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Remittance-Domestic Investment Nexus in Ethiopia: Evidence from the Autoregressive Distributed Lag (ARDL) Model

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Article Info	Abstract
Article History *Received: 5 Dec 2025* *Accepted: 19 Jan 2026* **Keywords:** ARDL, Domestic investment, Ethiopia, Error correction model, Remittance	Remittances play a pivotal role in narrowing the saving-investment gap in developing countries. However, empirical studies on the impact of remittances on domestic investment are limited, and even the results of the existing studies are at best inconclusive, especially for developing countries. The main objective of this study was to examine the remittance-domestic investment nexus in Ethiopia, with control variables, including lending rate, real gross domestic product (RGDP), inflation, and national saving employing time series data from 1981-2021. The autoregressive distributed lag (ARDL) model, together with its short-run error correction (EC) representation, was employed to analyze the data. The results showed that remittance had a statistically insignificant negative short-run but a significant positive long-run impact on domestic investment. These findings indicate that the government of Ethiopia should encourage and implement policies to channel remittances into productive investments in the effort to bring economic development to the country.

1. Introduction

Developing countries face huge savings-investment gaps and depend on foreign capital inflows, such as remittances (Dash et al., 2024). Thus, remittances are one of the largest capital inflows to developing countries (Tilbe, 2023), making them one of the policy tools by the Sustainable Development Goals (SDGs) in 2030 to end poverty in developing countries (Ayobami et al., 2024). Remittance inflows stabilize financial markets (Zardoub, 2020) and bring smooth investment (Barajas et al., 2009). Remittance also improves labor productivity (Mamun et al., 2015) and broadens the base of investment (Perez-Saiz et al., 2019). Ethiopia has an estimated number of 3 million migrants living abroad (Zekarias, 2023), making it a top remittance recipient country in Africa (Andersson, 2015).

Remittance serves as a means of capital for investment (Kemiso, 2022) and a source of foreign exchange (Zerihun, 2020). Despite the number, Ethiopia collects only 16.67% of its remittance inflow (Geda et al., 2011). The inefficiency comes from poor infrastructure (Cooper & Esser, 2018), an underdeveloped financial system (Mossie, 2022), a large number of unbanked adult population (Bekele, 2022), and low financial inclusion in the country.

While some studies argued that the long-run effect of remittances on an economy is negligible (Mallick, 2008a), others, such as (Dash, 2020; Nwokolo et al., 2021; Zardoub, 2020), found that remittance has a positive effect on domestic investment. On the other hand, studies found that remittance has a negative effect on investment.

While the dominant empirical evidence is on the remittance-economic growth nexus, the evidence on the remittance-investment nexus is scanty

(Dash, 2022; Magwedere & Marozva, 2024; Nyeadi et al., 2022), although investment is an important channel through which remittances impact economic growth and development (Dash et al., 2024). Even the evidence from the existing studies is inconclusive and mixed (Comes, 2018; Magwedere & Marozva, 2024).

Cross-country studies dominate the literature, and this masks the exact impact of remittance as countries differ in socioeconomic and institutional conditions (Yiheyis & Woldemariam, 2016). Moreover, an empirical study is indispensable in a net remittance receiver country to help develop fundamental institutional arrangements. Therefore, this study attempts to answer this research question: Do remittances have significant short-run and long-run effects on domestic investment in Ethiopia? This study addresses this research question by analyzing the short-run and long run dynamics between remittance inflow and domestic investment in Ethiopia, relying on the ARDL model.

The study contributes in many ways to the remittance-investment literature. First, it helps to leverage the controversy on the remittance-investment nexus by providing additional evidence based on the Ethiopian context. Second, it contributes to the development of literature on the issue, which has been least explored so far. Third, this study employed the ARDL model in the time series analysis of remittance-investment nexus. Fourth, the study serves as a reference for further study in the field. Fifth, the result of the study can be used as inputs for policymakers and practitioners to make informed decisions in the effort to benefit from remittances.

2. Review of Literature

Established theories on remittance include the economic theory of the family, the implicit family loan arrangement theory, the altruistic theory, migration optimists, migration pessimists, and the pluralist view. For the economic theory of the family, remittance inflow is a family relation in which the migrant sends remittance both from altruism and a business point of view (Le, 2011). Based on the implicit loan arrangement theory, a migrant family makes implicit and informal financial market arrangements with their home family members (Vanwey, 2004). On the other hand, the altruistic theory states that migrants decide to remit from their familial character to take care of their families at home (Henry et al., 2009).

The optimist theory forecasts that there is room for developing countries to jump and catch up with developed countries through the capital inflow (De Haas, 2007). On the other hand, the pessimist theory stresses that remittance promotes laziness in recipient households and triggers corruption (Larsson & Ångman, 2014). For the pluralists, remittance in itself is neither a blessing nor a curse as its impact depends on the enabling conditions prevailing in the home country (Adarkwa, 2015; Larsson & Ångman, 2014). Thus, the impact of remittance on investment can be heterogeneous (De Haas, 2010).

As stated earlier, the empirical evidence on the remittance-domestic investment nexus is widely mixed. For example, (Ali & Alpaslan, 2013) found a bidirectional long run positive relationship but no short run relationship. Furthermore, (Dash, 2022) confirmed the long run cointegration of remittance and domestic investment. Using ARDL, (Hossain & Hasanuzzaman, 2012) found a positive unidirectional long run causal relationship running from remittances to domestic investment in Bangladesh. In a similar vein, (Dash, 2020; Khan et al., 2019) also revealed that remittances contribute to physical capital formation, hence domestic investment. Recent studies by (Kemiso, 2022) and (Ogede et al., 2023) revealed that remittances positively influenced economic growth in Ethiopia and Nigeria, respectively. Employing panel data from 10 Western African countries, (Keho, 2024) found that remittance has a positive effect on domestic investment. Furthermore, (Saydaliyev et al., 2020) found a pivotal role of remittances in increasing the financial inclusion of countries given efficient institutions.

On the other hand, (Chaudhary, 2022; Su et al., 2021) found the shadow impact of remittance.

Furthermore, (Mallick, 2012) found that remittance has an adverse negative impact on domestic investment. In a different perspective, remittances are criticized of increasing CO_2 emissions (Rahman et al., 2019), exaggerating income inequality (Ofori et al., 2022), and exerting a direct negative impact on domestic investment (Nyeadi et al., 2022).

Based on data from Indonesia, (Hendika & Setyowati, 2022) found a positive relationship between inflation and domestic investment. In contrast, (McCloud, 2022) concluded that domestic investment does not respond to inflation-targeting policies both in short run and long run. Similarly, (Kamasa et al., 2022) revealed that inflation uncertainty significantly hurts domestic investment by triggering volatility in commodity prices in Ghana. (Cavallo & Pedemonte, 2016) revealed a positive and significant relationship between national saving and domestic investment rates. On the other hand, (Hasanah, 2020) found that domestic saving and domestic investment have no statistical correlation in the study of the pre-global financial crisis in Indonesia. Real gross domestic product (GDP) is a predictor of domestic investment (Waktola, 2020). (George-anokwuru, 2017) found that the lending

3.2 Conceptual Framework

The flexible accelerator model is a basis for a conceptual framework to understand the impact of remittance on domestic investment in Ethiopia. The accelerator theory of investment explains investment as "a flow into capital stock" which can instantaneously respond to changes in demand for output. This implies that further investment is a function of output growth since increased output growth requires the installment of

The accelerator theory supposes that the required level of capital stock (K^*) is a function of the user cost of capital (i) and the level of output (Q) (Dash et al., 2024). Mathematically expressed:

$$K^* = \partial Q_t i_t^{-\alpha} \qquad (2)$$

Where, ∂ is the adjustment coefficient between the required and past investment rates, α is the elasticity of substitution between labor and capital. Thus, the growth rate of investment can be

rate has a statistically significant negative relationship with domestic investment in Nigeria. In contrast, (Vithessonthi et al., 2017) revealed that the lending rate is ineffective in moderating the sensitivity of firms to investment.

3. Data and Methods

3.1 Data Sources and Variable Description

The data for all the variables came from the National Bank of Ethiopia (NBE) for the period 1981-2021. The dependent variable, domestic investment (DINV), includes both private and public investment. On the other hand, the independent variables employed in this study are inflation rate (INF), national saving (NS), real gross domestic product (RGDP), lending rate (LR), and total personal remittance (Remit) measured annually from 1981-2021. For the simplicity of interpretation and, national saving (NS), real gross domestic product (RGDP), personal remittance, and domestic investment (DINV) are transformed into their natural logarithm form. The rationality of transforming these variables into logarithmic form is to punish extreme values, linearizing exponential relationships, and make distributions more normal.

additional capital that in turn fuels further investment (Dash, 2022). The theory posits that firms install new capital when they need to produce more. That is to say that:

$$\Delta I = \beta \Delta \qquad (1)$$

Where, ΔI is change in investment, ΔQ is change in output (change in economic growth), and β is the slope parameter measuring the rate of change of investment with respect to change in output.

expressed as:

$$I_t = \Delta K_t^* \qquad (3)$$

When substituting equation (2) into equation (3), the investment equation becomes:

$$I_t = \Delta \partial Q_t i_t^{-\alpha} \qquad (4)$$

Furthermore, assuming constant elasticity of substitution and introducing an error term, the investment equation can further be expressed as:

$$I_t = \beta_1 \Delta Q_t - \beta_2 \Delta i_t + \varepsilon_t \qquad (5)$$

Thus, following (Dash, 2022; Dash et al., 2024) this study employed the flexible accelerator investment theory as a conceptual model that captures the remittance-domestic investment relationship, which the ARDL model develops, is expressed as:

A framework to develop the autoregressive distributed lag (ARDL) model in its attempt to examine the relationship between remittance and domestic investment. Therefore, the theoretical

$$DINV_t = \alpha + \beta_1 LR_t + \beta_2 RGDP_t + \beta_3 INF_t + \beta_4 NS_t + \beta_5 REMIT_t + \varepsilon_t \qquad (6)$$

Where, DINV is domestic investment, LR is lending rate, RGDP is real gross domestic product, INF is inflation rate, NS is national saving, REMIT is remittance.

3.3 Empirical Model: Autoregressive Distributed Lag Model (ARDL)

The autoregressive distributed lag (ARDL) model is an unrestricted dynamic model, that specifies a dependent variable as a function of its lag and lags of basic explanatory variables (Ahmed et al., 2018). If there is one cointegration vector, autoregressive distributed lag (ARDL) model is more appropriate regardless of cointegrated order one or zero or both (Nkoro & Uko, 2016). This implies that the ARDL model can be applied for $I(0)$ or $I(1)$ to identify the long run relationship. Regarding its application, (Chaudhary, 2022; Kamasa et al., 2022) employed the ARDL model in their studies of the remittances-investment nexus.

The general autoregressive distributed lag model with P optimal lag of dependent variable domestic investment (DINV) and q optimal lags of covariates lending rate (LR), real gross domestic product (RGDP), inflation rate (INF), national saving (NS), and remittance (Remit) is specified as follows following (Chaudhary, 2022; Kamasa et al., 2022; Rotimi et al., 2022).

$$DINV_t = \varphi_0 + \sum_{j=1}^{p} \beta_j DINV_{t-j} + \sum_{i=0}^{q} \theta_i LR_{t-i} + \sum_{n=0}^{q} \gamma_i RGDP_{t-n} + \sum_{k=0}^{q} \delta_k INF_{t-k} + \sum_{m=0}^{q} \omega_k NS_{t-m} + \sum_{o=0}^{q} \rho_o Remit_{t-o} + \varepsilon_t \qquad (7)$$

Where, $j = 1,2, - - -, p$ and $i, n, k, m, o, d, v = (0,1,2, - - - -, q)$,

Where, φ_0 is constant term and $\beta_j, \theta_i, \gamma_i, \delta_k, \omega_k$, and ρ_o are slope parameters to be estimated, ε_t is the error term, and the variables are as described in equation 6 above.

The autoregressive distributed lag (ARDL) model handles long run cointegration between variables and must test whether there is long run relationship between variables or not. To that end, ARDL bound Cointegration test must be conducted (Genave, 2019).

$$\Delta DINV_t = \alpha_0 + \tau_0 DINV_{t-1} + \tau_1 LR_{t-1} + \tau_2 RGDP_{t-1} + \tau_3 INF_{t-1} + \tau_4 NS_{t-1} + \tau_5 Remit_{t-1} + \sum_{j=1}^{p} \beta_j \Delta DINV_{t-j} + \sum_{i=0}^{q} \theta_i \Delta LR_{t-i} + \sum_{n=0}^{q} \gamma_i \Delta RGDP_{t-n} + \sum_{k=0}^{q} \pi_k \Delta INF_{t-k} + \sum_{m=0}^{q} \omega_k \Delta NS_{t-m} + \sum_{h=0}^{q} \Gamma_h \Delta Remit_{t-h} + \varepsilon_t \qquad (8)$$

Where, $\tau_0 - \tau_5$ are long run coefficients, $\beta_j, \theta_i, \gamma_i, \pi_k, \omega_k, \Gamma_h$ are short run coefficients, and q is the lag order and the variables are as described in equation 6 above.

The null hypothesis of the cointegration test that is H_0: $\tau_0 = \tau_1 = \tau_2 = \tau_3 = \tau_4 = \tau_5 = 0$ is tested against the alternative $H_1 = \tau_0 \neq \tau_1 \neq \tau_2 \neq \tau_3 \neq \tau_4 \neq \tau_5 \neq 0$ based on the usual F-statistics. The decision is that if the calculated F-statistics lies above the upper level of the band, the null hypothesis is rejected. If, on the other hand, the calculated F-statistics lies below the lower level of the band, the null hypothesis cannot be rejected (Hossain & Hasanuzzaman, 2012). The short run dynamics of the parameters estimated are generated by specifying a short run error correction model as follows:

$$\Delta DINV_t = \alpha_0 + \sum_{j=1}^{p} \beta_j \Delta DINV_{t-j} + \sum_{i=0}^{q} \theta_i \Delta LR_{t-i} + \sum_{n=0}^{q} \gamma_i \Delta RGDP_{t-n} +$$

$$\sum_{k=0}^{q} \pi_k \Delta INF_{t-k} + \sum_{m=0}^{q} \omega_k \Delta NS_{t-m} +$$
$$\sum_{h=0}^{q} \Gamma_h \Delta Remit_{t-h} + \lambda ECT_{t-1} + \varepsilon_t \qquad (9)$$

Where, the other coefficients are as described in equation (8), λ is the coefficient of the error correction term that captures the speed of adjustment of the variables after a short run disequilibrium (Magwedere & Marozva, 2024). The value of λ should be significantly negative to confirm the presence of cointegration (long run causal relationship) of the variables in the series (Magwedere & Marozva, 2024).

4. Results and Discussion

4.1 Descriptive analysis

As table 1 below shows, the macroeconomic variables used in the study are analyzed using descriptive statistics.

Table 1: Descriptive Analysis (in millions of dollar except for lending rate and inflation rate in %)

Variables	N	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Domestic investment	41	123000	164000	16067	659734	2.202	7.054
National saving	41	111000	142000	12461.05	590000	2.122	6.815
RGDP	41	363000	397000	101803	1717795	2.275	7.478
Lending rate	41	10.245	3.561	5	21.5	.592	3.473
Inflation rate	41	9.268	10.882	-9.809	44.357	1.147	5.091
Remittance	41	28379.8	38518.79	566.70	189000	2.157	8.692

Source: Authors' computation using STATA15 (Time series data 1981-2021)

4.1.1 Trends of the Macroeconomic Variables Over Time

Almost all variables have grown very slowly over the last 30 years, and it was only after around 2010 that some of the variables showed an increasing trend. It can be seen that national savings and domestic investment have been moving very closely, except that they departed from each other in recent times. Furthermore, the growth of remittance over time has been extremely steady. Surprisingly, the inflation rate and lending rate overlapped throughout the time series period.

Figure 1 below shows the trends of the macroeconomic variables used in the study over time.
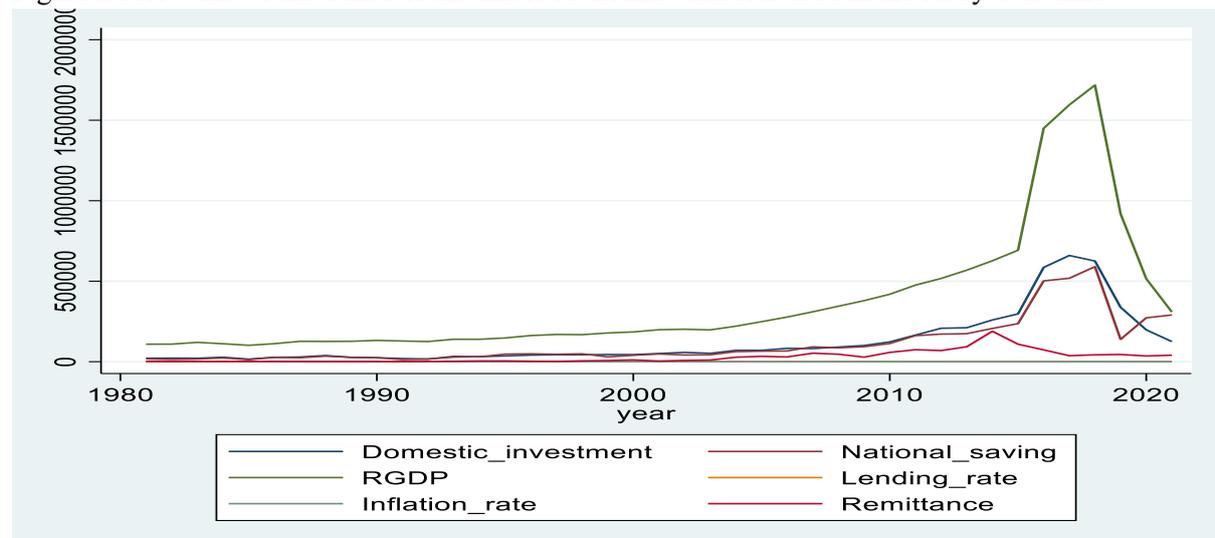

Figure 1: Trends of the Macroeconomic Variables
Source: Authors' computation using STATA15 (Time series data 1981-2021)

4.2 Pre-estimation Diagnostic Tests

4.2.1 Unit root test

A time series data is said to be stationary if its

first, second, and cross moments are time invariant. The first moment of the stochastic process must be constant irrespective of time. The variance of the stochastic process must be independent of time. This study used the Augmented Dickey Fuller test (ADF) to test the stationarity of the series. Augmented Dickey-Fuller test has a good strength in that it accounts for different lags of variables and autocorrelation (Ojapinwa & Odekunle, 2013).

The Augmented Dickey Fuller (ADF) test shows that two variables are integrated of order zero i.e

$I(0)$ but the remaining four variables are integrated of order one i.e $I(1)$ (Table 1). This result ensures that the autoregressive distributed lag (ARDL) model is an appropriate method of estimation for this study. According to (Nasrullah et al., 2021), ARDL is the best model when variables are stationary at level and first difference.

Table 2 below summarizes ADF test for each variable.

Table 2: Unit root test (ADF test results)

| Level Tests | Variables | Types of stationarity | | | Decision |
		Drift	Without drift	Trend	I(d)
At level	lnDIV	-1.073	0.889	-1.606	Need differencing
	lnRemit	-0.974	0.995	-2.088	Need differencing
	lnRGDP	-1.144	0.704	-0.946	Need differencing
	lnNS	-1.040	1.007	-3.760	I(0)
	LR	-0.739	0.973	-1.655	Need differencing
	INF	-4.714	-3.115	-5.139	I(0)
At first difference	lnDIV	-4.913	-4.887	-4.869	I(1)
	lnRemit	-6.219	-6.109	-6.146	I(1)
	lnRGDP	-2.689	-2.761	-2.708	I(1)
	LR	-4.806	-4.693	-4.776	I(1)

Source: Authors' computation using STATA15 (Time series data 1981-2021)

4.2.2   Optimal Lag Selection

There are many optimal lag length selection techniques like Aikaike's information criterion (AIC), Schwarz information criterion (SIC), Hannan-Quinn criterion (HQC), final prediction error (FPE), and Bayesian information criterion (BIC) (Khim & Liew, 2004). This study used the

SIC to select the optimal lags as it is conservative and produces the most important lags of variables avoiding over parameterization. The following table (table 3) shows the optimal lag of each variable included in the study.

Table 3: Optimal lag-length selection test

Variable	lag	LL	LR	df	p-value	FPE	AIC	HQIC	SBIC
lnDINV	3	-2.362	4.128*	1	0.042	.083	.343	.405	.518
lnRemit	1	-25.667	91.311*	1	0.000	.261	1.495	1.526	1.582
lnGS	1	-18.674	68.564*	1	0.000	.179	1.117	1.148	1.204
lnRGDP	4	16.738	6.8947*	1	0.009	.031	-.634	-.557	-.416
LR	1	-77.833	40.512*	1	0.000	4.382	4.315	4.346	4.402
INF	3	-138.431	4.116*	1	0.042	129.278	7.698	7.760	7.873

Source: Source: Authors' computation using STATA15 (Time series data 1981-2021)

4.2.3   Bound Cointegration Test

The existence of long run relationship between time series variables under consideration can be treated with the help of a bound cointegration test (Yiheyis & Woldemariam, 2016). Cointegration

is the stationarity of the linear combination of individually non-stationary time series variables. This study conducted bound cointegration test,

and the result shows that there is a long run relationship between variables captured in the study as the calculated F-statistics is greater than the values at all levels of significance as shown in Table 4 below.

Table 4: Bound Cointegration Test

Test statistic	Value	Significance level	I(0)	I(1)
F-statistic	9.336	1%	3.41	4.68***
		5%	2.62	3.79***
		10%	2.26	3.35***

Source: Authors' computation (Time series data 1981-2021)

4.3 The Long Run ARDL model Result

The long run ARDL model result is shown below in Table 5.

Table 5: The Long Run ARDL Model Result

Variable	Coefficients	t-value	P-value
LR(-1)	-0.0299	-3.52	0.003***
lnNS(-1)	-0.0110	-0.54	0.598
lnRGDP(-1)	0.9421	3.32	0.004***
lnRemit(-1)	0.0514	2.04	0.058*
INF(-1)	0.0030	2.06	0.056*
Cons	0.2226	0.51	0.614
N	36		
R-squared	0.964		
Adj R-squared	0.921		
Log likelihood	47.83		
Root MSE	0.096		
Durbin-Watson (20,36)	2.036		

Source: Authors' computation (Time series data 1981-2021)

The Long run ARDL model result above (Table 5) shows that remittance is positive and statistically significant. The coefficient of remittance shows that a percentage increase in remittance increases domestic investment by 5% indicating that Ethiopian migrants indeed invest part of their remittance in their home country. This indicates that investment is more elastic to every dollar remittances inflowing to the country. On the other hand, this strong elasticity might be due to the low investment base the country experiences with other sources of investments, such as national savings. The effect of national saving on investment is insignificant, indicating the effect of financial globalization, a scenario where investment is financed by foreign capital and the effect of national saving is infinitesimal. On the other hand, national savings may not have significant effect on investment if there is capital flight in the country.

In addition, real GDP (RGDP) and inflation have a significant positive relationship with domestic investment. The highly statistically significant value of real GDP indicates that output growth indeed fuels further investment that is in line with the accelerator theory of investment.

Although the coefficient of inflation is positive, its value is quite small (0.3%) indicating that higher inflation is harmful to the economy and

only moderate level is helpful. In contrast, lending rate (LR) has a significant negative long run relationship with domestic investment. This is because when the cost of capital is very high, in exceptional cases unaffordable to investors, investment unequivocally decreases which again

4.4 The Short Run Error Correction Model

The error correction model must be specified if there is long run relationship between the variables (Khan et al., 2019). Error correction model

confirms the assumption of the accelerator theory. Given other factors constant, as lending rate increases by one percent, domestic investment (DINV) decreases approximately by 3%.

involves short run relationship between economic variables, and it measures the speed of short run disequilibrium adjustment towards long run equilibrium. The ECM model result is presented as follows in Table 6 below.

Table 6: Short Run Error Correction Model Result

Variables	Coefficients	t-statistics	P-value
$\Delta lnDINV(-1)$	0.5796043	2.11	0.051**
$\Delta lnDINV(-2)$	0.3992099	2.83	0.012**
ΔLR	0.011152	0.67	0.514
$\Delta lnNS$	0.223204	2.16	0.046**
$\Delta lnNS(-1)$	0.3070796	2.79	0.013**
$\Delta lnRGDP$	1.339814	-2.34	0.033**
$\Delta lnRGDP(-1)$	-0.7248576	-1.34	0.199
$\Delta lnRGDP(-2)$	-0.6739257	-1.37	0.191
$\Delta lnRGDP(-3)$	-0.2482912	-0.76	0.457
$\Delta lnRemit$	-0.0377646	-1.00	0.334
ΔINF	-0.0053682	-1.77	0.095*
$\Delta INF(-1)$	-0.0054179	-2.22	0.041**
$\Delta INF(-2)$	-0.0032862	-1.63	0.122
ECT_{t-1}	-2.20	-6.1	0.000***
Cons	0.2226515	0.51	0.614

Source: Authors' computation using STATA15 (Time series data 1981-2021)

The results of the short run EC model show that the coefficients of national saving ($\Delta lnNS$) and real gross domestic product ($\Delta lnRGDP$) are positive and significant but the coefficient of inflation (ΔINF) is significant and negative. The positive impact of real gross domestic product on investment may be through its impact on aggregate demand (Mallick, 2012) as proposed by the acceleration theory. The coefficient of remittance ($\Delta lnRemit$) is negative but statistically insignificant in the short run EC model. This finding is similar to (Hossain & Hasanuzzaman, 2012) who reported a short run negative impact of remittance on investment in Bangladesh. The short run negative impact of remittance on domestic investment can be attributed to the following perspectives. First, when increased remittance, denominated in foreign currency, flows to the home country, it raises the demand for local currency,

which in turn, makes export more expensive. When exports become expensive, profit margin decreases and investors become discouraged, leading to limited domestic investment in the short run. Second, remittances in the short run are used for consumption instead of saving, as a way for survival, which decreases local funds for domestic investment. However, in the Ethiopian context, there is no evidence that remittance significantly affects domestic investment negatively in the short run.

The error correction term (ECM_{t-1}) which measures the speed of adjustment to the long run equilibrium is significantly negative (coefficient =-2.20 and p = 0.000) and confirms the presence of cointegration of variables, as (Alogoskoufis & Smith, 1991) explained that if an ARDL series can have an error correction representation, the variables in the series are cointegrated. It has

been recommended that the value of the error correction term lies between zero and one in absolute value. However, in this study the coefficient of the term is even much larger than one (1): 2.20 in absolute value. Of course, (Narayan & Smyth, 2006) found an error correction term coefficient of 1.21 and (Nigusse et al., 2019) also found 1.72 in absolute value. This large value implies that "instead of monotonically converging to the equilibrium path directly, the error correction model fluctuates around the long run value in a dampening manner. However, once this process is done, convergence to the equilibrium path is rapid" (Narayan & Smyth, 2006). Furthermore, the value indicates that the deviation from long run equilibrium in the current period is corrected by 220% in the next year and the adjustment process of the variables follows an oscillating type of convergence to the long run equilibrium and it takes less than a year to return to its long run equilibrium (Nigusse et al., 2019).

4.5 Model Fitness Tests

Testing the goodness of fit of models is common in empirical studies. The Durbin-Watson statistic 2.036 confirms the best fit of the model. The value of the Breusch- Godfrey LM test of serial correlation is 0.7212 which is greater than 0.05 which implying that the null hypothesis of no serial correlation cannot be rejected. No serial correlation means that the model is correctly specified with the appropriate functional form (Hossain & Hasanuzzaman, 2012). The result is shown in Table 7 below.

Table 7: **Breusch- Godfrey LM Test of Serial Correlation**

Lag(p)	χ^2	df	Prob > χ^2
1	0.127	1	0.7212

Source: Source: Authors' computation using STATA15 (Time series data 1981-2021)

The Ramsey RESET test of omitted variable bias with a null hypothesis of no omitted variables was used. The decision is accept the null hypothesis when the generated p-value is greater than the standard 5% significance level. The result obtained $F(3,26) = 1.70$ with prob>F = 0.1909, which is much greater than 5%, leading to accept the null hypothesis of no omitted variable bias in the model (Nigusse et al., 2019).

The skewness-kurtosis test (Lobato & Velasco, 2004) of normality with probability of 0.5998, which is higher than 5%, confirms that the residual term is normally distributed.

The relationship between variables may change due to structural breaks or other shocks. According to (Brown et al., 1975), time series regression has one important assumption: the relationship between variables must be constant over time. Thus, (Brown et al., 1975) suggested the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) to test the dynamic stability of time series analysis. This study used CUSUM and CUSUMSQ as tools of model stability. The recursive statistic value is 0.4981, which is less than the recursive values at all critical values, and this implies that the model is stable with the specified lag lengths of variables. Table 8 below presents the stability test.

Table 8: Stability Test

Statistic	Test statistic	1%	5%	10%
recursive	0.4981	1.1430	0.9479	0.850

Source: Source: Authors' computation using STATA15 (Time series data 1981-2021)

The CUSUM plot also shows that CUSUM process is inside of the band as shown in figure 2 below.
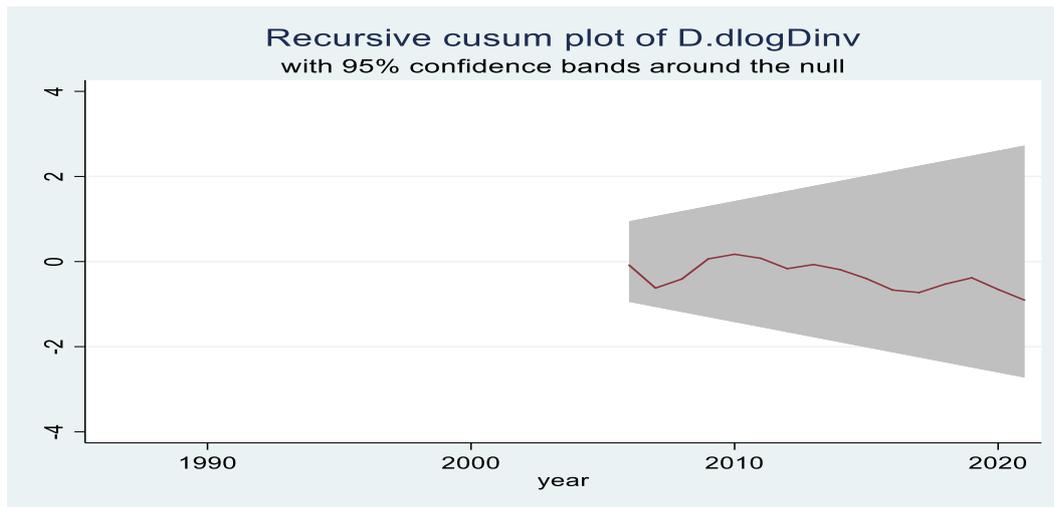
Figure 2: CUSUM plot

5. Discussion

This study found that remittance has short run negative but long run positive relationship with domestic investment in Ethiopia for the period 1981-2021. This finding is substantiated by the pluralist view of remittance that remittance can have both positive and negative impacts on investment. In line with the idea of the pluralist view, (Issifu, 2018; Nyeadi et al., 2022) emphasized the role of financial and institutional quality for remittance to contribute positively to domestic investment.

Furthermore, in the short run migrants may invest in necessities such as food, clothing, and housing for themselves as well as for their home family (Khan et al., 2019). According to the pessimist theory of migration, remittance is considered extremely dangerous to the receiving country as it is often invested in unproductive activities (Haan et al., 2000). Furthermore, remittance may go against investment due to the unattractive investment environment in the country. In line with this, (Adenutsi & Ahortor, 2021) found that remittance in Sub-Saharan Africa is dominantly driven by the altruistic behavior of migrants and a weak self-interest motive to invest.

The ineffectiveness of remittance may be because of weak or absent institutions and policies that direct remittances to productive investments (Comes, 2018). Furthermore, for remittance to be successful in achieving macroeconomic goals governments should create conducive business environments (Zardoub, 2023). Similarly, (Chaudhary, 2022) found a negative relationship between remittance and investment due to the lack of remittance focused policies in Nepal.

The long run positive relationship between remittance and domestic investment was justified as remittances in the long run contribute in part in financing investment through removing capital constraints (Haan et al., 2000). This finding is in line with the findings of (Ali & Alpaslan, 2013; Dash, 2020, 2022; Gheeraert et al., 2008; Khan et al., 2019; Nonyelum et al., 2023; Nwokolo et al., 2021; Yasmeen & Anjum, 2016).

The lending rate had long run significant negative relationship with domestic investment (George-anokwuru, 2017; Vithessonthi et al., 2017). This is because an increase in lending rate means an increased cost of borrowing for investors that in turn may force them to decrease further investment that supports the idea of the accelerator theory that assumes that the required level of capital depends on the cost of capital. The finding of this study supports the arguments of (Geddafa & Shukla, 2023; Waktola, 2020). For saving and investment to have a positive relationship, structural factors must be established a priori (Bodman, 2006). More specifically, (Bodman, 2006) unequivocally stated that "government policy plays a significant role in producing time series correlations between saving and investment". To add more, (Schmidt, 2003) found that investment

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is independent of the savings rate in Australia.

Real gross domestic product (RGDP) had a statistically significant positive relationship with domestic investment both in the short run and in long run. This finding supports the accelerator theory that the growth rate of investment is determined by the growth rate of output. This result is supported by the finding of (Waktola, 2020) who reported that the growth of real GDP promotes investment in Ethiopia.

Inflation had a statistically significant negative impact on domestic investment in the short run but a positive impact in the long run. This result is in line with the findings of (Onwe & Olarenwaju, 2014), who found a negative short run but positive long run relationship between inflation and corporate saving. The short run negative impact of inflation can be justified in the short run as high inflation poses uncertainty in future investment and therefore, firms may decide to cut further investment (McCloud, 2022). In addition, (Kamasa et al., 2022) found that inflation is an uncertainty that causes the investment environment to panic and finally slows down investment through, at least, volatile prices. The long run positive impact of inflation on domestic investment supports the finding of (Hendika & Setyowati, 2022).

As the saying goes, "All models are wrong but some are useful", this study has some limitations. Extent of business freedom, institutional quality, and financial development conditioned the impact of remittance on investment but this study has not capture these variables due to lack of quality data on the mentioned variables. Furthermore, better evidence can be obtained by incorporating additional variables in the time series analysis of remittance.

6. Conclusion and Recommendations

Remittances have become one of the external sources of financial resources for developing countries to narrow saving-investment gap. This study examined the impact of remittance inflow on domestic investment over the period 1981-2021 based on data from Ethiopia using the autoregressive distributed lag (ARDL) model. The long run ARDL model result showed that lending rate and national saving had a negative impact on domestic investment at different levels of statistical significance, whereas real GDP, remittance, and inflation had a statistically significant positive impact on domestic investment in Ethiopia. The short run error correction model (ECM) result showed that national saving and real gross domestic product had a significant positive relationship with domestic investment whereas inflation and remittance had negative impact at varied levels of significance. Therefore, the study recommends that the government of Ethiopia should formulate policies that effectively direct remittances to foster domestic investment. For remittance to have a positive influence on domestic investment both in the short run and in long run, conducive investment environments should be in place including developing well-functioning financial systems, diaspora bond, lowering transaction costs, and improving financial literacy of the wider population.

Conflict of Interest

The authors declare that they have no known financial or non-financial conflicts of interests.

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