categories: the domestic factors (usually merged under the general term of poor performance of macroeconomic policy), and the external factors. The division of the reasons into these two substantial sections is, however, not justified. Indeed, external factors significantly influence what happens domestically and vise versa (Ajayi 1991). Even though this study has examined both domestic and external factors independently, for the sake of simplicity and coherent discussion, the review of theoretical literature is presented in the following manner.

2.1.1.   Domestic (Poor Macroeconomic Performance) Causes of External Indebtedness

The Relationship between Capital Flight and External Debt

There is a consensus that one of the primary causes of the external indebtedness of indebted countries is undoubtedly capital flight. Although developing countries have become heavily indebted, in an apparent contradiction, they were reported to also have the highest capital flight in the world. Part of the reason is macroeconomic instability in developing countries (Menbere 2004). Over the past decades, external debt and capital flight have become inseparable and highly related. Capital flight has been a significant issue since the early 1980s in developing countries. A massive amount of capital has left these countries over the last three decades (Alam–Quazi 2003).

Economists have identified the relationship between external debt and capital flight in two main contexts: the first considers the various macroeconomic issues that relate to external debt and capital flight, where it is generally believed that if resources held abroad were used at home for increasing investment that would increase the availability of foreign exchange, this would enable countries to invest and grow faster. In this context, others also argue that in the absence of capital flight, the external debt of developing countries would have been much lower than with capital flight (Menbere 2004). However, the causality between external debt and capital flight is another way how economists show their relationship. There are two kinds of linkages between external debts and capital flight. The first linkage runs from external debt to capital flight and the second from capital flight to external debt. Each of these linkages

can also be subdivided into two. Thus, the direct linkage can be divided into four groups based on whether the direction of causality runs from debt to capital flight or vice versa or whether one provides merely the cause for the other or provides the means as well (Menbere 2004, Suma 2007). The four types of linkages are a Debt-driven capital flight, Debt-fueled capital flight, Capital flight-driven external borrowing, and Capital flight-fueled external borrowing.

Debt-driven capital flight refers to a situation where excess external borrowing motivates private residents to shift their capital abroad. Some of the reasons for this are associated with the expectation of currency devaluation, fiscal crisis, and avoidance of the risks these entail, among other distortions. Debt-fueled capital flight refers to a situation when borrowed funds are directly transferred abroad. Under this scenario, external debt provides the resources and motivations for capital flight. Capital flight-driven external borrowing refers to a situation when the continued outflow of funds creates a financing gap bridged through external financing. Finally, flight-fueled external borrowing refers to a situation in which domestic residents' exported capital is borrowed back under the round-tripping hypothesis (Fofack 2009, Ampah et al. 2018).

Poverty (Savings- Investment Gap)
Several studies relate the most important cause of external indebtedness to the vicious circle of poverty type of argument. For example, Uzun et al. (2012) argue that the saving amount which is left from consumption is channeled to investment and economic growth. However, in developing countries because of insufficient domestic resources and less tendency of saving, states have difficulties in financing economic development. Thus, overseas borrowing is needed to meet investment requirements when domestic savers are unable or unwilling to save.

Likewise, Ayadi and Ayadi (2008) remarked that growth would not take-off until the capital stock had risen to a given threshold. As capital rises, and investment and output rise, in a virtuous circle, the savings level will also continue to grow. Beyond a given level, the increase in both capital and savings will be sufficient to create self-sustaining growth. The reason for choosing external finance, to ensure continued development along with domestic resources, is provided by the theory of 'dual-gap. According to this theory, since investment is a function of saving, and in developing countries there is also a lack of domestic savings to fund the needed investment, it is logical to look to the use of complementary external funds.

The Foreign-Exchange Constraint (Balance of Payment (BOP) deficit)
Another equally important justification to the external borrowing of developing countries is that of the foreign exchange gap. Because even assuming that there is no capital deficiency and no savings gap, the growth rate of developing countries may still be hindered by a foreign exchange gap (Menbere 2004, Uzun et al. 2012). Export earnings are usually insufficient to generate enough foreign exchange to finance imports, making external borrowing the essential means of gaining access to the technology that is vital for the expansion of the export sector that ultimately leads to rapid economic growth (Menbere 2004).

Fiscal Irresponsibility

The problems caused by the external factors have in most cases been exacerbated by the adoption of misguided macroeconomic policies. One of such domestic errors that has occurred is massive fiscal deficits (Ajayi 1991). The fiscal deficit occurs when government expenditure is higher than its revenue. This condition is a common phenomenon in most developing countries including Ethiopia.

According to Fischer and Easterly (1990), there are four ways of financing the public-sector deficit: by printing money, running down foreign exchange reserves, borrowing abroad, and borrowing domestically. Higher government expenditure relative to its revenue, in the context of developing countries, puts further pressure on the current account balance and hence increases external indebtedness to fill the gap.

An optimal tax smoothing model developed by Robert Barro explains the causes of government debt. This model tries to tell whether there is any role for government debt if it hardly affects real outcomes such as investment and consumption. According to the neoclassical view of public finance, there is still a role for government debt in smoothing intertemporal distortions arising from government policy especially from raising taxes. In particular, government debt may be used to smooth tax and inflation rates and therefore private consumption over time. Such neoclassical views on public finance give prescriptions for the creation and existence of government budget deficits and thereby government debt to finance the budget deficit (Heijdra 2002).

2.1.2.   External Causes of External Indebtedness

Oil price shocks along with policies of developed countries and their banks

The principal cause of the international debt crisis of the 1970s and 1980s was the increase in oil prices in 1973 and 1979. The quadrupling of the oil price was particularly harmful to non-oil producing developing countries, who experienced an enormous rise in their import expenditure, on top of which the resulting recession severely curtailed their export earnings. As a result of this, the current account deficits of the developing countries rose.

In fact, most of today's indebted developing countries became indebted during and after these periods. This went along with a dramatic fall in the terms of trade of especially primary commodities, which further increased the trade deficit and made things even more complicated. An increase in the price of oil raised its revenues far in excess of these countries' demand. These "petrodollars" were, therefore, deposited in the Eurodollar markets by OPEC (Organization of the Petroleum Exporting Countries). The "fund-starved" developing countries then borrowed these funds from the Eurodollar market to pay their import bills from Europe, the United States and Japan. Moreover, most developing countries themselves are net importers of oil, adding further pressure on their demand for foreign exchange either in the Eurodollar market or elsewhere (Menbere 2004).

On the policies of developed countries and their banks, the policies adopted by the developed countries and their bank were instrumental in creating the debt crisis

in Africa. Before the 1970s, the developing countries' external debt was relatively small (Suma 2007). However, between the end 1970s and the early 1980s, the rise in oil prices had increased the revenue of oil exporting countries. Nonetheless, they were unable to absorb them within their economies. They deposited a large volume of Petrodollars in the commercial banks of the developed world. Thus, these banks had accumulated huge funds which could not be used by the developed countries. Nevertheless, African countries needed funds for their economic development programs which these banks 'recycled' in the form of loans to Africans. In this regard, Dymski (2002) accuses multinational banks in developed countries in the late 1970s and early 1980s of "pushing" credit on to less-developed countries in their desperation to clean up these accumulated petrodollars.

2.2. *Empirical Literature*

In this section, the empirical studies are presented on the determinants of external indebtedness. For the sake of simplicity, clarity, and attractiveness we used tabulation. From Table 1, except a few studies (Ajayi 1991, Menbere 2004, and Greenidge et al. 2010), all used a time series data set of more than twenty years. Beyond that, their methodologies were very different. Awan et al. (2011) is the only study that used Johansen co-integration approach. However, the results of most of the studies have some similarities even though their time scope, case studies and methodologies are different.

Table 1 Survey of Empirical Literature

Author and year	Model Type Adopted	The scope and case study	Results
Ajayi (1991)	OLS (Ordinary Least Square)	From 1970 to 1988, Nigeria	Deterioration in the terms of trade, the rise in foreign real interest rates, a fall in the growth of industrial countries and increase in external debt. However, the reverse is true for improvement in the fiscal positions
Mbire–Atingi (1997)	OLS	From 1970 to 1995, Uganda	An increase in the foreign interest rate, appreciation in the real effective exchange rate, deterioration of the fiscal position, worsening of the terms of trade significantly worsens the debt to export ratio.
Menbere (2004)	Random and Fixed effects	From 1982 to 1999, For 60 developing countries	Poverty (saving gap), income instability, debt service payment and capital flight are the leading causes of external borrowing.
Greenidge et al. (2010)	Dynamic OLS	From 1987 to 2005, For 12 Caribbean Community	An increase in the output gap, the decline in government spending, a rise in the real effective exchange rate leads to a reduction in the stock of external debt, but the higher difference between actual and expected government expenditure, and depreciation of currency leads to more accumulation of foreign debt.

Table 1 Survey of Empirical Literature (continued)

Sulley (2010)	OLS	From 1975 to 2008, Tanzania	Domestic factors such as budget deficit and low domestic saving have a significant share in explaining external debt compared to external factors such as trade deficit, real exchange rate, and interest payment even though all are the causes of foreign debt.
Awan et al. (2011)	Johansen Cointegration	From 1972 to 2008, Pakistan	The fiscal deficit has no significant impact on external debt. However, three channels of uni-directional causality were found running from fiscal deficit to foreign debt, terms of trade to exchange rate and fiscal deficit to terms of trade.
Bittencourt (2013)	Dynamic panel data (Pooled OLS, Fixed Effects, difference-GMM (Generalized Method of Momentum) and system-GMM estimators)	From 1970 to 2007, For nine Young Democracies of South America	Economic growth, Trade openness, the liquid liability, and inflation reduce the debt burden. However, income inequality increases the external debt.
Awan et al. (2014)	ARDL (Auto Regresive Distributed Lag)	From 1976 to 2010, Pakistan	Fiscal deficit, nominal exchange rate, and trade openness increase the debt burden.
Al-Fawwaz (2016)	ARDL	From 1990 to 2014, Jordan	Terms of trade lead to indebtedness in the long run. However, GDP per capita has a negative impact.
Adamu–Rasiah (2016)	ARDL	From 1970 to 2013, Nigeria	Oil price, exchange rate debt service, gross domestic saving and fiscal deficit are causes of external debt accumulation.

Source: own construction

3. An Overview of External Debt in Ethiopia

This section presents an overview of external debt, trends in foreign debt along with its growth rate during the period from 1981–2012. It is a descriptive study that shows the past status of the external debt. It is presented using trend analysis.

3.1. The Trends in External debt and its Growth Rate in Ethiopia

Ethiopia's external debt has changed significantly in its magnitude over the last four decades. During the 1980s the external debt of Ethiopia becomes very high. As can be seen from Figure1, the total external debt of Ethiopia increases continuously from 1981 to 1995. By 1981 the total foreign debt was 1.84billion US $, and it grew steadily until 1995 when it reached 10.32 billion US $.

The growth rate of external debt fluctuated in the 1980s, reaching a peak of 78% in 1981, then it declined to 1.8% in 1989. But, in 1990 Ethiopia's external debt grew to 10%. However, after 1992 it declined continuously and reached –46.3% in 1999. Even if the growth rate of external debt started to rise in the early 2000s, it fell in the mid of 2000s, down to –63.3% in 2006. The increase in total debt in the early 2000s was attributed to two factors. First, transfers from external creditors to support the implementation of the Sustainable Development and Poverty Reduction Program (SDPRP). The reason for a large decline in foreign debt during 2006 was associated with debt relief or cancellation of HIPC initiative. The external debt of Ethiopia again started to rise continuously from 2.6 billion US$ in 2007 to 10.4 billion US$ in 2012.

Figure 1 Total and Growth of external debt in Ethiopia, 1981–2012

Total External Debt (Mill US$)

Growth of External Debt (%)
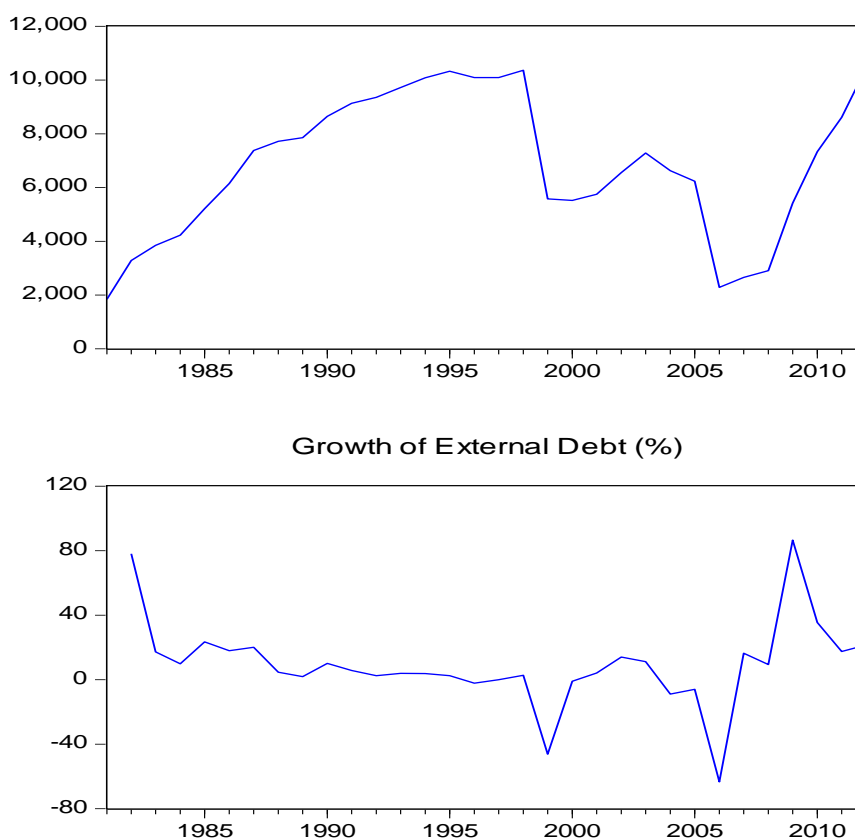
Source: Authors own construction based on World Bank data

4. Data Sources, Model Specification, and Methodology of the Study

In this section, we present the source of data for the study. Besides that, using the theoretical and empirical studies as a base, the model is specified. Furthermore, the methodology that we have used is described in detail.

4.1. Data Type, Source, and Data Analysis

In this study, secondary data were used for time series data running from 1981 to 2012. The sources of the data were international bureaus and organizations. Further, in the study we used both descriptive statistics (averages, percentages, trends, and tabulations) and econometrics to analyze the determinants of external indebtedness for Ethiopia.

Table 2 Definitions, measurement and sources

Variables	Definition and Measurement	Source
ED	External debt as a percentage of GDP	WDI
CAB[12]	Current account balance as a percentage of GDP	IMF
DEF	Budget deficit as a percentage of GDP	IMF
CFL	Capital flight as a percentage of GDP	Political Economy Research Institute database.
DSR	Total debt service as a percentage of exports of goods, services and primary income.	WDI
INT	Interest rate	WDI
TOT	Terms of trade as a percentage of GDP	WDI

Source: own construction

4.2. Model Specification

Like previous studies in the case of developing countries and SSA countries, the analytical framework for this study included both domestic and external causes of foreign debt determinant variables. Hence, based on the literature, the study employed the following model.

$$Y_t = \alpha + \beta X_t + \varepsilon_t \tag{1}$$

where Y_t is external debt stock to GDP ratio (ED) at period *t*.
X_t is a vector of explanatory variables included in the model at period *t*.
ε_t is the error terms at period *t*.

Besides that, variables in the vector X identified are based on theoretical and empirical evidence in the literature. It captures both internal and external macroeconomic factors which cause indebtedness directly or indirectly. These factors are current account balance, budget deficit, debt service, capital flight, interest rate, and terms of trade. Therefore, X can be written as:

$$X_t = F(CAB, DEF, DSR, CFL, INT, TOT) \tag{2}$$

More specifically, the model we used is:

$$ED_t = \beta_0 + \beta_1 CAB_t + \beta_2 DEF_t + \beta_3 DSR_t + \beta_4 CFL_t + \beta_5 INT_t + \beta_6 TOT_t + \varepsilon_t \tag{3}$$

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[12] The record of all transactions in the balance of payments covering the exports and imports of goods and services, payments of income, and current transfers between residents of a country and nonresidents.

$$(+) \qquad (+) \qquad (+) \qquad (+) \qquad (+) \qquad (-/+)$$

where β_0 is an intercept term, and β_1, β_2, β_3, β_4, β_5, and β_6 are the long run coefficients that will be estimated. The signs in parenthesis are the expected hypothesized signs of the variables.

4.3.   Methodology

Before carrying out the estimation of the above model, the time series characteristics of each data must be investigated. The unit root test, selection of lag length, and cointegration test are the main tools before estimation, and diagnostic tests are used after estimation. Finally, the study used Johansen co-integration for long-run and short-run estimation of the model.

4.3.1.   Unit Root Test and Lag Length Determination

The regression results from the above model are appropriate if and only if the variables in the model are all stationary because non-stationary variables lead to spurious results. This study used the classical unit root test, namely, the Augmented Dickey-Fuller (ADF) test. Further, after unit root test and before estimating the model, we have to decide the maximum lag length, to generate the white noise error terms. Different information criteria can be used to determine the optimal lag length. The most popular are the Akaike information criterion (AIC) and Schwarz's Bayesian information criterion (SBIC).

4.3.2.   Co-integration Test

We can use two ways to test for the existence of co-integration: the Engle-Granger two-step approach or the Johansen maximum likelihood estimation procedure. Since the Engle-Granger two-step approach has several limitations, to overcome these limitations, this study used the Johansen maximum likelihood for the analysis. According to Harris (1995), there are two test statistics for cointegration under the Johansen approach. These are the trace statistics (λ_{trace}) and the maximum Eigenvalues (λ_{max}). These test statistics values can be obtained as follows:

$$\lambda_{trace(r)} = -T \sum_{i=r+1}^{k} \ln(1-\lambda) \tag{4}$$

$$\lambda_{max(r,r+1\ )} = -Tln(1-\lambda r + 1) \tag{5}$$

where T is sample size, λ is the largest canonical correlation, r is the null hypothesis of cointegrating vector, and *r+1* is the alternative hypothesis of cointegrating vectors.

The trace test (λ_{trace}) is a joint test where the null hypothesis is that the number of cointegrating vectors is less than or equal to r, against an unspecified alternative that there is more than r. On the other hand, the maximum Eigenvalue test (λ_{max}) tests the null hypothesis that the number of cointegrating vectors is r against the alternative of r+1.

Once we get the cointegration of the variable, we used the VECM (Vector Error Correction Model) to examine the short run and long-run relationships in a system of variables. The VECM can be written as follows:

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \cdots + \Gamma_{p-1} \Delta Y_{t-p} + u_t \qquad (6)$$

Where; $\Pi = -(I_m - A_1 - \cdots A_p)$
$\Gamma_i = -(A_{i+1} + \cdots A_p), i = 1,2,\ldots P-1$
$Y_t = a\ vector\ of\ all\ endogenous\ variables\ of\ the\ system\ and\ they\ are\ I\ (1)$
$u_t = stochastic\ error\ term\ and\ p\ is\ the\ number\ of\ lags\ in\ the\ equation$

Finally, it is necessary to run diagnostic tests such as serial correlation using Breusch-Godfrey serial correlation LM test, heteroskedasticity test using Breusch-Pagan-Godfrey test, normality using Jarque-Bera test, and stability tests using CUSUM and CUSUM of squares.

5. Econometric Estimation Results and Discussion

This part presents the econometric results and their interpretation, along with theoretical and empirical support. In particular, the unit root test using ADF, lag length selection using SBC, cointegration test using trace statistics and maximum Eigen statistics, long run and short-run dynamics using Johansen cointegration, and diagnostic tests (normality, heteroscedasticity, autocorrelation, and stability tests) are presented.

5.1.   Unit Root Test

Before we checked the presence of long-run relationship (cointegration) between the variables, we checked the order of integration of each variable in the model by using Augmented Dickey-Fuller (ADF) (Table 3). The result shows that all variables included in the model are I (1) at one percent level of significance. Since all variables have the same order of integration, the Johansen cointegration approach could proceed.

Table 3 Unit root test

| Variables | ADF test statistics (with intercept) | | Order of integration |
	Level	First difference	
ED	-1.155256	-4.730746 ***	I(1)
CAB	-2.694467*	-5.671643 ***	I(1)
DEF	-3.270316**	-6.466197***	I(1)
CFL	-3.513721**	-6.169509***	I(1)
DSR	-1.814258	-6.977144***	I(1)
INT	-3.478557**	-8.179621***	I(1)
TOT	-3.426241**	-9.522251***	I(1)

Note *** Significant at 1% level, ** Significant at 5%, * Significant at 10 % level
All the values in the table are t-statistics,
Source: Authors own construction based on Eviews 9 result (2018)

5.2.   *Lag Length Determination*

There are different types of criteria to select the optimal number of lags for estimation of the long run as well as the short run models. The most common criteria are Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (BIC)[13]. The result shows the optimal lag length is ambiguous (see Table 4). Besides that, because of the number of variables in the model, and a small number of observations; the two-lag model would have been unstable, so we decided to apply the one lag solution.

Table 4 Lag Length Determination

Lag	AIC	**BIC**
0	42.84592	43.17287
1	40.39644	**43.01201***
2	38.61603*	43.52022

Note: * Optimal lag length using AIC and BIC.
Source: Authors own construction based on Eviews 9 result (2018)

5.3.   *Number of Cointegration Vectors*

To check the existence of cointegration among the variables we have used the Trace Statistics and the Maximum Eigen statistics. "Table 5 and 6 shows the analysis rejects the null hypothesis that there is no cointegrated vector (None)." The trace statistics describe there being at most three co-integrated vectors. Furthermore, the maximum Eigenvalue statistics show there is at most two co-integrated vectors. Hence, both statistics showed the presence of a high association between explanatory and dependent variables.

Table 5 Trace Statistics

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of E(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.948309	222.5122	125.6154	0.0000
At most 1 *	0.857457	133.6380	95.75366	0.0000
At most 2 *	0.618992	75.19464	69.81889	0.0175
At most 3	0.490176	46.24658	47.85613	0.0703

Note: * rejection of the hypothesis at 5 % level. Trace test indicates three cointegrated equations.
Source: Authors own construction based on Eviews 9 result (2018)

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[13] Relative to AIC, BIC is designed to identify the true model, and is good for consistent estimation (Acquah 2010, Prabhat 2010). Furthermore, BIC is more tolerant, penalty for additional parameters is more in BIC and hence it chooses the more parsimonious model (Prabhat 2010).

Table 6 Eigenvalue Statistics

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of E(s)	Eigen value	Max-Eigen Stats	0.05 Critical Value	Prob.**
None *	0.948309	88.87419	46.23142	0.0000
At most 1 *	0.857457	58.44340	40.07757	0.0002
At most 2	0.618992	28.94806	33.87687	0.1731
At most 3	0.490176	20.21068	27.58434	0.3268

Note: * rejection of the hypothesis at 5 % level. Eigenvalue statistics indicates two cointegrated equations.

Source: Authors own construction based on Eviews 9 result

5.4.   *The Long Run Equation*

The result of Johansen approach cointegration test confirmed the existence of long-run equilibrium relationship between the variables used in the estimation of external debt determinants. The Johansen long-run equation will be:

$$ED = 89.24562 + 9.73CAB + 2.8DEF + 1.01CFL + 1.02\ DSR + 15.3INT - 1.47TOT$$
$$\qquad\qquad (14.68^{***})\ \ (3.31^{***})\ \ (4.63^{***})\ \ (5.186^{***})\ (9.64^{***})\ (-6.11^{***})$$
***Significant at 1% level

The numbers in parenthesis under the estimated coefficients are t-values of the estimated coefficients. From the above long-run equation, it can be observed that all variables are significant in determining the external indebtedness of Ethiopia.

Moreover, the current account balance, fiscal deficit, capital flight, debt service, and interest rate positively and significantly affect external indebtedness of Ethiopia. Moreover, the current account balance and fiscal deficit positively and significantly affect external indebtedness of Ethiopia. This means the rise in the current account and fiscal deficit by one percentage point results in an increase in the external debt of Ethiopia by 9.73 and 2.8 percentage points respectively. The reason behind this is both current account and fiscal deficit caused by the resource gap. As a result, the country was forced to borrow from foreign sources to fill this gap. This means large and growing fiscal deficits, as well as current account deficits, were financed through borrowing from foreign sources on a short-term, medium-term, or long-term basis. This result is also consistent with Menbere (2004) in the case of 60 developing countries, Ajayi (1991), Mbire and Atingi (1997) in the case of Nigeria and Uganda respectively. Also, our result supports the hypothesized sign that we set/made previously.

Capital flight is another variable that affects external debt accumulation of Ethiopia positively and significantly. The rise in capital flight by one percentage point results in an increase in the external debt of Ethiopia by 1.01 percentage points. The reason behind is when there are substantial capital outflows in the form of capital flight, there are no resources available to finance imports and domestic investment,

which may lead to external debt. This result, moreover, is consistent with Menbere (2004). Also, our result supports /match the hypothesized sign we set previously.

A one percentage point increase in debt servicing leads to the rise of external debt by 1.02 percentage points. This is because the debt service payment incites further demand for external borrowing. This result is consistent with Menbere (2004), Adamu and Rasiah (2016). Also, our results match with the hypothesized sign. In our results, the interest rate is one of the significant variables. A one percentage point increase in the interest rate causes an increase in the external debt by 15.3 percentage points. This result is matched with the finding of Ajayi (1991), Mbire and Atingi (1997), Sulley (2010), and it is also similar to the hypothesized sign.

However, unlike the above variables, the terms of trade negatively and significantly affect external indebtedness of the country in the long-run. That means the rise in the terms of trade by one percentage point results in a decrease in external debt of Ethiopia by 1.47 percentage point. This means an improvement in the terms of trade makes the external debt of Ethiopia fall. This is because when the terms of trade of the country deteriorate, the country may lack foreign exchange to undertake different activities, especially to import different commodities which are the basis for economic growth. As a result, the country is forced to borrow from foreign sources even at unfavorable terms and conditions. The reverse is true when there is an appreciation in the terms of trade, like in this study. Furthermore, this result is in line with the works of Ajayi (1991) and Mbire and Atingi (1997) in the case of Nigeria and Uganda respectively.

5.5. *The Short Run Estimation*

The short-run equation relates the difference of dependent variable with the difference of the independent variables, and the error term in the lagged periods. More specifically, the one period lagged difference terms for D(ED), D(CAB), D(DEF), D(CFL), D(DSR), D(INT), and D(TOT) capture the short-run change in the corresponding level, while the error correction term (ECM) captures the long run impact.

Here the error correction term (ECM(-1)) coefficient is negative and significant as expected, implying that there is reasonable adjustment process towards the long-run steady state. This guarantees that although the actual external debt may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The coefficient of the error correction term of -0.381115 shows that about 38 percent of the deviation of the actual external debt from its equilibrium value is eliminated every year; hence, the full adjustment would require almost two and half years.

We also applied diagnostic tests to the model. The diagnostic tests such as tests of normality test of Jarque–Bera, serial-correlation of Breusch-Godfrey LM, heteroskedasticity test of Breusch-Pagan-Godfrey were conducted. The estimated residuals did not provide any significant evidence of non-normality, serial-correlation, and heteroskedasticity effect in the error term (see Annex1). The model stability is necessary for prediction and econometric inference. Thus, stability test was conducted using recursive residual (CUSUM) and CUSUM of square (CUSUMSQ) tests (see Annex 1).

Table 7 Short-run Estimation Result of D(ED)

Variable	Coefficient	Std. error	t- statistic	Prob.
D(ED(-1))	-0.443138	0.10135	-4.37236	0.0003***
D(CAB(-1))	-1.835750	0.464893	-3.948756	0.0007***
D(DEF(-1))	-1.129293	0.430623	-2.622463	0.0159**
D(CFL(-1))	-0.024313	0.104088	-0.233587	0.8176
D(DSR(-1))	-0.447233	0.112927	-3.960367	0.0007***
D(INT(-1))	-1.984597	0.722226	-2.747888	0.0121**
D(TOT(-1))	0.497879	0.112110	4.440976	0.0002***
C	-0.222294	0.823540	-0.269925	0.7899
ECM(-1)	-0.381115	0.037968	-10.03786	0.0000***
R-squared	0.888112	Mean dependent variable		-0.352149
Adjusted R- squared	0.845488	S.D dependent variable		11.44352
S.E. of regression	4.498221	Akaike information criterion		6.088566
Sum squared resid	424.9138	Schwarz criterion		6.508925
Log-likelihood	-82.32849	Hannan-Quinn criteria		6.223043
F-statistic	20.83597	Durbin-Watson stat		2.107525
Prob(F-statistic)	0.000000***			

Note: *** Significant at 1% level   ** Significant at 5% level
Source: Authors own construction based on Eviews 9 result (2018)

6. Conclusion, Policy Recommendations, Future Study

The central focus of this study is to examine the determinants of external indebtedness of Ethiopia. The Johansen cointegration approach was used to assess the long run and short-run dynamics of the variables. The result showed that the current account balance, budget deficit, capital flight, debt service, and interest rate significantly increase the external debt of Ethiopia. However, the terms of trade displayed a negative and significant effect on external debt of Ethiopia.

Based on our findings and intuitive knowledge, reducing external indebtedness is feasible following an appropriate fiscal policy (contractionary fiscal policy) via cutting unnecessary government spending and increasing tax collection efficiency, monetary policy (via exchange rate devaluation and deflationary policy), and supply-side policies to improve the competitiveness of an economy and exports. Finally, creating a conducive political, social, and economic environment to attract FDI and to control capital flight is vital. Even though this study tried to meet the existing literature gap, it also has limitations. This study was restricted to a small number of variables due to the Johansen cointegration approach, which needs all variables to be I(1), and therefore other variables such as exchange rate, political instability, trade openness, inflation rate, economic growth, and methods of financing current account deficits such as foreign direct investment were omitted. Hence, future research could expand the investigation by taking these factors into account.

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Annex 1: Diagnostic Tests

A. Normality Test
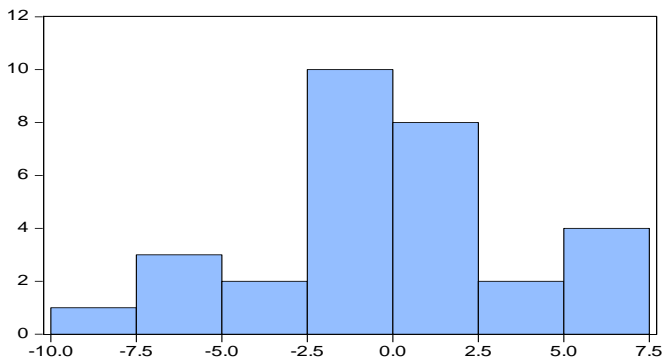
Series: Residuals	
Sample 1983 2012	
Observations 30	
Mean	3.08e-13
Median	-0.209557
Maximum	7.259211
Minimum	-8.460150
Std. Dev.	3.827819
Skewness	-0.110969
Kurtosis	2.924124
Jarque-Bera	0.068767
Probability	0.966201

B. Autocorrelation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.343644	Prob. F(2,19)	0.7135
Obs*R-squared	1.047307	Prob. Chi-Square(2)	0.5924

C. Test for Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.327505	Prob. F(14,15)	0.2960
Obs*R-squared	16.60119	Prob. Chi-Square(14)	0.2781
Scaled explained SS	7.825971	Prob. Chi-Square(14)	0.8982

D. Model Stability test