The Impact of Personal Remittance on Economic Growth in Sri Lanka: An Autoregressive Distributed Lag Bound Test

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Abstract

The study explores the impact of personal remittances on the economic growth of Sri Lanka from 1980 to 2021. The Autoregressive Distributed Lag (ARDL) technique is employed to analyze both long-term and short-term effects of personal remittances on the country's economic growth. Findings revealed a positive and statistically significant influence of personal remittances on long-term economic growth. However, no short-term causal relationship between the two variables was observed. Further, it was noted that outward labor migration does not have a significant impact on economic growth either in the long or short run. On the other hand, the study confirmed that gross fixed capital formation significantly and positively contributes to economic growth in both temporal dimensions though foreign direct investment and had a negative but statistically insignificant impact on the long-term economic growth. Moreover, the study underscored the critical role of gross fixed capital formation as a determinant of economic growth, emphasizing its significance both in the long and short run. The study implications highlight the importance of effectively leveraging remittances to foster the economic growth of the country. The intention is to provide valuable insights to the government and policymakers, aiding them in formulating domestic policies for the management of migration from Sri Lanka and strategic utilization of remittances for the country's benefit.

Keywords: *ARDL bound test, Economic growth, Personal Remittance, Sri Lanka*

JEL Classification: *F24, F43*

Introduction

The relationship between remittances and economic growth has captured attention of economists and policymakers in recent years. Remittances have increased remarkably in recent decades, proving to be notably less volatile compared to other traditional sources of foreign exchange (Amuedo-Dorantes & Pozo, 2023). In many developing countries, remittances serve as a significant and much-needed source of funds. They

facilitate accumulation of human capital, fostering healthier lifestyles, enhancing access to healthcare, higher educational attainment and poverty reduction (Amuedo-Dorantes & Pozo, 2023). In Sri Lanka, remittances play a vital role in enhancing the well-being of family members left behind and are considered to be contributing to the country's economic growth. The country has a longstanding tradition of migration, with its citizens venturing abroad for work and education as early as the 20th Century. However, since the 1970s, there has been a substantial increase in emigration from Sri Lanka, primarily due to the relaxation of immigration policies in several Western nations. Workers' remittances act as a substantial buffer against the widening trade deficit bolstering the external sector resilience of the country.

As reported by the World Bank (2024), Sri Lanka stands as one of the largest recipients of remittances in South Asia, with overseas Sri Lankans remitting an estimated US$7140 million in 2020, which accounted for approximately 8.47 % of the country's GDP (World Bank, 2024). This influx of foreign currency would have significantly impacted the nation's economy, particularly in terms of poverty reduction, household consumption, and investment. Notably, workers' remittances have been a substantial source of foreign exchange earnings, consistently covering approximately 80% of the annual trade deficit, on average, over the past two decades (Central Bank of Sri Lanka, 2022). Remittances have proven to be non-debt creating foreign exchange inflows, distinct from many merchandise exports, as they do not involve imported content. Strengthening remittance inflows to Sri Lanka offers several macroeconomic and socioeconomic benefits, including narrowing the current account deficit of the Balance of Payments, supporting economic growth, improving foreign exchange liquidity in the banking system, reducing poverty and income disparities, addressing regional disparities, and alleviating the fiscal burden related to social security payments (Central Bank of Sri Lanka, 2022).

Given the substantial contribution of foreign remittances to the Sri Lankan economy, there is a growing interest in understanding their impact on economic growth. However, despite the increasing significance of remittances, their impact on economic growth has not been extensively explored, particularly in the Sri Lankan context, within the broader landscape of international financial inflows.

International literature regarding the impact of remittances on economic growth remains inconclusive. While some studies assert positive effects of remittances on economic growth (Paranavithana, 2014; Ramanayaka & Wijethunga, 2018; Das et al., 2019; Kadozi, 2019; Kharel & Upadhyay, 2021; Aslam & Alibuhtto, 2023) some other studies have failed to establish a significant relationship between remittances and economic growth. Consequently, unraveling the dynamic relationship between foreign remittances and economic growth in a country is pivotal for policymakers. This understanding is crucial to formulate effective policies that optimize the benefits of remittance inflows while mitigating potential detriments.

The main objective of this study is to empirically analyze the impact of personal remittances on economic growth, using Sri Lanka as a case study for the period 1980 to 2021. Employing the ARDL bound cointegration test by Pesaran et al. (2001) to examine the relationship between remittances and economic growth, this research could contribute significantly to economic literature, not only in Sri Lanka but in relation to developing countries as well.

The remainder of this paper is organized as follows. The second section reviews the theoretical and empirical literature on remittances and economic growth. The third section presents the remittance inflow and growth performance of Sri Lanka, while the fourth section summarizes the analytical framework. The fifth section explains the data sources and describes the variables. The sixth section discusses the econometric methodology and empirical results, followed by a conclusion and policy implications in the last section.

Literature Review

Theoretical Literature

Personal remittances and their impact on economic growth have received considerable attention in economics. Researchers have used various theoretical frameworks to examine the relationship between remittances and economic progress. The review considers relevant theories, such as the neo-classical view, the structuralist view and the pluralist view. The neo-classical view holds an optimistic view of remittances and its impact on economic growth. According to the neo-classical view, the flows of personal remittances as well as experience, skills and knowledge that migrants acquire abroad will increase economic growth in the recipient countries (Adenutsi, 2010; Anaynwu & Erhijakpor, 2010; de Haas, 2007). Furthermore, the neo-classical view emphasizes that personal remittances reduce the level of unemployment, improves the living standards of the poor, contributes to public infrastructure, fostering community development and sustainable livelihoods (Nzima et.al, 2016). The Neo-classical view of personal remittances sheds a positive light. In the neo-classical view, personal remittances are a process contributing to the optimal allocation of production factors, which benefit all equally, both the countries of origin and recipients (de Haas, 2007).

On the other hand, the structuralist view has a negative stance regarding personal remittance effect on economic growth. According to this view, international migration increases the dependency level of remittance recipient countries on remittance inflows, and also affects economic growth, since only a few households receive remittances, leading to inequalities among the population. Further, the structuralist view emphasizes that personal remittances as a process drain developing countries in general and backward rural areas in particular of their labor and human capital resources. Personal remittance will not contribute to the alleviation of poverty of the worst-off. Instead, the gradual undermining of traditional economies could even increase the deprivation of non-remittance families (de Haas, 2007). In addition to above, personal remittances

could also create an inflationary pressure on the economy (Guha, 2013). If the remittance received are spent mainly on consumption, rather than investment, this could encourage more rapid inflation in the remittance receiving developing countries (Imai et al, 2014; Mughal, 2013; Acosta et al., 2006).

The pluralistic view stresses that there are no strictly optimistic or pessimistic outcomes due to remittances in the remittance receiving countries. The third view tries to link the two views above and argues that personal remittances have both optimistic and pessimistic impacts on economic growth (de Haas, 2010). Accordingly, personal remittances will impact economic growth positively if recipients of these remittances use them for productive purposes and negatively if recipients use them for unproductive purposes.

Empirical Literature

The relationship between remittance and growth is a highly debated topic. Although several studies covering different groups of countries and periods have found that remittance is an important determinant of economic growth, the overall evidence reveals ambiguous results regarding this relationship. While a majority of the studies (Aslam & Alibuhtto, 2023; Kharel & Upadhyay, 2021; Kadozi, 2019; Das et al., 2019; Eggoh et al, 2019; Ramanayaka & Wijethunga ,2018; Kaphle, 2017; Meyer & Shera, 2017; Ahmad et al., 2016; Loto & Alao, 2016; Azam, 2015; Adeyi, 2015; Paranavithana, 2014; Sharma, 2013; Siddique et al., 2012; Pradhan et al.,2008) provide a positive link between remittances and economic growth, a few studies (Bandara, 2019; Datta & Sarkar, 2014; Chami et al.,2005) fail to establish this connection.

Aslam & Alibuhtto (2023) investigated the long-term relationship between workers' remittances and economic growth in Sri Lanka using time series data for the years 1975–2021. Both exploratory data analysis (EDA) and inferential data analysis (IDA) tools were used in this study. Remittances from employees are positively correlated with GDP per capita, according to EDA. This study shows a positive long-term relationship between worker remittances and GDP per capita. Both short- and long-term causal relationships exist between worker remittances and GDP per capita. According to the IRF analysis, an initial shock to worker remittances of one standard deviation has a significant positive effect on economic growth.

Kharel & Upadhyay (2021) measure the impact of labor migration on macroeconomic variables using statistical tools such as error correction and regression models from 1995-2019. The study finds that the flow of remittance has increased and positively impacted macroeconomic variables during the study period. The results show a positive relationship between foreign employment and Remittance and a positive impact on economic growth. Kadozi (2019) examines the impact of remittance inflows on economic growth in Sub-Saharan Africa (SSA) countries and Rwanda in particular for the period between 1980 and 2014. The cross-sectional analysis of SSA countries shows no statistically significant impact of remittances on the economic growth in the region.

However, it is found that remittance-growth impact is positively and statistically significantly conditioned by the country's level of development, financial development, and education, while the quality of institutional variables adversely affects the remittance-growth impact in the region. In contrast, the same findings reveal a positive and significant growth impact on remittances in Rwanda. The results of the country-level analysis reveal plausible evidence of long-run causality running from remittances to GDP per capita in Rwanda, but not vice versa.

Das et al. (2019) deeply discuss the relationship between GDP and remittances, highlighting their finding that GDP and remittances are cointegrated wherein they reinforce each other positively. This finding is statistically robust with ARDL models having well-behaved errors and parameters that are generally stable over the period 1976–2014. Eggoh et al. (2019) provide econometric evidence on whether international remittance spur economic growth considering estimates from a sample of 49 developing countries during the period 2001-2013. Using Panel Smooth Transition Regression (PSTR) difference and system generalized methods of moment models, they find that remittances have a positive and significant impact on economic growth in developing countries, unlike aid and foreign direct investments that have a trivial impact.

Ramanayaka & Wijethunga (2018) provide convincing evidence to support the growing belief in the significance of remittances as an external source of financing, with significant support for domestic economic growth, associated with development policies, and gender issues. This study examines various labor migration trends and analyzes remittance inflows and their effects on Sri Lanka's economy between 1970 and 2015. Kaphle (2017) conducted a study examining the relationship between remittances and trade to economic growth in Nepal for the period between 1976 and 2017, using time series econometric techniques; unit root, cointegration, and ECM. The outcome of this study confirms the long-run relationship between remittances, trade, and economic growth. However, no short-run causal relationship was found between remittances and economic growth, though trade showed a significant influence, even in the short run, on GDP for the period of analysis (Gimhani & Francis, 2016).

Meyer & Shera (2017) used annual panel data from 1999 to 2013 to investigate the effects of worker remittances on the economic growth of Albania and five neighboring nations. Multiple regression analysis was used to investigate the relationship between worker remittances and economic growth. The findings demonstrated that worker remittances significantly and positively contributed to the economic growth of the six countries. Ahmad et al. (2016) conducted an important study on the impact of workers' remittances on Pakistan's economic development. This study provided significant evidence on the important economic question of whether worker remittances contributed to economic growth in Pakistan between 1980 and 2010. The quantitative evidence showed that worker remittances were likely to be a major source of economic growth for the country.

Loto & Alao (2016) investigated the contribution of remittances to economic growth in Nigeria from 1980 to 2016 using the VECM technique. The study concluded that remittance is a major driver of Nigeria's economic growth. Azam (2015) regressed GDP against openness to trade, FDI, the number of telephone lines, and remittances for four South Asian countries; Bangladesh, India, Pakistan, and Sri Lanka for the period from 1976 to 2012. The empirical results support the existence of a significantly positive relationship between migrant workers' remittances and economic growth. This study provided valuable evidence on the significance of migrant workers' remittances as a source of economic growth.

Adeyi (2015) examined remittances and economic growth in Nigeria and Sri Lanka from 1985 to 2014 using Granger causality under the VAR framework. The results revealed that there is a unidirectional link in Nigeria; that is, remittances are found to lead to economic growth, while as would be expected economic growth does not lead to remittance inflow. However, in Sri Lanka, a two-way directional causality is found, that is, remittances influence growth in economic growth and vice versa. Paranavithana (2014) examined the effect of workers' remittances on economic growth in Sri Lanka using annual time-series data from 1977 to 2012. VECM based empirical evidence suggests a long-term, positive, direct, and indirect relationships between worker remittances and economic growth. However, the results of the Wald test show no direct or indirect short-run causal relationship between worker remittances and economic growth.

Sharma (2013) found that international contract-based migration benefits relatively poor households, on average, but that there are a number of significant restrictions. First, obtaining an overseas employment contract and financing moving-related costs are expensive, and poor households with limited credit or liquidity are less likely to take advantage of migration opportunities. Second, it is less likely that many poor households have the necessary social networks to support successful job search. The overall impact of migration showed positive outcomes in areas such as health, food consumption, and other basic goods by examining household survey data for a sample of migrant and non-migrant households from the Western province of Sri Lanka.

Siddique et al. (2012) use time series data spanning a 25-year period to apply the Granger causality test under a VAR framework to examine the causal relationship between remittances and economic growth in Bangladesh, India, and Sri Lanka. According to this study, remittances contributed to Bangladeshi economic expansion. In Sri Lanka, two-way directional causality was found, meaning that economic growth contributed to growth in remittances and vice versa. In India, there appears to be no causal relationship between remittance growth and economic growth. Pradhan et al. (2008) investigates the impact of worker remittances on economic growth in a sample of 39 developing nations using panel data from 1980 to 2004. The empirical results

demonstrated a significant overall fit based on the fixed effects method. Growth is has a positive effect due to remittances.

Sutradhar (2020) examines the effect of workers' remittances on the economic growth of four emerging South Asian nations. To calculate the effect of remittances, using balanced panel data from 1977 to 2016. According to empirical regression analysis, remittances had a detrimental impact on economic growth in Bangladesh, Pakistan, and Sri Lanka. Remittances, however, benefited India's economic expansion. This study also shows that remittances and economic growth in the four countries have a significant and adverse relationship. The relationship between remittances, financial sector development, and economic growth in Nigeria from 1981 to 2017 was the subject of Anetor (2019). The study examined the long-run and short-run relationships between the variables using the ARDL model. The findings demonstrate that remittances have both long-term and short-term negative and significant impacts on economic growth.

Bandara (2019) focused on identifying the significance of the relationship between workers' remittances and economic growth in the Sri Lankan context, using time series data for 31 years, from 1985 to 2015. According to the results of the statistical analysis, a negative but insignificant relationship was found between workers' remittances and economic growth. Datta & Sarkar (2014) used time series econometric methods, specifically the ARDL framework, to analyze the effect of remittances on economic growth in the Bangladeshi economy. According to the study, remittances to Bangladesh have grown significantly over the past 20 years and now account for more than 10% of the GDP as of 2008. While remittances can promote growth and development, and avert balance of payment crises, they can also hinder growth if used carelessly or for ostentatious purposes. Remittance recipients run the risk of becoming overly dependent on quick cash, which would make them less motivated and less likely to participate in the labor force, which would affect economic growth.

Chami et al. (2005) developed a model to examine whether remittances are profit-driven or not by using panel data for 113 developing countries from 1970 to 1998. Based on family economics, it was suggested that remittances are compensatory transfers rather than profit-driving transfers, which should be inversely correlated with GDP growth.

Analytical Framework

Based on the literature review, the model employed to examine the impact of personal remittances on economic growth is derived from the production function framework. This particular model has been derived and utilized by previous studies conducted by Iqbal & Sattar (2005), Waheed & Aleem (2008), and Jawaid & Raza (2012). The production framework is as follows:

$$Y = f(A, L, K) \quad (1)$$

where *Y* is the real gross domestic product, *L* is the employed labour force, *K* is the capital stock and *A* is total factor productivity. The impact of remittance inflows can be shown through "A". (Waheed & Aleem, 2008 and Jawaid & Raza, 2012)

$$A = g(REM) \quad (2)$$

Substituting Equation (2) in Equation (1):

$$Y = f(L, K, REM)) \quad (3)$$

Based on the general production function, an empirical model has been developed for estimation as follows:

$$GDPPC = \beta_0 + \beta_1 PREM_t + \beta_2 OLMIG_t + \beta_3 GFCF_t + \beta_4 FDI_t + \beta_5 EX_t + \varepsilon_t \quad (4)$$

In the above model, the variables used to examine the relationship between personal remittances and economic growth (proxied by log GDP per capita in the equation) are as follows. GDPPC (current US$), which serves as a proxy for economic growth. PREM captures Personal remittances, reflecting the inflows of financial transfers from individuals abroad.

In this Multiple linear regression (MLR) function variables have been changed into log format to make the data smooth and remove the problem of heteroskedasticity from the data. The model is as follows.

$$lnGDPPC = \beta_0 + \beta_1 lnPREM_t + \beta_2 lnOLMIG_t + \beta_3 lnGFCF_t + \beta_5 lnFDI_t + \beta_6 lnEX_t + U_i \quad (5)$$

Data Source and Description of Variables

The study employs time series data spanning from 1980 to 2021 to examine the persisting correlation between personal remittances and economic growth in Sri Lanka. Data pertaining to personal remittances (PREM), GDP per capita (GDPPC), and various other macroeconomic indicators - namely, gross fixed capital formation (GFCF), outward labor migration (OLMIG), foreign direct investment (FDI), and exports (EX) have been taken from reputable data sources such as the Central Bank of Sri Lanka (CBSL) annual reports, the World Bank open data, Sri Lanka Bureau of Foreign Employment (SLBFE) statistics, and publications by the Department of Census and Statistics.

The GDP per capita is frequently used as a dependent variable proxy for economic growth when analyzing the relationship between personal remittances and economic growth. There is evidence of a positive correlation between personal remittances and GDP per capita, according to several studies that have looked into this relationship (Giuliano & Ruiz-Arranz, 2009). In the context of this study, Personal remittances received (current US$) is considered the main independent variable. Personal

remittances are the funds sent by individuals working in a foreign country back to their home country. Personal remittances can provide a source of income to recipient households, which can be used for consumption, savings, investment, or other economic activities.

Outward labor migration, Gross fixed capital formation, FDI net inflows and Export of goods and services are considered as controlled variables in the model. Outward labor migration in Sri Lanka refers to the movement of individuals from Sri Lanka to other countries for employment purposes. A number of studies, for example, Chami et al. (2005) and Mountford (1997) found a positive relationship between labour migration and economic growth. Carrington & Detragiache (1998) and Beine, Docquier & Rapoport (2008) found a negative relationship between labour migration and economic growth. Gross fixed capital formation refers to the total value of investments made in the acquisition or production of fixed assets within an economy during a specific time period. By considering GFCF as a controlled variable, we can isolate the specific effect of personal remittances on economic growth while accounting for the potential influence of investment levels. This helps in obtaining a more accurate understanding of the relationship between personal remittances and GDP in Sri Lanka. Considering foreign direct investment as a controlled variable strengthens the validity of our study and allows for a more nuanced understanding of the relationship between personal remittances and GDP in Sri Lanka. It helps identifying the specific role of remittances in driving economic growth while accounting for the potential effects of FDI on the economy. Exports of goods and services refers to the total value of goods and services sold by a country to foreign markets within a given time period. It represents the monetary amount received by the country for its exports. All the variables in the dataset of this study are transformed into natural logarithms for usual statistical reasons.

Econometrics Tests and Results

The study utilized the widely recognized autoregressive distributed lag (ARDL) approach proposed by Pesaran et al. (2001). Among various econometric methods, the ARDL model is considered the most suitable when the variables exhibit stationarity at either order I (0) or integrated of order I(1) or mutually cointegrated (Oteng-Abayie & Frimpong, 2006; Ravinthirakumaran, 2014; Shafiullah & Ravinthirakumaran 2016; Francis et al. 2019; Ravinthirakumaran et.al, 2019; Danthanarayana et.al, 2024). However, it is not applicable when any of the variables exhibit integration of order I(2). In the context of this study's objectives, the ARDL model outperforms other models in capturing both the short-run and long-run effects of personal remittance on economic growth. It offers flexibility in accommodating variables with different orders of integration. Further, the ARDL model allows for the inclusion of lagged variables to capture the dynamic relationship between the variables. The appropriate lags for each variable are determined through diagnostic tests such as the Breusch Godfrey test, Breusch Pegan Godfrey test, and the Normality test.

Unit Root Test

The initial step in the ARDL analysis involves conducting a unit root analysis to determine the integration status of each variable. This step is crucial to satisfy the bounds test assumption of ARDL models. Specifically, it is important to ensure that each variable is either integrated of order zero I(0) or integrated of order one I(1), while avoiding integration of order two I(2). Various tests are available for unit root analysis, including the Augmented Dickey Fuller (ADF), Kwiatkowski-Phillips-Schmidt-Shin (KPSS) and Phillips-Perron (PP), among others. Each test is designed to be compatible with different data characteristics and assumptions. In this paper, authors used the augmented Dickey-Fuller test (Dickey & Fuller, 1979) for unit root analysis. The unit root test results presented in Table 1 provide insights into the stationarity properties of the variables.

Table 1: Augmented Dickey-Fuller test

Variables	In level		In first difference		Conclusion
	t - statistics	p - value	t - statistics	p - value	I(d)
$lnGDPPC$	-2.26	0.45	-4.55	0.00	I(1)
$lnPREM$	-0.14	0.99	-3.59	0.04	I(1)
$lnOLMIG$	-1.28	0.88	-6.30	0.00	I(1)
$lnGFCF$	-2.66	0.26	-5.16	0.00	I(1)
$lnFDI$	-4.31	0.01	--	--	I(0)
$lnEX$	0.45	0.99	-4.87	0.00	I(1)

Note: * and ** indicate significance at 1% and 5% levels, respectively.

Source: Estimated by author using E-View

The results indicate that foreign direct investment is integrated at order zero (I(0)), signifying its stationarity in level form. Conversely, variables such as GDP per capita , personal remittance, outward labor migration, gross fixed capital formation, and exports initially display a unit root in their level form but achieve stationarity upon taking their first difference, establishing them as integrated at order one (I(1)). Consequently, all variables of interest are integrated of order one (I(1)) except for FDI. These results have implications for the time series analysis as they confirm the presence of both non-stationary and stationary variables, which should be taken into consideration when modeling and analysis of the data.

ARDL Bound Test for Cointegration

There are various methods available for investigating cointegration, among which Pesaran et al. (2001) developed the ARDL bounds testing approach. This approach is suitable for assessing cointegration regardless of the order of integration, whether it is I(0) or I(1). In the ARDL bounds testing approach, the cointegration between series is determined based on the calculated F-statistics. The F-statistic test is used to investigate the long-run relationship among the series. For that, the computed F-statistic is

compared with sets of critical values for the bound test. Pesaran et al. (1996) tabulated two sets of critical values for the bound test and were reproduced by Pesaran & Pesaran (1997) and Pesaran et al. (2001). The first set of critical values assumes all variables to be I(0) and it is the Lower Critical Bound (LCB), and the other set of critical values assumes that all variables are I(1), which is the Upper Critical Bound (UCB). If the calculated F-statistics exceed the upper critical bound (UCB), it indicates the presence of cointegration. Conversely, if the F-statistics fall below the lower critical bound (LCB), there is no cointegration. When the calculated F-statistics lie between the UCB and the LCB, the decision regarding cointegration becomes inconclusive.

The ARDL model for the standard log-linear functional specification of long-run relationships among *GDPPC*, *PREM*, *GFCF*, *FDI* and *EX* may be given follow as:

$$\begin{aligned}\Delta lnGDPPC_t = {} & \beta_0 + \sum_{i=1}^{l} \beta_{1i}\, \Delta lnGDPPC_{t-i} + \sum_{i=0}^{m} \beta_{2i}\, \Delta lnPREM_{t-i} \\ & + \sum_{i=0}^{n} \beta_{3i}\, \Delta lnOLMIG_{t-i} + \sum_{i=0}^{o} \beta_{4i}\, \Delta lnGFCF_{t-i} + \sum_{i=0}^{p} \beta_{5i}\, \Delta lnFDI_{t-i} \\ & + \sum_{i=0}^{q} \beta_{6i}\, \Delta lnEX_{t-i} + \alpha_1 lnGDPPC_{t-1} + \alpha_2 lnPREM_{t-1} \\ & + \alpha_3 lnOLMIG_{t-1} + \alpha_4 lnGFCF_{t-1} + \alpha_5 lnFDI_{t-1} + \alpha_6 lnEX_{t-1} \\ & + \varepsilon_t \end{aligned} \quad (6)$$

Where Δ is the first-difference operator, *ln* (.) is the logarithm operator. The left-hand side is the change in GDP per capita, β_0 is the constant and ε_t is the white noise disturbance term. The long-run effect can be inferred by the estimates of α_2 to α_6 which are normalized on α_1, the remaining expressions with the summation sign (β_1 to β_6) representing the short-run dynamics of the model.

Table 2 presents the computed F-statistic for the cointegration test, along with the critical value based on the suggestion by Narayan (2005). Given a relatively small sample size (42) and the use of annual data, a lag length of 2 is used in the bounds test. For annual data, Pesaran & Shin (1999) suggest a maximum of 2 lags (Narayan, 2004).

Table 2: F-Statistic of Cointegration Relationship

Computed F-Statistic	Lag length	Critical Values		Significance Level
		Lower Bound	Upper Bound	
12.77**	5	3.06	4.15	1%
		2.39	3.38	5%
		2.08	3.12	10%

Note: ** shows the cointegration is present at 5% level of significance. The upper and lower bounds were obtained using restricted intercept with trend. The critical values are obtained from Narayan (2005) Table: Case III.

The calculated F-statistic (12.77) is observed to be higher than the upper bound critical value at a 5% level of significance (3.38), considering the restricted intercept and no trend. The result shows that a cointegration relationship exists among the variables. This implies a valid long-run relationship among the variables under consideration, thereby providing a basis for further analysis and investigation. The estimated long-run coefficients of the model given for Equation (1) are reported in Table 3. The long-run test statistics results indicate that the coefficients for PREM, GFCF and EX are statistically significant at the 1% level. The coefficients for the other variables, including OLMIG, and FDI, are not statistically significant at conventional levels.

Table 3: Estimated Long-run Coefficients of GDP per capita

Variable	Coefficient	*t*-Statistic	Probability
C	-5.92	1.39	0.00
$lnPREM^{*}$	1.11	11.56	0.00
$lnOLMIG$	0.05	1.07	0.29
$lnGFCF^{*}$	0.20	3.12	0.00
$lnFDI$	-0.01	-0.22	0.83
$lnEX^{*}$	-5.92	-3.51	0.00

*Note: * and ** indicate significance at 1% and 5% levels, respectively.*

Personal remittances exhibit a substantial positive impact in the long run, with a coefficient of 1.11. Outward labor migration demonstrates a marginal positive effect on the dependent variable in the long run. However, this relationship is not statistically significant at conventional levels, suggesting limited empirical support. Gross fixed capital formation exhibits a significant positive impact on the dependent variable at the 1% level, with a coefficient of 0.20, highlighting the substantial role of gross fixed capital formation. Foreign direct investment proves to have a negligible negative effect on the dependent variable in the long run. This relationship lacks statistical significance, suggesting a weak association between FDI and the dependent variable. Exports (EX) exhibit a noteworthy negative impact on the dependent variable. These results contribute to our understanding of the dynamics between the variables and provide insights for policymakers and stakeholders in formulating strategies to foster economic growth and development.

Error Correction Mechanism

The Error Correction Mechanism (ECM) is a widely used econometric model that incorporates both short-run dynamics and long-run equilibrium relationships between variables (Engle & Granger, 1987). The mechanism is commonly employed in various fields of research, such as macroeconomics, finance, and applied econometrics, to analyze the dynamic interactions between variables and investigate the presence of cointegration (Engle & Granger, 1987). It is particularly useful for analyzing the adjustment process toward long-run equilibrium following short-run shocks. In the mechanism, the differenced variables are typically regressed on lagged values of

themselves and the Error Correction Term (ECT), which captures the deviation from the long-run equilibrium relationship. The ECT represents the speed at which the system corrects any disequilibrium in the short run and adjusts towards the long-run equilibrium. The short-run coefficients indicate the immediate impact of changes in the independent variables on the dependent variable, while the long-run coefficient captures the long-term relationship between the variables after all short-run adjustments have taken place. We obtain the short-run dynamic parameters by estimating an error correction mechanism given by equation (1) associated with the long-run estimates. This is specified as follows:

$$\Delta lnGDPPC_t = \delta_0 + \sum_{i=1}^{l} \delta_{1i}\, \Delta lnGDPPC_{t-i} + \sum_{i=0}^{m} \delta_{2i}\, \Delta lnPREM_{t-i} + \sum_{i=0}^{n} \delta_{3i}\, \Delta lnOLMIG_{t-i} + \sum_{i=0}^{o} \delta_{4i}\, \Delta lnGFCF_{t-i} + \sum_{i=0}^{p} \delta_{5i}\, \Delta lnFDI_{t-i} + \sum_{i=0}^{q} \delta_{6i} \Delta lnEX_{t-i} + \gamma ECT_{t-1} + \mu_t \quad (7)$$

Where ECT_{t-1} is the Error Correction Term. The error correction term is included to capture the short-run dynamics and represent the deviation from the long-run equilibrium relationship.

The outcomes of the error correction mechanism are presented in Table 4, offering valuable insights into the relationship between economic growth and its external determinants in the short run.

Table 4: Short-Run Results Using ARDL Model

Variable	Coefficient	*t*-Statistic	Probability
ΔGFCF	0.03	0.95	0.35
ΔGFCF (-1)	-0.07	-2.51	0.02
ΔEX	0.17	2.85	0.01
ECT (-1)	-0.51	2.85	0.00
R^2	0.79		
AdjR^2	0.77		
F-Statistic	12.77		0.00
DW-Statistic	1.86		

*Note: * indicates significance at 1% level*

As can be seen, the estimated error correction coefficient of ECT(-1), is negative and statistically significant, indicating that cointegration occurs among GDP per capita and other variables in the model. The findings indicate that the coefficient for ΔGFCF is 0.03, suggesting a positive relationship but it does not attain statistical significance at the 5 % level. Conversely, the lagged ΔGFCF (ΔGFCF(-1)) exhibits a coefficient of -

0.07, signifying a statistically significant negative relationship at the 5 % level. The coefficient for ΔEX stands at 0.17, indicating a statistically significant positive relationship at the 1% level. Additionally, the error correction term has a coefficient of -0.51, proving statistically significant at the 1 % level. These results suggest that after a shock, approximately 51%, adjustment towards the long run equilibrium is completed after one year.

Diagnostic and Stability Tests

Diagnostic tests for serial correlation, heteroskedasticity, and normality of the models are considered in this study. The Breusch-Godfrey serial correlation LM test, proposed by Breusch & Godfrey (1981), is employed in this study to detect the presence of serial correlation in the estimated model. By conducting this test, the study aims to ensure the validity and reliability of the results by identifying and addressing any potential issues arising from serial correlation, ultimately enhancing the accuracy of interpretations and conclusions (Breusch & Godfrey, 1981). The Breusch-Pagan-Godfrey test is used in this study to assess the presence of heteroskedasticity in the estimated model. The test, involves regressing the squared residuals from the model on the independent variables. The test statistic is then computed based on the regression results and compared to critical values to determine the presence of heteroskedasticity. If the test statistic exceeds the critical value, it indicates the presence of heteroskedasticity, suggesting that appropriate adjustments should be made to account for this issue (Breusch & Pagan, 1979; Godfrey, 1978). The normality test is conducted in this study to assess whether the error terms of the estimated model follow a normal distribution. Deviations from normality can impact the validity of statistical inference and the reliability of the model's results. Various statistical tests can be employed to assess normality, such as the Shapiro-Wilk test, the Kolmogorov-Smirnov test, or the Jarque-Bera test. These tests assess the skewness and kurtosis of the error terms and compare them to the expected values under normality. If the test statistic exceeds the critical value, it suggests a departure from normality, indicating that the assumptions of the model may not hold (Royston, 1995). Table 5 below shows the summary of results for the diagnostic tests.

Table 5: Diagnostic Test

Test Statistics	F statistics	Probability
A: Serial Correlation	0.550	F (2,30): 0.584
B: Heteroskedasticity	0.900	F (8,32): 0.528
C: Normality	1.953	0.376

Breusch-Godfrey serial correlation LM test results confirm that the model's estimated coefficients and statistical inferences remain reliable and valid within the specified lag range. Breusch-Pagan-Godfrey heteroskedasticity test implies that the residuals of the regression model do not exhibit significant heteroskedasticity. Based on the results of the normality test, the data exhibits certain characteristics of a normal distribution. The

test statistic of 1.953, with a corresponding probability of 0.376, suggests that the departure from normality is not significant at the conventional level of significance. Therefore, it can be concluded that the data is approximately normally distributed, and the assumption of normality needed for the statistical analysis are reasonably met. After establishing the cointegration relationship, it is essential to assess the stability of the estimated model. This study conducts stability tests to ensure the reliability of the long-run parameters and examine the short-run dynamics of the equations. To test stability, the paper adopts the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests proposed by Borensztein et al. (1998). The CUSUM test detects systematic changes from the coefficients of regression, while CUSUMSQ is able to detect the sudden changes from constancy of regression coefficients (Brown et al., 1975). Figures 2 and 3 represent the results of CUSUM and CUSUMSQ tests, respectively.

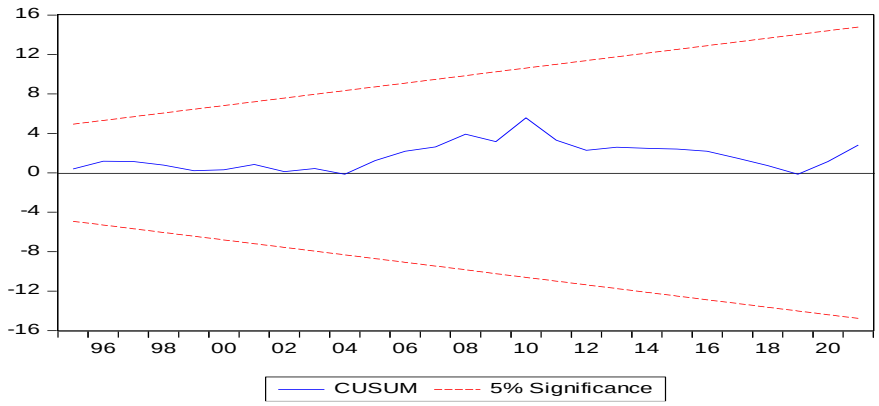

Figure 1: Plot of CUSUM of Recursive Residuals

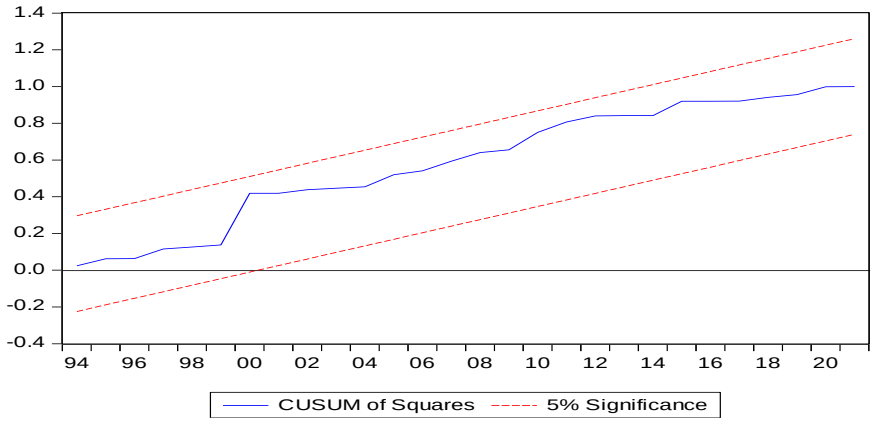

Figure 2: Plot of CUSUMSQ of Recursive Residuals

The results indicate that the statistics of both CUSUM and CUSUMSQ test lie within the interval bands at 5 % confidence interval. The results then suggest that there is no structural instability in the residuals of economic growth equation. The absence of structural instability in the residuals supports the reliability of the model and the validity of the statistical inferences made based on it.

Conclusion and Policy Implications

This study offers valuable insights into the interplay among personal remittances, gross fixed capital formation, exports, outward labor migration, foreign direct investment, and economic growth. The findings highlight that PREM, GFCF, and EX exhibit significant positive effects on economic growth in the long run. However, the relationships between OLMIG and FDI with economic growth do not achieve statistical significance. The reported results affirm the crucial roles of remittances, investment in physical capital, and the promotion of export activities as drivers of sustained economic growth. In light of these findings, policymakers can craft strategies to create an environment conducive to continuous economic expansion by harnessing the potential of personal remittances, attracting investment, boosting exports, and fostering human capital development. These strategic measures have the potential to contribute significantly to long-term economic growth, job creation, poverty reduction, and overall improvement in living standards for the population.

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