

DO REMITTANCES, FOREIGN AID, AND FDI SERVE AS AUTOMATIC OUTPUT STABILIZERS IN SRI LANKA? AN APPLICATION OF THE ARDL APPROACH

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Abstract

For developing nations in particular, the country has strong ties to Foreign Direct Investment (FDI), remittances, and official development assistance. Foreign capital receipts are crucial to Sri Lanka's economic advancement, as with other developing nations. A thorough comprehension of the ramification of these overseas finance on Sri Lanka's national income growth is still lacking, despite much study in the field. This study strives to resolve that void by analyzing the effects of external inflows on Sri Lanka's Gross Domestic Product (GDP) from 1980 to 2022, utilizing available and reliable data. An Autoregressive Distributed Lag (ARDL) model enabled an analysis of the variables' relationship. According to this analysis, Sri Lanka's sustained economic growth is heavily depends by personal remittances, Official Development Assistance, and Foreign Direct Investment. In addition, the Error Correction Term's value of -0.776953 shows that a yearly adjustment of 77.69 will be made to any short-term aberrations in economic growth caused by external shocks, allowing for a restoration to long-term equilibrium. The high Error Correction Term (ECT) value shows that Sri Lanka's economy can withstand a lot of pressure from outside. Stronger financial systems, more diverse economies, and better institutions are the tenets of macroeconomic policies that can fortify this resilience. By providing actual data on the impact of monetary flows on Sri Lanka's growth, this study adds to the existing literature. The findings will provide valuable implementations for policymakers and scholars in enticing funding from outside sources.

Keywords: ARDL approach, Economic development, Foreign, Remittances

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1 Introduction

Worldwide financial inflows, including remittances from employees, Official Development Assistance (ODA), and Foreign Direct Investment (FDI), have been rising during the last 20 years. These have been identified as major drivers of economic growth as well as those are aimed at funding sustainable development in many developing countries like Sri Lanka (Amna & Faouzi, 2023; Alfieri & Havinga, 2006). Savings investment, foreign exchange, and fiscal are the three main gaps frequently encountered by developing countries and often depend on external funding such as FDI, ODA, and remittances to fill this gap (Bacha, 1990). Remittances from migrants have been steadily increasing and have significant outcomes on the economies of host countries (Rao & Hassan, 2012). Further, FDI is vital in providing external capital and facilitating technology exchange, human capital development, global trade connectivity, and business competitiveness (OECD, 2002). In addition, ODA from developed nations plays a crucial role in supporting developing countries by addressing gaps in savings-investment, foreign exchange, and fiscal aspects. Ekanayake & Halkides (2008) found that migrant money transfers are used for consumption, housing, and land instead of being invested in productive activities. Additionally, they contended that these funds are seen as wasteful and may be better utilized to foster development and growth in the long run.

Remittances, foreign aid, and FDI constitute integral components of Sri Lanka's economic landscape, playing pivotal roles in its balance of payments and funding developmental initiatives. These inflows are posited to act as automatic stabilizers, mitigating the impact of economic fluctuations by providing a stable source of income. However, the empirical evidence supporting this proposition remains sparse and inconclusive. Despite substantial money transfers, economists still debate the impact of external financial flows on economic growth (Nikhil, 2016).

Since 1990 until 2024, FDI in Sri Lanka has been unstable holding with varying levels. FDI in 2020 and 2021 was greatly influenced by economic uncertainties caused by the global COVID-19 pandemic. However, Sri Lanka's economy showed improvement in 2022, leading to a gradual recovery of FDI inflows. According to the Central Bank of Sri Lanka's report in 2023, there will be a significant growth in FDI inflows. Between 2020 and 2024, Sri Lanka witnessed notable

variations in migrant remittances. The decline in remittances in 2020 can be recognized to the primary cause of the COVID-19 pandemic. However, there was a change observed when migrant workers began sending money to their families for support during the crisis. In 2021, remittances experienced impressive positive growth, reaching around USD 5.5 billion. With the improvement in economic conditions and the relaxing of global pandemic restrictions, remittances saw a \$6.3 billion flow in 2022. Remittances reordered a small drop to USD 5.97 billion in 2023 as a result of economic challenges faced by the countries where Sri Lankan expatriates are working.

Inflows of remittances surpassed USD 400 million in January 2024, indicating a positive growth. According to the Central Bank of Sri Lanka, there was an 11.4% increase compared to January 2023. Sri Lanka's ODA from 1990 to 2022 also fluctuated because of challenges and recovery efforts. Sri Lanka experienced a rise in ODA from 2020 to 2021 due to international aid efforts focused on COVID-19. The aid encompassed assistance for health services, social protection, and economic stabilization initiatives. The healthcare system received substantial support from the World Bank and other international organizations to address urgent needs and enhance its capabilities.

Sri Lanka's economy suffered a severe contraction in 2022, leading to an economic crisis. The increase in ODA has a direct impact on international endeavors to stabilize the economy and ensure the provision of essential services. Substantial lending for multiple projects, including sustainable development, infrastructure, and human development was authorized by the World Bank. According to the World Bank (2024), the ODA remained vital for Sri Lanka's economic recovery until 2023.

Numerous intellectuals have established a constructive relationship between foreign direct investment (FDI) and economic performance Benedict & Jignesh (2023), Herzer & Amp (2012), Ibrahim & Acquah (2021), Joshua et al. (2021), Nguyen (2020) Reza et al. (2018). Despite this, research by Katerina et al. (2004), Louzi & Abadi (2011), Nagarjuna (2022) shows that foreign direct investment (FDI) has not significantly raised GDP. More official development assistance (ODA) results in better economic growth for recipient states, according to studies by Abate (2022), Aurolipsa & Narayan (2019) and Moolio & Kong (2016). A number of studies have

found that increasing official development assistance (ODA) slows down national economies, including Adjei & colleagues (2020), Ezo et al. (2022), Fashina et al. (2018). Herzer & Dierk (2010), Maheswaranathan (2024), Oladipo (2020), Tiwari (2011) and Yiew & Lau (2018), and were among the empirical researchers that primarily examined the effect of FDI on GDP growth using a single indicator variable. In an effort to address a gap in the current literature, this study employs three independent variables such as ODA, FDI and remittances. Further, Figure 1 points out the trend of ODA, money transfers from migrant workers, GDP per capita growth and FDI in Sri Lanka from 1980 to 2022. More specifically, remittance inflows increased from 1992 to 2007, whilst ODA and FDI saw swings. The GDP showed a lot of variation from one year to the next, with negative numbers in 2001, 2019, and 2020. It is surprising that Sri Lanka's economic performance fell short of expectations, considering the enormous external financial support the country received Danthanarayana et al. (2024). This result prompted the researchers to go to Sri Lanka for their study.

This study also contributes to the existing literature by analyzing the efficacy of remittances, ODA, and FDI as automatic stabilizers in Sri Lanka and yielding real-world insights into their role. In addition, it offers feasible policy recommendations for Sri Lanka and other emerging nations dealing with comparable issues. Hence, this paper addresses the information gap by applying the Autoregressive Distributed Lag (ARDL) method to the correlation between GDP, remittances, official development assistance (ODA), and foreign direct investment (FDI) in Sri Lanka from 1980 to 2022. The ARDL method takes into consideration both the short-term and long-term intergration between variables, as well as the complex dynamics included in these types of relationships.

The following is an outline of the rest of this work. Section 2 gives a complete literature review focused on foreign financial inflows and their effect on Sri Lanka's economic stability. The study's methodology and data sources are covered in Section 3. The empirical findings reported in section 4. In Section 5, review the study's main points, suggestions for policymakers and future research.

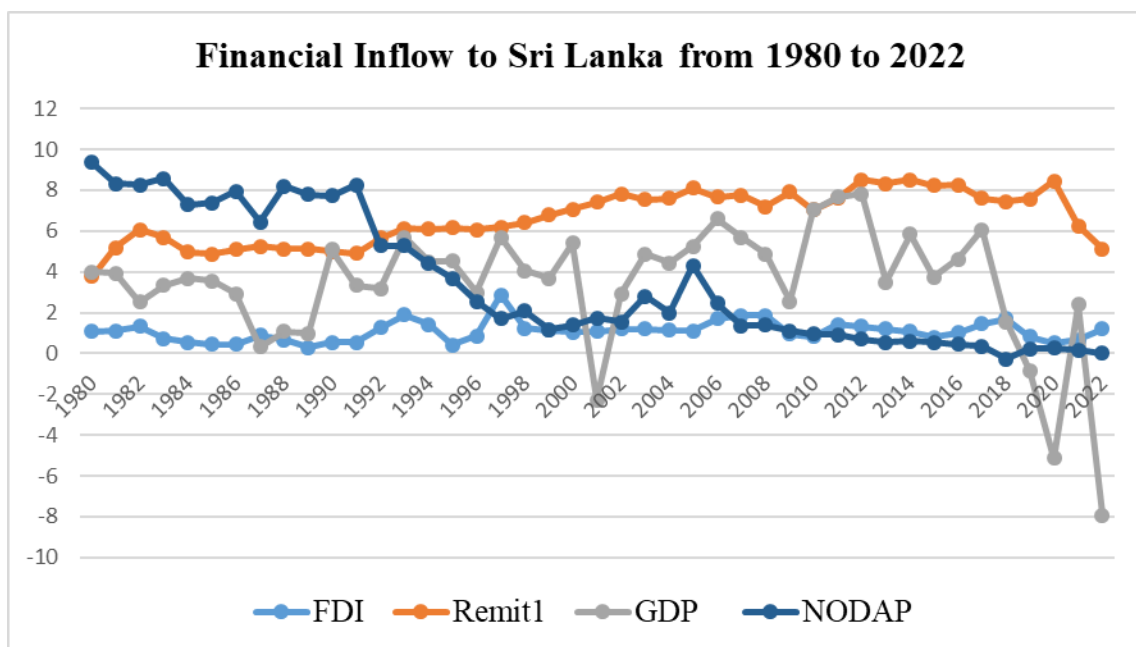


Figure 1. Financial inflows to Sri Lanka from 1980 to 2022

Source: World Development Indicator database, World Bank

2 Review of Literature

2.1 Theoretical Literature

Generally human capital development, population growth, asset accumulation and technological enhancement are the key determinants of the economic growth of a advancement (Todaro & Smith, 2009). Scholars from various countries Alassane, (2021) Belesity (2022), and Depken et al. (2021) have proven that less developing countries do not have the potential financial capacity to stimulate economic performance due to the limitation of the state income, considerable fiscal allocation to social programs and low savings. In this junction, foreign financial inflows like FDI, ODA, remittances, etc., save as an additional funding option to finance fiscal gaps Muhammed & Ubaid (2021); Waqas (2017). In addition, inadequate domestic capital hinders the essential economic and social infrastructural development, including power energy, irrigation facilities for agricultural development, better transport facilities, and communication networks. As a result, these economies need support from foreign capital to develop their infrastructural facilities Zardoub & Faouzi (2023). Theoretically, foreign financial inflow is vital to spur the economic growth of the recipient countries.

The limitation in financial inflows poses a significant challenge to growth, exacerbating difficulties in macroeconomic management and policy implementation. An increase in economic growth attracts the international financial markets, which lead to a rise in capital inflows; conversely, the reverse effect applied when the economy experiences a depression Waqas (2017). Economic depression is generally associated with currency crises, low levels of production, less investment activities and high levels of unemployment, which cause to reduction in the standard of living of the people and a reduction in economic growth Njang (2017).

2.2 Empirical Literature

In a series of studies, scholars have conducted empirical investigations across different region and countries, yielding mixed results. The following sections investigate the recent relevant studies to find the findings.

Research by Aurolipsa & Narayan (2019) looked at how foreign direct investment (FDI), remittances, and official development assistance (ODA) affected economic advancement in India and Sri Lanka. They employed a Granger causality test, VECM, and vector decomposition analysis to predict variation errors for subsequent periods and assess the impulse response function of these variables using data from 1980 to 2016. The outcomes demonstrated that the two countries were affected differently by these monetary injections. Because of their status as key growth drivers in the Indian economy, foreign direct investment (FDI) and remittances have performed a pivotal role in the country's economic advancement. Interestingly, the study highlighted the crucial role that migrant workers' remittances and foreign aid play in boosting Sri Lanka's economy. When compared to India's economy, Sri Lanka's dynamics stand out. These results demonstrate the critical role of foreign direct investment (FDI) in bolstering growth in output in both countries, albeit in different ways.

Muhammed & Ubaid (2021) examined the role of foreign assistance on national growth in Afghanistan and Egypt. Using various econometric methods such as Johansen and Juselius cointegration, Granger causality, and vector auto-regression, they failed to detect any evidence of a long-term link between official development assistance (ODA) and GDP in either nation.

While their research exhibited that official development assistance (ODA) contributed to national growth in Egypt and Afghanistan, it did so in a singular fashion. Utilising panel data spanning 1990-2006, Mamoun & Kevin (2013) investigated the repercussion of foreign direct investment (FDI), official development assistance (ODA), and overseas remittances on GDP growth. The GMM method emphasis that international remittances primarily serve a salient role on dependent countries rather than ODA and FDI. Amna & Faouzi (2023) investigated developing-world nations' reliance on foreign direct investment (FDI), remittances, official development assistance (ODA), and GDP growth. Utilising panel data analysis on year data spanning 1990–2016, they validated the mixed impact of monetary flows on GDP growth. Using the FMOLS and DOLS regression models, Khatir & Güvenek (2021) reviewed the impact of foreign direct investment (FDI) and remittances on five SAARC nations from 2008 to 2020. They reasoned that foreign direct investment (FDI) and remittances are vital to the development of these nations' economies. Additionally, the study demonstrated a positive correlation between remittances and output growth, but found no significant correlation between FDI and output growth. Driffield & Jones, (2013) assessed ramifications of foreign direct investment, official development assistance, and migrant remittances on GDP growth in developing countries in 2013. They discovered that whereas FDI and remittances strongly increase GDP, official development assistance (ODA) might often have the opposite impact. Truthfully, remittances and foreign direct investment (FDI) both stimulate economic output.

The influence of foreign direct investment (FDI), remittances, and official development assistance (ODA) on Nigeria's national output growth from 1984 to 2014 was studied by Amna & Faouzi (2018). They discovered that FDI and ODA both considerably increase GDP growth, both immediately and in the long term, using the ARDL approach. They found that FDI was more influential than ODA. More importantly, their findings demonstrated that remittances substantially impede Nigeria's economic progress in the short and long run. Waqas Javaid (2017) explored the consequences of remittances, FDI, and ODA on GDP growth in Pakistan from 1973 to 2014 by deploying the ARDL approach. The results point that the international inflows and GDP growth are pertains to the long run. Furthermore, the findings demonstrate that both official development assistance (ODA) and foreign direct investment (FDI) considerably increase GDP

growth, in the short and long term. Still, remittances don't contribute much to Pakistan's GDP growth. Njangang et al. (2018) used the Pooled Mean Group (PMG) technic to access the impact of foreign direct investment (FDI), official development assistance (ODA), and remittances on economic advancement in African nations between 1980 and 2016. Additionally, they considered the immediate effects of these variables. Based on their findings, foreign direct investment (FDI) significantly boosted national growth in Africa over the long term. But official development assistance (ODA) and remittances failed to provide any noticeable results. Furthermore, they state that there is little evidence that FDI, remittances, and ODA impact GDP growth in the near run.

Uwaoma & Michael (2015) stated that foreign direct investment (FDI) and official development assistance (ODA) support national growth in Africa. When all three factors were considered together, however, only foreign direct investment (FDI) significantly boosted national output growth during the research period. Although official development assistance (ODA) and remittances both contributed positively to national growth in the Americas and the Caribbean when considered independently, only remittances maintained their significance after controlling for other factors. Applying a two-step system GMM approach, Belesity (2022) analysed economic advancement in sub-Saharan African nations. The results showed that only foreign direct investment (FDI) significantly boosted GDP growth, whereas official development assistance (ODA) and remittance inflows (RMI) had the opposite impact. According to research by Mohammed (2016), who looked at panel data for a number of MENA nations, official development assistance (ODA) hurts economic development whereas remittances help it. The influence of foreign exchange revenues and international assistances on GDP in South Asia was studied by Joshi (2016). While remittances regularly boosted GDP, foreign direct investment (FDI) and official development assistance (ODA) showed mixed results. Alassane (2021) explored whether climatic shocks may lessen the growth-inducing effects of foreign direct investment (FDI), official development assistance (ODA), and remittances and confirmed that throughout the research period, developing nations benefited from international financial assistances. Ahmed & Martinez (2013) looked at how foreign direct investment (FDI), official development assistance (ODA), and remittances affected GDP growth in Nigeria and

confirmed that both FDI and ODA had positive impact on output growth while remittance has the negative impact on economic advancement of Nigeria's economy. Abdullahi et al. (2015) studied how foreign direct investment (FDI), financial development (FD), remittances, and official development assistance (ODA) affected the growth of Nigeria's gross domestic product (GDP). Foreign direct investment (FDI) outperformed remittances and official development assistance (ODA) in terms of their positive and statistically significant impact on growth in the short run. These connections persisted throughout time, despite the fact that they do not have statistical significance.

Research on the ramifications of remittances, ODA, and FDI on economic stability has been extensive, but studies examining their combined role as automatic production stabilizers in Sri Lanka are lacking noticeably. Despite the potential synergy of their combined functions, most studies only look at these components alone. Consequently, this work strives to fill that knowledge gap by employing the ARDL method, which is more suited to analyzing small-sample data along with the short- and long-term dynamics of the variables.

3 Research Methodology

This study looks at the impact of remittances, foreign direct investment (FDI), and official development assistance (ODA) on Sri Lanka's economic development from 1980 to 2022 using GDP growth as the dependent variable. Data was only available and reliable up until 2022, therefore that's when the study ended. According to research by Yahyaoui & Bouchoucha (2021), Bekalu (2022), Basnet (2013), and John et al. (2015), the independent variables that are considered gross capital formation, exports, remittances, foreign direct investment (FDI) and official development assistance (ODA). Remittances are funds sent back to a recipient's home country by migrant workers; this research aims to examine their economic impact Bekalu (2022). Foreign direct investment (FDI) is measured as net inflows as a percentage of GDP. According to Camarero & Cecilio (2003), this approach is based on the idea that factors like investment plans and capacity limits mitigate the immediate economic effects of foreign direct investment

(FDI). The net amount of official development assistance and official aid received (in current US dollars) is known as official development assistance (ODA) (Amna & Faouzi, 2020). Research on endogenous growth often uses gross capital formation (GCF) in current US dollars as a stand-in for investment. While exports of goods and services are measured in constant 2015 US\$ Belesity (2022); Muhammed et al. (2021); Nigel & Chris (2013), this variable is essential for understanding the dynamics of economic growth, as pointed out by Amna & Faouzi (2023), Joshi (2016), Mahmoud (2016), McKinley (2009) and Nigel & Chris (2013)). The research makes use of annual data sets spanning 1980 - 2022. After a thorough literature review, we settled on all of the variables using information from the World Bank, the Central Bank's Annual Reports and Statistics, and other pertinent sources. Detailed explanation of the variables and data sources are explained by the Table 1.

3.1 Theoretical Model

Solow's (1956) long-run growth approach, explain the economic growth by considering population growth, capital accumulation, and technological advancement. This model is utilized in this present study which is constructed by using Cobb-Douglas production function as show in equation 1.

$$Y_t = A(t)K(t)^\alpha L(t)^\beta \dots \dots \dots 1$$

Where $\alpha+\beta$ lies between 0-1, α and β are the share of labour and capital input respectively, t is the time duration, $Y(t)$ shows total production, $K(t)$ and $L(t)$ are the capital and labour respectively, $A(t)$ denotes technology and $A(t)L(t)$ explains the effective labour. The following equation 2 illustrate the performance of capital stock per worker.

$$K(t) = sK(t)^\alpha - (n - g + \gamma)K(t) \dots \dots \dots 2$$

Where, s indicates the savings rate, g denotes the technological improvement, n shows the population growth and γ indicates the depreciation of the capital goods. This recommends that $K(t)$ is closer to the steady value of k^* as indicated in equation 3.

$$s(K^*(t)^\alpha = (n + g + \gamma)K^*(t) \dots \dots \dots 3$$

Also, the steady-state value of capital per worker can be written as follows:

$$K^* = \left(\frac{s}{n+g+\gamma} \right)^{1/\beta} \dots\dots\dots 4$$

Equation (4) illustrates the assumption of Solow theory of constant returns to scale. In this, productive workforce (A(t)L(t)) and productive capital (K(t)) are growing at a rate of (n + g). Consequently, economic growth (Y(t)) is also increasing proportionately. Equation (5) illustrates the finding when inserting equation (4) into the steady-state output per productive workforce.

$$Y^* = \left(\frac{s}{n+g+\gamma} \right)^{1/\beta} \dots\dots\dots 5$$

When transform the equation into the log form:

$$\ln Y^* = \frac{\alpha}{\beta} \ln s - \frac{\alpha}{\beta} \ln(n + g + \gamma) \dots\dots\dots 6$$

Equation (6) illustrates the stable production level (y*) per unit of workforce, which is determined by the saving rate (s). The saving rate is positively correlated with the stable productive level. Therefore, an increase in savings causes economic growth through increased investment. However, other variables such as technological improvement (g), population growth (n) and depreciation (γ) are negatively correlated with economic growth and capital labour ratio. Therefore, theoretically, foreign financial inflows (FDI, ODA and remittances) enhance economic growth by boosting capital stock and adding physical capital (K).

3.2 Econometric Method

Econometric methods were employed to explore both the long-term and short-term relationships between the variables and also to achieve the study's objectives between remittances, FDI, ODA, and economic growth.

$$GDP_t = \delta_0 + \beta_1 REM_t + \beta_2 FDI_t + \beta_3 ODA + \beta_4 GCF_t + \beta_5 LNEXP_t + u_t \dots\dots\dots (1)$$

Where, $\beta_1, \beta_2, \beta_3, \beta_4$ are estimators, δ_0 is Intercept, GDP_t is GDP Per capita growth, REM_t is personal remittances, FDI_t is Foreign Direct Investment, ODA_t is Official Development Assistance, GCF_t is Gross Capital Formation, $LNEXP_t$ is exports of goods and services and u_t is the Error Term.

Table 1 Explanations of Variables

Variable	Symbol	Variable definitions (measurement)	sign	Data
Economic growth	GDP	GDP per capita growth (annual %)	+	WDI ²
Remittances	REM	Personal remittances, received (% of GDP)	+	WDI
Foreign Direct Investment	FDI	Foreign direct investment, net inflows (% of GDP)	+	WDI
Official Development Assistance	ODA	Net official development assistance received (% of GNI)	+	WDI
Gross capital formation	GCF	Gross capital formation (% of GDP)	+	WDI
Exports of goods and services	EXP	Exports of goods and services (constant 2015 US\$)	+	WDI

(Source: Developed by researcher)

3.3 Unit Root Test

The unit root test, introduced by Dickey and Fuller in 1979, is used to determine whether the variables are stationary or non-stationary. This is explained by the following equation.

$$Y_t = \beta_0 + \beta Y_{t-1} + e_t$$

$$e_t \sim (0, \sigma^2)$$

² World Development Indicators

$H_0: \beta = 1$ (Variable Y_t has stationary)

$H_1: \beta < 1$ (Variable Y_t has not stationary)

If $TS < CV$ or P -value $< \alpha$, H_0 will be rejected which means Y_t has not stationary.

3.4 ARDL Approach

The following ARDL approach was established to explore the long-run correlation between the variables when the variables found in $I(0)$ and $I(1)$, Pesaran et al. (2001).

$$\begin{aligned} \Delta GDP_t = & \beta_0 + \beta_1 REM_{t-1} + \beta_2 FDI_{t-1} + \beta_3 ODA_{t-1} + \beta_4 GCF_{t-1} + \beta_5 LNEXP_{t-1} \\ & + \sum_{t=1}^{q1} \beta_{11} \Delta GDP_{t-1} + \sum_{t=1}^{q2} \beta_{21} \Delta REM_{t-1} + \sum_{t=1}^{q3} \beta_{31} \Delta FDI_{t-1} + \sum_{t=1}^{q4} \beta_{41} \Delta ODA_{t-1} \\ & + \sum_{t=1}^{q5} \beta_{51} \Delta GCF_{t-1} + \sum_{t=1}^{q5} \beta_{61} \Delta LNEXP_{t-1} + u_t \end{aligned}$$

Where, GDP_t = GDP Per capita growth, REM_t = Personal Remittances, FDI_t = Foreign Direct Investment, ODA_t = Net Official Development Assistance, GCF_t = Gross Capital Formation, $LNEXP_t$ = Exports of goods and services, Δ = 1st difference, β_0 = Intercept, ϵ_t = Error term, $\beta_1 \rightarrow \beta_{11}$ = Long term coefficients and short term coefficients.

3.5 ARDL Bounds Test

The ARDL Bound technic is utilized to establish the long-term relationship between variables. If the calculated F-statistic value is exceeding the upper limit $I(1)$ value, it means that the null hypothesis can be rejected, confirming that the variables have a cointegration relationship. Conversely, if the calculated F-statistic value is below the lower limit $I(0)$ value, the null hypothesis is accepted, indicating that there is no cointegration relationship between the variables. However, if the calculated F-statistic value falls between the upper bound $I(1)$ value and the lower bound $I(0)$ value, the results are inconclusive.

3.6 Error Correction Model

Error Correction model is a data analysis method introduced by Sargan in 1964. The Error Correction term has been used to identify short-term dynamic relationships and long-term adjustments. Accordingly, the Error Correction model equation for the study is as follows.

$$\Delta \text{GDPG}_t = \beta_0 + \sum_{t=1}^{q1} \beta_{1t} \Delta \text{GDPG}_{t-1} + \sum_{t=0}^{q2} \beta_{2t} \Delta \text{REM}_{t-1} + \sum_{t=0}^{q3} \beta_{3t} \Delta \text{FDI}_{t-1} \\ + \sum_{t=0}^{q4} \beta_{4t} \Delta \text{ODA}_{t-1} + \sum_{t=0}^{q5} \beta_{5t} \Delta \text{GCF}_{t-1} + \sum_{t=0}^{q5} \beta_{6t} \Delta \text{LNEXP}_{t-1} + \lambda \text{ECT}_{t-1} + u_t$$

Where, GDP_t is GDP Per capita growth, REM_t is personal remittances, FDI_t is Foreign Direct Investment, ODA_t is Net official development assistance, GCF_t is Gross capital formation, LNEXP_t is Exports of goods and services, λ is Error Correction Term and λECT_{t-1} = lag value of residuals derived from joint cointegration.

3.7 Diagnostic Test

Diagnostic test confirmed the best model selection include Breusch- Godfrey Serial Correlation LM Test, Heteroskedasticity test: ARCH Test, Jarque-Bera and CUSUM Test for Confirmation stability of model.

4 Results and Discussion

Foreign direct investment (FDI) is not stationary at the first difference (I(1)), but all other variables, including GDP, remittances, official development assistance (ODA), GCF, and exports of commodities and services, are. Furthermore, the results imply that the ARDL method is appropriate as the dependent variable is stationary at the first difference I(1) and the other variables are both level (I(0)) and first difference (I(1)) stationary. In addition to being the greatest model for directly interpreting the dynamics of both short- and long-run interactions, the ARDL model is more efficient and adaptable when dealing with data from small samples.

Table 2: Results of ADF Unit root test

Variables	Augmented Dickey – Fuller		Phillips-Perron test statistic		Conclusion
	Level	1 st Difference	Level	1 st Difference	
GDP	0.6216	0.0000***	0.0290	0.0000	I(1)
REM	0.1885	0.0000***	0.1774	0.0000	I(1)
FDI	0.0006***	-	0.0013***	-	I(0)
ODA	0.5894	0.0000***	0.4690	0.0000	I(1)
GCF	0.4539	0.0000***	0.5014	0.0000	I(1)
EXP	0.8341	0.0000***	0.8954	0.0000	I(1)

Source: Researcher prepared using by research data, 2023

Note: *, **, *** indicate significant at 10%, 5%, 1% level respectively.

After the stationary tests, the Akaike Information Criterion (AIC) was employed to determine the ideal ARDL model lag length. The AIC found that of the available models, the ARDL (1, 3, 3, 2, 1, 1) was the best fit. For this reason, the ARDL (1, 3, 3, 2, 1, 1) was selected for the purpose of analysing the dynamic impact of FDI, ODA, and worker remittances on Sri Lanka's economic development. Below, you can see Figure 1, which shows the top 20 models' Akaike Information Criteria.

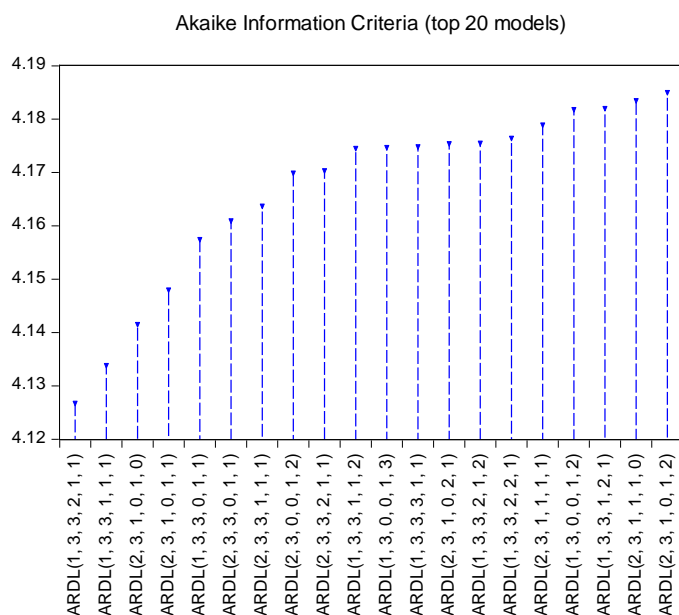


Figure 1 Akaike Information Criteria (top 20 models)

4.1 ARDL bound Test

To evaluate the cointegration and long-term connection among the variables, we used the Bounds test over the study period. The results are displayed in Table 4. The ARDL (1, 3, 3, 2, 1, 1) model, chosen considering the study's factors, provides the basis for the evaluation.

Table 4: Findings of the ARDL bound Test

ARDL Bounds Testing Approach, ARDL (1, 1, 2, 3, 1, 1)					
Test statistic	Value	Significance	Lower Bound I (0)	Upper Bound I (0)	
F- statistic	7.239606	10%	2.08	3.0	
		5%	2.39	3.3	

Source: Researcher prepared using by research data

The results of the Bounds test, which was used to establish the cointegration connection among the variables, are detailed in Table 4. At the 5% level of significance, the calculated F-statistic of

7.239606 is greater than the upper bound I(1) value of 3.0. This means that the null hypothesis of no relationship between the variables was rejected, confirming that economic growth, FDI, remittances, and ODA in Sri Lanka from 1980-2022 have a long-term cointegration.

Table 5: Findings of the Long-Run Relationship

ARDL Bounds Test Long Run Coefficients				
ARDL (1, 3, 3, 2, 1, 1) Dependent Variable: GDP, Time Period: 1980-2022				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
FDI	6.655438	2.252261	2.955002	0.0071
REMIT	2.969853	1.047559	2.835021	0.0094
ODA	1.125154	0.488795	2.301893	0.0307
GCF	-0.095438	0.122271	-0.780545	0.4430
LEXP	-2.338583	3.335242	-0.701173	0.4902
C	28.01928	72.68760	0.385475	0.7034

Source: Researcher prepared using by research data

Note: *, **, *** indicate significant at 10%, 5%, 1% level respectively.

Statistical and probability values for the long-run coefficients of the variables in the ARDL (1, 3, 3, 2, 1, 1) model are presented in Table 5. Remittances have a probability value of 0.0071, foreign direct investment (FDI) of 0.0094, and official development assistance (ODA) of 0.0307, all of which are statistically significant at the 10% and 5% levels, respectively, according to the data. In the long term, these results suggest that remittances, official development assistance (ODA), and foreign direct investment (FDI) all have a positive and statistically significant impact on economic growth. This is because an increase in these factors has the potential to boost productive capacity and financial stability, leading to substantial growth for the country. With a computed coefficient for remittances of 2.969853, we may deduce that a 1% rise in remittances leads to a 2.969% increase in long-term economic growth. This provides more

evidence that remittances have the potential to boost investment, savings, and consumption. The findings are in agreement with those of earlier studies conducted in developing nations (Khatir & Güvenek, 2021), seven countries in central Europe Comes at el. (2018), Ibrahim & Acquah, 2021; and a few countries in the Middle East and North Africa (Sabra, 2016). A one percent increase in foreign direct investment (FDI) results in a 6.65 percent increase in long-term economic development, according to an estimated coefficient of 6.655438. Some of the ways in which foreign direct investment (FDI) helps domestic economies include by facilitating the sharing of technology, raising human capital, integrating commerce, and promoting competitiveness. Nguyen, (2020), Abdullahi at el. (2015), OECD (2002), Joshua et al. (2021), and Durmus & Hilal, (2021) all arrive to the same result in middle-income nations. A positive and statistically significant coefficient for official development support (1.125154) suggests that an increase of 1% in development assistance leads to an improvement of 1.125 percent in economic growth. Development aid is critical for promoting economic progress, as this shown. The improvement of Sri Lanka's infrastructure, human resources, and technology could have an impact on this. This conclusion is consistent with research conducted in developing nations (Alassane, 2021), low-income countries Mamoun and Kevin, (2013), and two South Asian countries Aurolipsa & Narayan, (2019). On the other hand, Nigel & Chris, (2013) found that official development assistance (ODA) had a negative correlation with GDP growth in poor nations.

Both the GCF and LEXP coefficients are negative, although neither is statistically significant ($p = 0.4430$ for GCF and 0.4902 for LEXP). This model clearly does not account for the fact that GDP, exports of goods and services, and GCF do not have a strong long-run relationship. Goods and services exports and GCF dampen economic growth, even if the effect is not statistically significant.

Table 6: Short Run Relationship of the Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	0.993457	0.552125	1.799332	0.0851
D(FDI(-1))	-2.793315	0.509027	-5.487556	0.0000
D(FDI(-2))	-2.334000	0.514158	-4.539461	0.0001

D(REMIT1)	0.784684	0.471506	1.664209	0.1096
D(REMIT1(-1))	-0.361290	0.550224	-0.656623	0.5179
D(REMIT1(-2))	-1.354770	0.520261	-2.604021	0.0159
D(ODA)	0.081420	0.294936	0.276058	0.7850
D(ODA(-1))	-0.470005	0.296961	-1.582713	0.1271
D(GCF_I)	0.567275	0.136753	4.148186	0.0004
D(LEXP1)	8.978964	3.479607	2.580453	0.0167
ECT(-1)	-0.776953	0.097197	-7.993584	0.0000
<hr/>				
R-squared	0.848325			
Adjusted R-squared	0.796023			
<hr/>				

Note: *, **, *** indicate significant at 10%, 5%, 1% level respectively.

Table 6 displays the short-term relationships between the research variables and the Error Correction Model. The projected negative value for the error correction term (ECT-1) coefficient is -0.776953. The fact that the response variable for economic growth is negative indicates that it follows the long-run equilibrium path. The error correction rate of 77% is indicated by an estimated coefficient of -0.776953. The only variable that has any noticeable effect on economics in the short run is the GCF. It is also believed that the model is superior since its variables explain 84.8% of the variation in economic development.

4.2 Diagnostic Test of the Model

In order to accomplish the goals of the study and demonstrate that the estimated ARDL (1, 3, 3, 2, 1, 1) model is the best fit, a diagnostic test is carried out. Tests for normality, stability, ARCH (heteroskedasticity), and Breusch-Godfrey serial correlation LM were therefore conducted in the research. The results from the diagnostic testing illustrated in Table 7.

Table 7: Diagnostic Test

Type of Test	F-statistic	Prob.
Breusch-Godfrey Serial Correlation LM Test	0.9289	0.9620
Heteroskedasticity Test: ARCH Test	1.3539	0.2476
Normality Test	1.2049	0.5445

Source: Prepared by researcher from Eviews

Results of the normalcy test ($p = 0.5445$), the Heteroskedasticity Test (ARCH), and the Breusch-Godfrey Serial Correlation LM Test ($p = 0.9620$) for autocorrelation detection are shown in Table 7. With a significance level of 5%, these numbers are too high. As a result, the model proves that the estimated ARDL (1, 3, 3, 2, 1, 1) model has normally distributed residuals, strongly advocates the lack of autocorrelation, and validates homoscedasticity.

Figure 2 below displays the experimental findings for the CUSUM of the evaluated ARDL (1, 3, 3, 2, 1, 1) model. On this graph, the blue line represents the trend line, while the red lines show the 95% confidence interval. A robust model will have a regression line that falls inside the 95% confidence interval's top and lower bounds. Based on the CUSUM plot's findings, this places the crucial boundaries at around the 5% significance level. The calculated model remains stable, then.

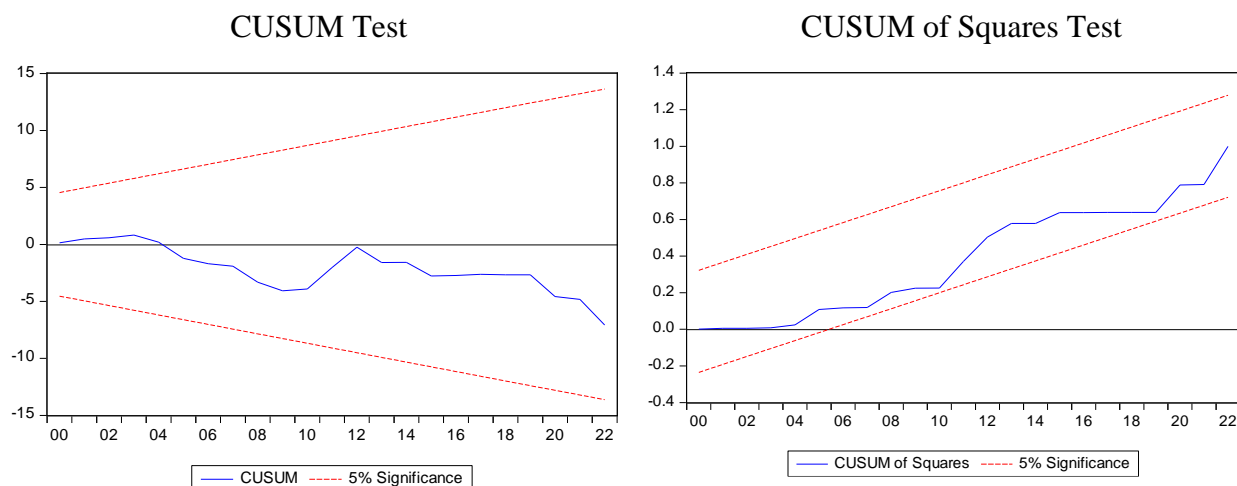


Figure 2: CUSUM Test

Source: Derive from research data

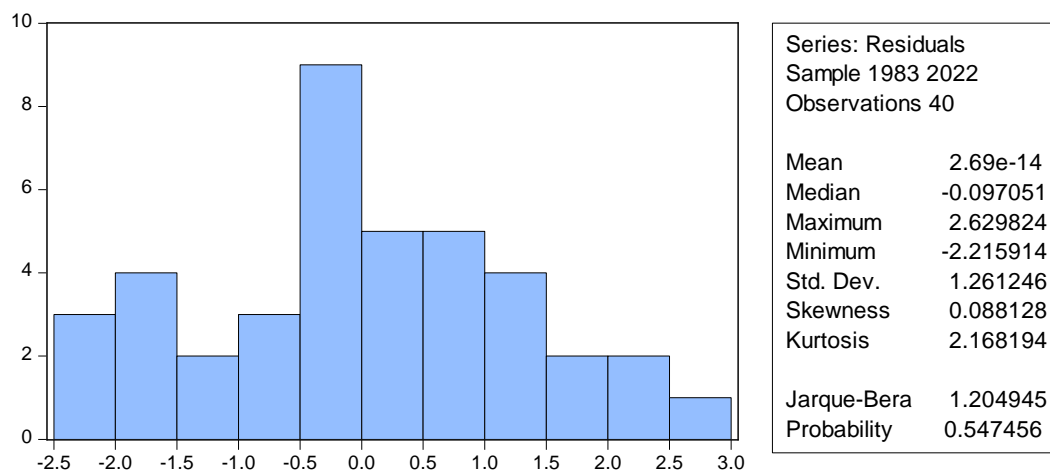


Figure 3: Normality Test

Source: Researcher prepared using by research data.

5 Conclusion

This study set out to answer the question, "How did ARDL bounds testing and the error correction term (ECT) affect Sri Lanka's economic growth from 1980 to 2022?" in connection to

foreign direct investment (FDI), remittances from migrant workers, and official development assistance (ODA). In the long run, this analysis found that remittances, official development assistance, and foreign direct investment all contribute favorably and considerably to economic growth. When compared to remittances, which take two periods to materialize, foreign direct investment (FDI) has a positive and statistically significant effect in the near term (at the 10% significance level). On the other hand, official development assistance (ODA) has a detrimental impact on economic growth in the short run and has no discernible effect in the long run. At a significance level of 5%, the error correction term, ECT (-1), is negative (-0.776953), suggesting that each year, 77% of the short-term growth disequilibrium caused by external shocks is corrected, guiding the economy towards long-term equilibrium. Instead of using official development assistance (ODA) for short-term consumption, governments should focus on making conditions favourable to foreign venture capitalists, welcoming remittances as investment opportunities, and building an environment that is conducive to stable economic growth. In order to deal with the immediate problems, the results highlight the importance of highlighting the beneficial effects of remittances, official development assistance, and foreign direct investment. The government should also work to create conditions that entice international investment, particularly in the areas of renewable energy, healthcare, education, and technology. This would lead to better economic growth and less dependence on industries like tourism, which are quite unpredictable. Better access to stable financial systems is another way to put remittances to work as an investment. To further foster an environment conducive to FDI and guarantee production sustainability over the long term, official development assistance (ODA) should be directed towards infrastructure development.

5.1 Limitations of the Study

Due to concerns about data availability and trustworthiness, the analysis was restricted to the years 1980–2022. Instead of considering nonlinear effects, the ARDL method prioritized linear correlations. Civil wars, financial crises, and the pandemic are all recognized as structural disruptions in the research, but their effects on economic development are not taken into consideration. Governance, corruption, and macroeconomic policies are some of the policy and institutional aspects that are also ignored. Furthermore, the analysis does not focus on the

distribution of FDI, ODA, and remittances by sector but rather examines their overall impact on economic development.

5.2 Directions for Future Researchers

Researchers want to learn more about the non-linear relationship between the two variables by using complex econometric tools like quantile regression and threshold models. It is possible to study the efficiency of foreign financial inflows by looking at the mediating impacts of governance metrics, policy stability, and institutional quality. Find out which industries get the most money from foreign direct investment, official development assistance, and remittances, and which ones help the economy grow the most. Some potential areas for further study in Sri Lanka include differences in the effect of foreign investments by region.

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