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The Impact of Remittance on Economic Growth of Ethiopia

Mesfin Bekele Gebbisa[1]* Genamo Fitala Feyissa[2]
1.Oromia Forest and Wild life Enterprise Arsi Branch
2.Bale Zone Inland Revenue Authority Oromia Regional State

Abstract
The purpose of this study was to investigate whether or not international remittances enhance economic growth in Ethiopia. Data for the period 1984-2017 from World Development Indicator and Ethiopia Ministry of Education annual statistical Bulletin was used. To investigate the impact international inflow remittances, foreign direct investment net inflow, inflation, general government final consumption expenditure, gross fixed capital formation, openness to international trade, human capital and population growth were also included. The study employed an aggregate Cobb-Douglas production function. Augmented Dickey Fuller tests were used to test for non Stationarity of the variables. It was found that all variables were integrated of order one. In addition, Johansen Cointegration test was employed to determine whether or not the variables were cointegrated. Error correction model was employed to estimate short – run and long run relationship using ordinary least square technique. The study found that in the long run General government final consumption expenditure, openness to international trade, human capital and Population growth where as in short run foreign direct investment net inflow had both positive and significant impact on economic growth. Additionally in the long run Inflow remittances, Inflation and foreign direct investment net inflows and in the short run inflation, Openness to international trade and Human capital (secondary school enrolment) had both negative and significant. This was in contrast with the expected result of positive and significance impact on economic growth rate. Gross fixed capital formation in long run where as remittance inflow, general government final consumption expenditure and human capital (secondary school enrolment) were found to be insignificant and no impact economic growth.
Keywords: Remittances, Economic growth, Error Correction Model (ECM), Augmented Dickey Fuller (ADF) test
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1. Introduction

Remittances are a major source of foreign exchange earnings in many developing countries. These flows were more than three times the size of official development assistance (ODA), More Stable than Private Capital Flows and significantly larger than foreign direct investment (FDI), excluding China. They are also a more stable component of receipts in the current account, reliably bringing in foreign currency that helps sustain the balance of payments and reduce instability (World Bank 2018a).

Remittances tend to be significantly higher in countries that are high risk and that have a high level of debt to gross domestic product (GDP). This is consistent with the fact that low- income countries, which are more likely to be high risk, receive more remittances as a share of GDP than middle and high income countries. Remittances tend to be higher, and more uniform, in low-income countries, because they are more frequently used for consumption than for investment. Where cash remittances are sufficiently large, they may weaken the exchange rate of the home country, further depressing the economy and providing even more reason to migrate (World Bank, 2005).

The cost of sending money to Low and Middle Income Countries continues to be high, well above the Sustainable Development Goal target of 3 percent. According to the Remittance Prices Worldwide database, the global average cost of sending remittances of $200 (inclusive of all fees and charges) was 7.2 percent in 2017. Among the regions in 2017, South Asia had the lowest costs, at 5.4 percent, while Sub-Saharan Africa continued to have the highest average cost, at 9.1 percent .Remittance costs across many African corridors and small islands in the Pacific remain above 10 percent, because of the low volumes of formal flows, inadequate penetration of new technologies, and lack of a competitive market environment. Two major factors contributing to high costs are (i) exclusive partnerships between national post office systems and any single Money Transfer Operation; and (ii) the de-risking behavior by commercial banks (World Bank, 2017).

Remittance is an extremely important source of foreign exchange for Ethiopia, perhaps larger than the export earning of the country in its foreign exchange generation capacity. Remittance has averaged 1.59 % of GDP over the last 10 years. Between 2008 and 2017 remittance flows have steadily grown from 386 million USD to 815 million USD. The largest remittance sending countries to Ethiopia were United States, Israel and Germany respectively (World Bank, 2018).

Recently there is a widespread belief within policy circles, that remittances provide finance for investment and thereby promote economic growth. This notion stem from the fact that remittances may not only provide

much needed finance for establishing micro enterprises but also stimulate economic growth by increasing consumption capacity of recipient households. Surprisingly, empirical evidence supporting the channels through which remittance can promote growth is so bearing (World Bank, 2018).

However, the remittance industry in Ethiopia is overwhelmed by a number of problems. Among these problem remittance senders uses informal channels. Individuals' choice between formal and informal channels for sending money back home depends on the socio-economic characteristics of their household members, level and type of economic activity in the hosting countries, exchange rate and sending charge differentials and relative efficiency of the formal sector relative to the informal sector (Alemayehu Geda *et.al*, 2011).

According to Leon Isaacs (2017) the Ethiopian diaspora like others least developed countries prefer to send remittances to their family members or invest directly in their pet projects back home through informal channels which are estimated around 78% of remittance. Lack of access to services in the send and receive markets, high direct and indirect costs associated with formal channels, irregular migration, the existence of parallel market exchange rates, and regulatory barriers for undocumented migrants contribute to the high level of informal transfers. Informal flows not only represent a loss of foreign exchange for the Government of Ethiopia, but also reduce the opportunities to encourage investment, are a risk to the consumer, and prevent the Government from tracking flows for Anti-Money Laundering and Combating the Financing of Terrorism purposes.

Therefore, the purpose of this study was to examining the impact of remittance on economic growth and the short run and the long run relationship between remittance and economic growth of Ethiopia for the period 1984-2017.

2. Conceptual framework

This study used production function framework to study the impact of international remittance inflows on economic growth in Ethiopia. The framework is similar to that used by Fayissa and Nsiah (2008), Ziesemer (2011), Siddique et al. (2012) and Ikechi and Anayochukwu (2013). Production functions show the relationship between outputs and physical inputs with a particular technology.

Mathematically, the general form of a production function is represented as;

$$Y = f(K, L, M, \delta, \theta) \quad \text{.....1}$$

Where Y is output, K is capital, L is land, M is materials, δ is returns to scale and θ is the coefficient parameter. The production function gives the technically feasible output when production is efficient.

International remittances can affect gross domestic product (GDP), in a number of ways. International remittances can be used for consumption and investment (in health, education and physical capital) purpose and hence enhance economic growth. Second, international remittances affect the level of deposits in commercial banks and therefore provide source of loanable funds. Thus, remittances enhance financial development which has been found to be good for economic growth. Third, remittances can create moral hazard and appreciation of domestic currency which hinders economic growth.

3. Data and methodology

3.1 Source of data and sample size

The data source for this seminar is the World Development Indicators (WDI) data base for all variables except Secondary school enrollment data. World Development Indicators is a data set compiled by World Bank and is used by many researchers. It's compiled from officially recognized international sources. Secondary school enrollment data from 2011 to 2017 was retrieved from Education statistics annual abstract published annually by Ethiopia ministry of education the remaining data from 1984 to 2010 is World Bank data. To achieve its objective the studies utilize the sample size of the study from 1984 to 2017.

3.2 Method of Data Analysis

Time series data may be stationary or non-stationary. OLS regressions on non-stationary data may give spurious results (Gujarati, 2005). On the other hand, Granger (1988) showed that a linear combination of non-stationary series may lead to a series which is stationary (co integrated) and a long run relationship exist between them. Therefore, it was vital to explore the characteristic of the data first in term of normality, stationarity and co integration.

3.2.1 Unit Root Test for Non-Stationarity

The first step was to determine if the variables are stationary or non-stationary. Stationarity implies that the mean and variance of a series are constant over time and that its covariance depends only on the gap between the two time periods and not on time (Gujarati, 2005). Augmented Dickey- Fuller (ADF) test, which is a test against the null hypothesis that there is a unit root, was used. ADF test is superior to Dickey Fuller (DF) test because the DF may have auto correlated errors (Gujarati, 2005).The ADF test Regression equation to test unit root in time series Y is given as;

$$\Delta Y = \partial + \delta Y_{t-1} + \sum_{i=1}^{n} \theta_i \delta Y_{t-1} + \beta T + \mu_t \quad \text{.....2}$$

The null hypothesis is Ho: δ = 0 and alternative hypothesis is Ha: δ <0. If the computed ADF test statistic is greater than the ADF critical at a given level of significance, then null hypothesis of non stationarity is rejected. If computed ADF test statistic is less than ADF critical statistic at a given level of significance, then null hypothesis on non stationarity is accepted. If non stationary in levels, the series are differenced once and if stationary, they are said to be integrated of order one, I (1).

3.2.2 Cointegration Test

In order to determine whether the variables have a long run relationship among themselves, the Johansen Cointegration test was used. This test allows more than one co-integrating relationship. Johansen test is of two types; with maximum eigenvalue or trace tests (Johansen, 1988). The maximum eigenvalue value tests the null hypothesis of *r* cointegrating vector against the alternative hypothesis of *r+1*. The trace tests the null hypothesis of *r* cointegrating vectors against the alternative hypothesis *n* cointegrating vector. Presence of Cointegration implies that the error correction model to correct for the short term disequilibrium as the variables move towards long run equilibrium.

If Y and X are cointegrated, by definition, the error term obtained from regressing Y on X is stationary. Thus we can express the relationship between Y and X with an error correction model (ECM) specification as:

$$\Delta Y = \beta + \theta \Delta X - \alpha \varepsilon + \mu \quad \text{.....3}$$

This will have the advantage of including both long run and short-run information. In this model, is the short-run effect that measures the immediate impact that a change in X will have on a change in Y. In contrast, is the feedback effect, or the adjustment which shows the extent towards the equilibrium relationship between the variable.

3.3 Diagnostic tests

The analysis of the data was carried out by Ordinary Least Squares (OLS) method. It was necessary to conduct the following tests to ensure that the OLS assumptions are met and the estimates are unbiased, efficient and consistent. Where these were violated, corrective measures were adopted.

3.3.1 Normality of the Disturbance Term

OLS assumes that the error term is normally distributed around zero mean and constant variance. When this normality is not observed, the OLS estimates are still Best Linear Unbiased Estimates (BLUE), but we cannot assess their statistical reliability by the classical tests of significance. The kurtosis and skewness test was employed to test the normality. Its null hypothesis is the random variable series is normally distributed.

3.3.2 Multicollinearity of the Explanatory Variable

Multicollinearity refers to a linear relationship among some or all explanatory variables of a regression model. In the presence of imperfect but high multicollinearity, estimation of the regression coefficient may be possible but with large standard error. If multicollinearity is perfect, regression coefficient are indeterminate with infinite standard errors. Multicollinearity becomes a serious problem if the pair-wise or zero-order correlation coefficient between two regressors is in excess of 0.8, (Gujarati, 2005). An explanatory variables correlation matrix was estimated to assess the degree of multicollinearity in the regression equation.

3.3.3 Autocorrelation of the Disturbance terms

This refers to correlation of a time series with its own past or future values. OLS technique assumes there is no or auto-correlation in the error terms entering the regression functions. If autocorrelation is present, estimates are still linear, consistent, unbiased, asymptotically normally distributed but inefficient. They do not have minimum variance among all linear unbiased estimators. The Breusch- Godfrey (BG) Lagrange Multiplier (LM) test was used to test for autocorrelation. The null hypothesis of the test is that there is no auto correlation.

3.3.4 Correct Specification of the Model

The goal of OLS is to closely fit a function with data through minimizing sum of squared residuals. For OLS estimates to be consistent and unbiased, the regression model must be correctly specified. Specification errors arise from inclusion of an unnecessary variable(s), omission of relevant variable(s), errors of measurement, adopting wrong functional form or incorrect specification of the stochastic error term. To test for correct specification of the model, the Ramsey Regression Specification Error Test (RESET) was used. The null hypothesis of the test is that the model is correctly specified.

3.3.5 Auto-Regressive Conditional Heteroskedasticity (ARCH)

ARCH occurs when the error term variance is related to the squared error term in the previous period. ARCH in itself does not invalidate standard OLS inference. However, ignoring ARCH effects may result in loss of efficiency. To test for the presence of ARCH, ARCH LM test was employed. The null hypothesis of the test is that that there is no ARCH.

3.4 Econometric model

From the foregoing discussion and the review of the literature, the effect of international remittances on the GDP can be represented as follows;

GDP = f(REM,FIDI,INF,GGFC, GFCF,OP,HC, POP)……..4

Where GDP is gross domestic product (% annual), REM is inflow remittances (% GDP), FDI is Foreign direct investment net inflows (% of GDP), INF is Inflation consumer prices (annual %)

GFCF is general government final consumption expenditure (% of GDP), GFCF is gross fixed capital formation (% of GDP), OP is openness to international trade, (% of GDP), HC is represented by School enrollment secondary (% gross) and POP is Population growth (annual %)

Equation 4 shows the effect of remittances on GDP holding the effects of other independent variables constant. Because the effects of independent variables in Equation 4 are likely to be non-linear, a Cobb-Douglas production function of the following form was adopted

$$GDP = \beta o REM_t^{\beta_1} FDI_t^{\beta 2} INF_t^{\beta 3} GGFC_t^{\beta 4} GFCF_t^{\beta 5} OP_t^{\beta 6} HC_t^{\beta 7} POP_t^{\beta 8} \in_t \text{ .....5}$$

Taking logarithms on both sides of equation 4 a log-log model is obtained. This can be written as;

$$LNGDP = LN\beta o + \beta_1 REM_t + \beta_2 FDI_t + \beta_3 INF_t + \beta_4 GGFC_t + \beta_5 GFCF_t + \beta_6 OP_t + \beta_7 HC_t + \beta_8 POP_t + \in_t$$

Where LN is the natural logarithm, βo is the intercept term, $\beta_1 - \beta 8$ are slope coefficients. They show the degree of responsiveness of GDP to changes in independent variables. $\in$ is the disturbance term while *t* denotes time.

3.5 Definition of Variable

This subsection considers the definition and selection of variables used in the analysis. In addition, it discusses measurement of the variables and expected signs of their estimated coefficients.

LNGDP is the dependent variable. It is the natural logarithm of the sum of gross value added by all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

LNREM is defined as the natural logarithm of current transfers by migrant workers and wages and salaries earned by nonresident workers (World Bank, 2014). Remittances are classified as current private transfers from migrant workers who are residents of the host country to recipients in their country of origin. This data is only for remittances channeled through formal means. It is recorded as a percentage of GDP. This is the variable of interest and its impact can either be positive or negative depending on the overall strength of microeconomic aspects of the effect of remittances as discussed in literature review. However, Singh et al. (2010) who found a negative coefficient of remittances on economic growth where as Ziesemer (2011) found that affect economic growth positively.

LNFDI is the natural logarithm of foreign direct investment as a percent of real GDP used to capture the effect of external sources of capital on economic growth Blonigen and Piger (2011) found out about the traditional gravity variables such as cultural, distance factors, per capita GDP, relative labor endowments, and regional trade agreements. Other determinants include trade openness, host country business facilitations and ease of business, host-country infrastructure, mainly financial institutions at the level of development, and host-country institutions.

LNINF is the natural logarithm of consumer price index and the first difference yield inflation rate. Changes in CPI capture the rate at which the general price of goods and services is rising. This will act as a proxy for macroeconomic stability in the country. Fischer (1993) and Modigliani and Miller (1958) found that firms and workers devote productive resources to deal with inflation. They further note that inflation uncertainty reduces efficiency by discouraging long-term contracts and increasing relative price and thus acts as a disincentive to investors. Consequently, LNCPI is expected to affect economic growth negatively. Previous studies by Barro (2013) and Chimobi (2010) support this hypothesis.

LNGGFC is the natural logarithm of general government final consumption expenditure as a percent of real GDP used as to capture the countries expenditure which has also an impact on the economic growth

LNGFCF is the natural logarithm of gross fixed capital formation as a percent of real GDP used as a proxy for investment in physical capital. According to Domar (1946), accumulation of physical capital is a pre-requisite for any economic growth to be realized. It determines the potential level of GDP of a country. Gross fixed capital formation is expected to enhance economic growth positively and supported by study of Muchiri Eliud Githiga (2014).

LNOPN is the natural logarithm of international share in GDP. That is the ration of the sum of exports and imports to GDP of a country. Trade openness is a measure of how open a country is to the rest of the world and is a proxy of globalization. According to Ayanwale (2007), it affects realization of competitive advantage, access to new technology and enhances efficiency through competition. Openness to trade is expected to affect economic growth positively and previous study by Abala (2014) supported this hypothesis.

LNHC is the natural logarithm of secondary school enrollment. It is an indicator of human capital. Neoclassical growth function recognizes labour as a key factor of production. In addition, growth is enhanced through improved quality of labour. Secondary school enrollment improves the quality of education hence it is expected to influence economic growth positively (Muchiri Eliud Githiga, 2014).

LNPOP is the logarithm of population growth as a rate. In this context, population growth is included as a proxy for labour supply. Regarding this there are two views the first is population is treat and become burden for economic growth while others says population is opportunity and asset for economic growth because they believe that innovation of technology and economic return achieved gradually.

4. Empirical results and interpretation

4.1 Descriptive Statistics and Normality

To ensure the variables used are normally distributed and no outliers exist, normality test was done using kurtosis as well as skewness. Normal distributed series has skewness when the probability is zero while for kurtosis ranges between 3 and -3. From the result of below table 4.1 except for remittance and inflation all variables are normally distributed based on kurtosis and skewness criteria.

Table 4.1 Descriptive Statistics and Normality Test Results

Variable	LNGDP	LNREM	LNFDI	LNINF	LNGGFC	LNGFCF	LNOPN	LNHCl	LNPOP
Mean	5.845	0.778	1.766	9.644	10.965	22.907	29.764	22.134	2.966
Min	-11.114	0.043	-0.025	-9.810	7.223	10.714	10.831	8.400	2.464
Max	13.859	3.230	5.464	44.390	17.888	40.671	50.579	47.100	3.601
Std. Dev.	6.825	0.772	1.878	11.44	2.506	8.468	10.904	12.102	0.343
Skewness	-0.912	1.194	0.668	1.171	0.720	0.675	0.136	0.618	0.373
Kurtosis	2.835	4.088	2.011	4.779	3.132	2.553	2.090	1.881	1.909
Obs	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0

Source: Own calculation using STATA 13.1 version

From the Table 4.1, the GDP (% of annual) of Ethiopia has a mean of 5.85 with a standard deviation of 6.825 over a period of 34 years. From 1981to 2017, GDP growth had a maximum value of 13.859 percent and a lowest value of negative 11.11 percent. Remittances over the same period had a mean of 0.77 percent with a standard deviation of 0.772. This variable had a maximum of 3.23 and a minimum of 0.043 with 34 observations. The population had a mean of 2.966 with a standard deviation of 0.343. With34 observations the variable had a maximum of 3.6 and a minimum of 2.46.

4.2 Unit Root test

Augmented Dickey Fuller (ADF) test is employed, which is based on the regression equation with the inclusion of an intercept but, no trend and regression equation with both intercept and trends. During testing if ADF test statistic is greater than the ADF critical at a given level of significance, then null hypothesis of non stationarity is rejected. If computed ADF test statistic is less than ADF critical statistic at a given level of significance, then null hypothesis on non stationarity is accepted

Table 4.2: Augmented Dickey Fuller Unit Root test

	With Intercept but no trend					With Intercept and trend				
	ADF	Critical Value				ADF	Critical Value			
Variables	test	1%	5%	10%	P-Value	test	1%	5%	10%	P-Value
LNGDP	-4.065	-3.696	-2.978	-2.62	0.0011	-5.077	-4.306	-3.568	-3.221	0.0001
LNREM	-1.977	-3.696	-2.978	-2.62	0.2965	-3.453	-4.306	-3.568	-3.221	0.0447
LNFDI	-2.001	-3.696	-2.978	-2.62	0.2861	-2.80	-4.31	-3.57	-3.22	0.1968
LNINF	-4.523	-3.696	-2.978	-2.62	0.000	-4.725	-4.306	-3.568	-3.221	0.0006
LNGGFC	-2.022	-3.696	-2.978	-2.62	0.2769	-1.966	-4.306	-3.568	-3.221	0.6199
LNGFCF	-0.554	-3.696	-2.978	-2.62	0.881	-3.054	-4.306	-3.568	-3.221	0.1177
LNOPN	-1.179	-3.696	-2.978	-2.62	0.6824	-0.658	-4.306	-3.568	-3.221	0.9757
LNERL	2.132	-3.696	-2.978	-2.62	0.9988	-0.981	-4.306	-3.568	-3.221	0.9466
LNPOP	0.387	-3.696	-2.978	-2.62	0.981	-2.008	-4.306	-3.568	-3.221	0.5969

Source: Own calculation using STATA 13.1 version

Table 4.2 presents the ADF tests for the variables LNGDP, LNREM, LNFDI, LNFIN, LNGGFCF, LNGFCF, LNOP, LNERL and LNPOP. The null hypothesis of the ADF tests is that as series has a unit root. The ADF tests were applied with an intercept only and with intercept and trend

From the results of the ADF tests, except LNGDP and, LNINF the variables are rejected the null hypothesis. That is LNREM, LNFDI, LNGGFCF, LNGFCF, LNOP, LNERL and LNPOP were found to be non-stationary (unit root) because the computed ADF test statistic is less than the ADF critical both with an intercept only and

with intercept and trend at 5% level of significance.

ADF tests results presented in Table 4.2 shows that the null of non-stationarity is not rejected for all variables because they are stationary in their first difference. This means all the variables are integrated of order one I (1).

4.3 Cointegration

The problem of non-stationary time series is solved by differencing the series successively until stationarity is achieved to avoid spurious results. However, applying differenced data leads to loss of long run properties of macroeconomic variables (Gujarati, 2005). However, if the series are non-stationary but cointegrated, it is possible to combine both short run and long run properties of the data by finding a linear relationship for two or more series. In this study, the Johansen cointegration tests were used. Cointegration relationship exists among the variables when the trace statistic and maximum eigenvalue statistics are greater than critical values. The null hypothesis is no rank and hence no Cointegration.

Table 4.3: Johansen Cointegration Rank Test (Trace)

Max. rank	Parms	LL	Eigenvalue	trace critical	5% crit.value
0	90	-472.19872	.	407.5216	192.89
1	107	-415.48575	0.97112	294.0956	156
2	122	-378.45703	0.90116	220.0382	124.24
3	135	-350.74899	0.82303	164.6221	94.15
4	146	-326.84473	0.77553	116.8136	68.52
5	155	-306.15939	0.72551	75.4429	47.21
6	162	-289.96632	0.63653	43.0568	29.68
7	167	-278.04317	0.52536	19.2105	15.41
8	170	-269.10344	0.42807	1.3310*	3.76
9	171	-268.43792	0.04074		

Source: Own calculation using STATA 13.1 version

Table 4.4: Johansen Cointegration Rank Test (max)

Max. rank	Parms	LL	Eigenvalue	max statistic	5% critical value
0	90	-472.19872	.	113.4259	57.12
1	107	-415.48575	0.97112	74.0574	51.42
2	122	-378.45703	0.90116	55.4161	45.28
3	135	-350.74899	0.82303	47.8085	39.37
4	146	-326.84473	0.77553	41.3707	33.46
5	155	-306.15939	0.72551	32.3862	27.07
6	162	-289.96632	0.63653	23.8463	20.97
7	167	-278.04317	0.52536	17.8794	14.07
8	170	-269.10344	0.42807	1.331	3.76
9	171	-268.43792	0.04074		

Source: Own calculation using STATA 13.1 version

Therefore, the results of the above table 4.3 and 4.4 shows that null hypotheses were rejected. Because the trace statistic and maximum eigenvalue statistics are less than critical values this implies that in the long run Gross domestic product, inflow remittances, foreign direct investment net inflows, Inflation consumer prices, general government final consumption expenditure, gross fixed capital formation, openness to international trade, School enrollment secondary and Population growth is integrated each other and move together That is, they are not integrated at order zero I(0) but they became stationary after first differencing I(1).

4.4 Diagnostic test

Before interpreting the results, the study examined the diagnostic tests of the estimated model.

Table 4.5 the overall diagnostic test

Breusch-Pagan……0.086(p-value .0.35	Ramsey……7.07(p-value .0.0017)
ARCH ……0.313(p-value .0.5759)	Over all F-Statistics .6.41 (p-value .0.002)
AIC……206.148	Durbin Watson …..…….2.39
BIC……219.886	

Source: Own calculation using STATA 13.1 version

Appendix 1 depicts the results of Multicollinearity using the Correlation Matrix. The correlation matrix shows the implied relationships between the individual explanatory variables. Gross domestic product, inflow remittances, foreign direct investment net inflows, Inflation consumer prices, general government final consumption expenditure, gross fixed capital formation, openness to international trade, human capital and Population growth

all had a correlation coefficient of less than 0.8 amongst themselves implying that there is no severe Multicollinearity.

To test Hetroscedasticity hypotheses are H_O=hetroscedasticity and HA = no hetroscedasticity. The result from the Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity as shown in Table 4.5 had a Chi square of 0.086 with a P value of 0.35. Implying that the p value is greater than 0.05(5) reject the null hypothesis. This means that data is free from hetroscedasticity.

The study further tested for Auto-Regressive Conditional Heteroskedasticity (ARCH) using the LM test for Autoregressive Conditional Heteroskedasticity (ARCH). The test result presented in Table 4.5 gives a Chi Square of 0.313 with a P value of 0.5759 implying the acceptance of the null hypothesis of no Auto-Regressive Conditional Hetroscedasticity.

The Breusch-Godfrey LM test for autocorrelation was used to test for the presence of Autocorrelation in the data. Table 4.5 presents the results, the test reports a Chi Square of 1.866 with a P value of 0.172 implying the acceptance of the null hypothesis of the presence of first order serial autocorrelation.

The Ramsey RESET test for model misspecification is presented in Table 4.5. The result gives an F statistic of 7.07 with a P value of 0.0017 implying the acceptance of the null hypothesis of no omitted variables hence the model is correctly specified

4.5 Lag Selection

Before running vector error correction model, the number of lags shall be determined by using LR, FPE, AIC, HQIC and SBIC. As the data are yearly, the AIC and BIC values of the models with different number of lags shall be compared.

Table 4.6 Lag selection reported along with LM test of serial correlation.

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-643.821				4.20E+06	40.8013	40.938	41.2136
1	-429.193	429.26	81	0	1215.98	32.4496	33.816	36.5719
2	-268.438	321.51*	81	0	34.4105*	27.4649*	30.0611*	35.2974*

Source: Own calculation using STATA 13.1 version

It can be seen from Table 2 that LR, FPE, AIC, HQIC and SBIC values are lowest at lag 2. However, there is an evidence of serial correlation at lag 2 based on lagrangian method (LM) test.

4.6 Error Correction Model (ECM)

When the variables are co-integrated, they move together in the same direction in the long run use vector error correction model when the variable is not co-integrating used unrestricted error correction model. Since our variables are cointegrated in the long run we used or employed vector error correction model (VECM) was therefore estimated to correct the short run disequilibrium as the variable moves toward the static long run equilibrium. The parameter estimates of the long run and short run relationship for ECM are presented below as follows.

4.6.1 Long run Error Correction Estimates

In order to identify the short-run relationships and check the stability of the long-run parameters, an error correction model shall be estimated. The error correction term is calculated by using the normalized long-run coefficients. All the difference terms in the model are replaced with the error correction term (ECM). Results for the error correction model are reported in the following

Table 4.7: long run error estimates

Beta	Coef.	Std.Err.	z	P>z
cons	114.876	.	.	.
LNGDP	1	.	.	.
LNREM	1.830	0.749	2.440	0.015
LNFDI	1.893	0.162	11.670	0.000
LNINF	0.155	0.025	6.240	0.000
LNGGFCE	-0.425	0.148	-2.880	0.004
LNGFCF	-0.036	0.091	-0.400	0.690
LNOPN	-0.489	0.050	-9.780	0.000
LNHC	-0.997	0.058	-17.100	0.000
LNPOP	-28.443	1.585	-17.950	0.000

$$ECT_{t-1} = 1.000LNGDP_{t-1} + 1.830\text{LNREM}_{t-1} + 1.893\text{LNFDI}_{t-1} + 0.155\text{LNINF}_{t-1} - 0.425\text{LNGFC}$$
$$0.036\text{LNGFCF}_{t-1} - 0.489\text{LNOPN}_{t-1} - 0.997\text{LNHC}_{t-1} - 28.442\text{LNOPN}_{t-1} + 114.867$$

Source: Own calculation using STATA 13.1 version

As it is shown in table 4.7, the estimated coefficients of inflow remittances, foreign direct investment net inflows, inflation consumer prices, general government final consumption expenditure, openness to international trade, human capital and population growth have an expected positive sign and statistically significant. Notice that the sign of the coefficient are reversed in the long run during interpretation.

The estimated coefficient of the long-run relationship shows that remittance which is the central variable of this study, has negative and statistically significant impact on the economic growth in the long run over economic growth at one percent. A one percent increase in remittance holding other things constant leads to approximately 1.830 percent decrease in GDP in long-run. This is because a more increase in remittances will result in a decrease in fixed investment. This may be that the money received in the form of remittances spent in educating their child, used for daily expense on consumption of goods and services and help the society in reducing poverty rather than building a fixed investment

Foreign direct investment as a percent of real GDP used to capture the effect of external sources of capital. The estimated coefficient of ΔLNFDI is positive and statistically significant at 1% level of significance. A one percentage point increase in inflation (ΔLNFDI), leads to 1.893 percentage point decrease in ΔLNGDP.

Inflation is an indicator of macroeconomic stability. The estimated coefficient of ΔLNINF is positive and statistically significant at 1% level of significance. A one percentage point increase in inflation (ΔLNINF), leads to 0.155 percentage point decrease in ΔLNGDP.

Gross government final consumption expenditure is negative and statistically significant variable that found impact on economic growth in the long-run at one percent level of significance. Holding other things remain constant a one percent increase in gross government final consumption expenditure has resulted in 0.036 percent change in real GDP.

Gross fixed l capital formation is spastically insignificant and the coefficient 0.036 indicates that holding other things remain constant a one percent change in gross fixed l capital formation brought a 0.366 percent change in GDP.

The Openness of the economy is usually advocated as a way to enhance growth. The coefficient of openness of trade to international is negative and significant at 1% level of significance. A one percentage point increase in openness (ΔLNOPN), leads to 0.489 percentage point increase in ΔLNGDP. This is due to importing foreign plants and equipment, and borrowing foreign technology through openness of trade to international market play an important and major role to economic growth in the long run.

Human capital (proxy measure are Secondary school enrolment) is the other most influential variable in this study that is found to be positive and statistically significant at one percent probability level and with positive impact on economic growth. Holding other things remain constant a one percent increase in human capital has resulted in 0.997 percent change in real GDP.

The population growth is a proxy for labour supply. The coefficient of population growth (ΔLNPOP) is positive and significant. A one percentage point increase in population growth (ΔLNPOP), leads to 28.443 percentage point increase in ΔLNGDP

4.6.2 Short-run Error Correction Estimates:

After confirming for the existence of long-run relationship and estimation of long-run coefficients in, the short-run Error Correction model is estimated. The coefficient of determination (R-squared) explains that about 67.2% of variation in GDP is attributed to variations in the explanatory variables in the short-run model

Table 4.8 short run error estimates

	Coef.	Std.Err.	Z	P>z
cons	-0.123	1.645	-0.07	0.94
ΔLNGDP	-0.013	0.265	-0.05	0.961
ΔLNREM	2.885	2.9438	0.98	0.327
ΔLNFDI	0.178	0.087	2.03	0.042
ΔLNINF	-0.524	.025	-2.02	0.043
ΔLNGGFCE	0.060	0.774	0.08	0.938
ΔLNGFCF	.0.450	0.182	-2.46	0.014
ΔLNOPN	-0.207	.0655	-3.16	0.002
ΔLNHC	0.248	0.802	0.31	0.757
ΔLNPOP	1.15	0.102	11.29	0.000
ECT	-0.982	0.356	-2.75	0.006

$$LNGDPi_t = -0.123 - 0.013LNGDP_{t-1} + 2.8850\text{LNREM}_{t-1} + 0.178\text{LNFDI}_{t-1} - 0.524\text{LNINF}_{t-1} + 0.060\text{LNGFC}_{t-1} + 0.450\text{LNGFCF}_{t-1} - 0.207\text{LNOPN}_{t-1} + 0.249\text{LNHC}_{t-1} + 1.15\text{LNOPN}_{t-1} - 0.982ECT_{t-1}$$

Source: Own calculation using STATA 13.1 version

The co-efficient of error correction term (ECT) is equal to -0.982 and is statistically significant at1%. The sign confirms to the restriction of negativity and less than one (Gujarati, 2005). It also implies that the rate at which short runs disequilibrium is being corrected to arrive to the long run equilibrium is 98.2% per annum. This is a high speed of convergence. The difference of 1.8% may be associated with rigidity of getting immediate impacts of some variables especially on inflow remittances, gross fixed capital formation and human capital.

In short run the estimated coefficient of ΔLNREM is negative and statistically insignificant. The results show that holding all other factors constant, a one percentage increase in remittances leads to 0.013 percentage point decrease in ΔLNGDP. *This is because Ethiopia remittances* which are estimated around 78% flows through informal channel. This is because of Lack of access to services in the send and receives markets, high direct and indirect costs associated with formal channels, irregular migration, the existence of parallel market exchange rates, and regulatory barriers for undocumented migrants contribute to the high level of informal transfers.

Foreign direct investment inflow, Inflation, openness to international trade and population had significant impact on economic growth in short term The sign of the coefficient of population and foreign direct investment inflow have been positive where as the sign of the coefficient of inflation and openness to international is negative

Gross fixed capital formation has a significant impact on economic growth with expected negative sign in the short run at one percent significance level. This shows that, holding other things remain constant a one percent increase in fixed capital formation has a fourth five percent decrease in economic growth.

Gross government final consumption expenditure has also insignificant impact on economic growth in short term Holding other things remain constant a one percent increase in total government expenditure has six percent increase in economic growth.

Human capital formation which is measured by Secondary school enrollment has no significant impact in the short run on the economy. Even its one period lagged value has a significant negative impact on the economy which is unexpected sign. In my opinion, this could be due to the reason that in the short run the expenditure that the government spent on education to construct schools, to publish books and salary payment for teachers is higher than the return expected from education. The other reason could be that those educated students may not engage on productive works or they may not get a job in the short run.

5. Conclusion and recommendation

5.1 Conclusion

The main purpose of this seminar is to investigate the impact of remittances on Ethiopian economic growth by employing time series data from1984-2017 from the World Bank and Ethiopia ministry of Education. Both theoretical and empirical scholarly articles (literatures) are reviewed on the impact of remittances on economic growth. Based on these there are different arguments regarding its impacts and there is no single conclusion towards the direction of its effect on economic growth; in some countries, remittances have a positive effect on economic growth, while in some other countries there is an inverse relationship and there are also countries where remittances have no any impact on economic growth.

To this end, an econometric procedure is taken to regress the variables those have an impact on Ethiopian economic growth (namely, Gross domestic product, inflow remittances, foreign direct investment net inflows, Inflation consumer prices, general government final consumption expenditure, gross fixed capital formation, openness to international trade, human capital and Population growth). Johansen Cointegration approach is used to analyze the relationship between remittances and economic growth. The augmented dickey fuller test was undertaken to stationary test and all the variables are stationary at first difference AR (1). The result of Johansen Cointegration also shows that there is a long run co-integration between dependent and independent variables. An ECM was used to examine short runs dynamics and correct for short run disequilibrium.

In the long run inflow remittances, foreign direct investment net inflows and Inflation consumer prices, have a positive and significant impact on economic growth, whereas general government final consumption expenditure, openness to international trade, human capital and Population growth have a significant and negative effect on GDP in the long run.

In the short run, population and foreign direct investment net inflows have a positive and significant impact on economic growth, whereas inflation , gross fixed capital formation and openness to international trade, have a significant and negative effect on GDP in the long run. The negative magnitude of the error correction term implies that 98.2 percent of the deviations caused by previous year's shocks converge back to the long-run equilibrium in the current year.

5.2 Recommendation

The Ethiopia governments create strong national educational system and add some additional policies/national programs that could channel remittances to productive sectors of the economy. Because Informal flows of remittances contribute to loss of foreign exchange, reduce the opportunities to encourage investment, are a risk to the consumer, and prevent the Government from tracking flows for Anti-Money Laundering and Combating the

Financing of Terrorism purposes.

Data for remittances used in this study did not include through informal channels. According to Leon Isaacs (2017) the Ethiopian diaspora like others least developed countries prefer to send remittances to their family members or invest directly in their pet projects back home through informal channels which are estimated around 78% of remittance. Consequently, a study that incorporates both formal and informal remittances is recommended

Improved Openness to trade need be enhanced to accelerate economic growth in Ethiopia. Through Openness of trade to international market capital goods and new technologies that may help to reinforce the growth process in the importing country. Foreign technology transfers enhance income growth rates.

Human capital formation should be enhanced in Ethiopia Because, high labor productivity, investment in human capital is termed as endogenous factor that enhance the accumulation of human capital through knowledge, skills, attitudes and health status of the people who participate in the economic process. They increase the level of human capital stock which enhances growth. Policies should also be put to ensure much of international remittances received are channeled to human capital formation purposes.

Create conductive environment for foreign direct investment net inflows contribute both in short and long run economic growth of the economy. The government of Ethiopia works on this to transform the country to the middle level income country.

Economic growth is not a good measure of standard of living. An analysis on the end use of remittances especially on poverty eradication, health and education is recommended.

There is need to analyze the relationship among external sources of funds; international remittances, foreign aids and foreign direct investment to find out if they are complement or substitutes to one another. With these findings, the government is too able to make better policies on area that it needs advocates with its limited resources to enhance growth.

Conflict of Interest

The authors would like to declare that they have no interest of conflict and we want to disclose you that it is our original research work.

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