
# Faculty of Commerce

## School of Economics

# The Impact of Capital Inflows on Economic Growth in Malawi: An Asymmetric Analysis.

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**ABSTRACT**

This study investigates the impact of four capital flows: external debt, official development assistance (ODA), remittances, and foreign direct investment (FDI)- on Malawi's economic growth using annual data spanning 1980 to 2022. Previous studies in the literature focus on a single capital flow and assume a symmetric relationship between capital flows and growth. However, this study focuses on how various capital flows each impact growth and considers potential asymmetry in capital flows' effects. The study determines asymmetric long-run and short-run relationships between capital flows and growth using a Nonlinear ARDL (NARDL), and the results are compared to the linear case using an Autoregressive Distributed Lag (ARDL) model. The NARDL models reveal significant asymmetries for all four capital flows, suggesting that positive and negative shocks influence growth disproportionately. In the long run, for all models, an increase in each capital flow increases growth, while reductions in inflows decrease growth, in some cases by a much larger proportion than the increase. In the short run, however, an increase in debt was detrimental to growth, yet debt and remittance inflow reduction improved growth. Conversely, an increase in FDI and remittances improved growth, while a decrease in FDI reduced growth. In contrast, the long-run ARDL results indicate that Remittances and ODA positively affect economic growth. Yet, external debt and FDI have no significant impact. In addition, short-run results show that lagged FDI and external debt positively impact growth, while ODA and remittance have no significant short-run effect. The study contributes to the literature by showing the disproportionate impact of positive and negative capital shocks on growth, which suggests that models that fail to account for asymmetry may be misspecified. These novel results show that accounting for asymmetric effects reveals dynamics that are overlooked in studies that assume that the capital–growth nexus is symmetric.

## 1. INTRODUCTION

With the rise in globalisation, capital flows represent a critical channel for allocating financial resources and knowledge and technology transfer across countries. The interplay between capital flows and economic growth has significant implications for developed and developing economies. Positive flows can boost infrastructure and foster job creation, leading to economic growth, whilst negative flows can lead to macroeconomic instability. This is echoed by Adrian, Gourainchas and Pazarbsioglu (2022) who state that although capital flows have the benefits of promoting economic growth through technology and skills transfer, large and unpredictable flows can also introduce risks to macroeconomic and financial stability, especially in developing nations. Examples of these risks include currency volatility and inflation, (Salvatore, 2013). However, despite these risks, many countries have increased their openness to capital flows in the hopes of reaping the benefits of economic growth.

Despite efforts to attract capital flows, the amount of capital inflow and the impact of such flows differs across countries. According to Krugman et al. (2018), two primary schools of thought explain why some countries experience growth while some attract little or no foreign investment and remain in poverty. One perspective centres on geographical features, stating that accessibility shapes a nation's long-term economic performance. This underscores the significance of international trade access, stating that landlocked countries trade less than those with favourable geography. This is resounded by Chanyenga (2017), who states that variations in economic structures and natural locational advantages lead to unequal foreign direct investment inflows. The second school of thought centres on institutions of government e.g., issues of good governance, having solid institutions and corruption. According to this perspective, a country's inability to safeguard citizens' private property rights discourages investment from other nations. Stallings (2007) linked increased capital mobility to globalisation and liberalisation and noted that FDI gravitates towards economically dynamic nations with higher per capita incomes, while remittances flow into less developed countries facing domestic unemployment challenges. These different schools of thought demonstrate that increased capital movements are of widespread interest in understanding how these flows influence economic growth, particularly in developing economies.

Developing countries depend on external finance for growth due to low domestic savings, which aids their local budgetary and development needs. Rehman and Ahmad (2016) discuss the

importance of capital inflows in addressing skill, capital and technology gaps. IMF (2008) indicates that globalisation is essential for developing economies, offering opportunities on a global scale. However, the relationship between capital flows and economic growth is multifaceted, as studies conducted in developed and emerging economies produce varying results on how foreign capital flows impact economic growth.

For instance, Alabi (2019) and Sunde (2017) found a positive relationship between FDI inflows and economic growth in Nigeria and South Africa, respectively, while Rehman and Ahmad (2016) findings showed that External Debt (ED) and Official Development Assistance (ODA) inflows negatively affect economic growth, highlighting the positive long-term effects of FDI and Remittances (REM) on growth. Alvarado, Iniguez and Ponce (2017) on the other hand, found that results varied across countries of different levels of development, which is supported by Chakufyali and Makanza (2023), who demonstrate that different levels of development determine the amount of FDI a nation can attract. Agbloyor, Adjasi and Yawson (2014) found that with a solid domestic financial market, private capital flows can boost economic growth. Iamsiraroj (2016) found a positive relationship between FDI and growth, highlighting that factors like labour force and trade openness influence FDI and foster income growth while Ayenew (2022) found a positive long-term relationship between FDI and growth in Sub-Saharan Africa. These studies show the heterogeneous nature of the relationship between various capital flows and economic growth.

Using annual data spanning 1980 to 2022, sourced from the World Bank (2023), the International Monetary Fund (2023), and the African Development Bank (2023), this study answers the following research questions: Do capital inflows: FDI, Remittances, External Debt, and Official Development Assistance have asymmetric impact on economic growth in the long and short run in Malawi? In addition, how do the symmetric results from the Autoregressive Distributed Lag (ARDL) model compare to the asymmetric results from the Non-linear Autoregressive Distributed Lag (NARDL) model?

Most studies assume a symmetric relationship between capital flows and growth and overlook potential asymmetries owing to threshold effects, as observed in studies by Fashina et al. (2018) and Reinhart and Rogoff (2010). Furthermore, the existing literature mostly uses panel-based methodologies focusing on several countries with varying demographics and development

trajectories, which masks the dynamics of a single country. In addition, studies primarily analyse FDI and external debt as significant forms of capital flows. Yet remittances represent one of the primary financial resources, sometimes exceeding FDI inflows in developing countries (Meyer & Shera, 2017), and Official Development Assistance (ODA) is an understudied portion of capital flows. However, recent studies by Elkhalfi et al. (2024), Sharaf (2022), Abdi et al. (2024), and Benhamou and Cassin (2021) have explored asymmetries between capital flows and economic growth using the NARDL model. In addition to the advantages of using the ARDL model (estimation of short- and long-term dynamics and handling small sample sizes well), the NARDL model allows for examining short- and long-run asymmetries (Meo, 2018).

Malawi, being a small landlocked country, faces challenges such as low domestic savings, high dependence on agriculture, chronic floods, rising inflation and macroeconomic instability induced by the impacts of the COVID-19 pandemic. Despite these challenges, studies have found positive relationships between growth and remittances, FDI inflows and ODA in sub-Saharan Africa, Southern African Countries and low-income countries(Asafo-Agyei & Kodongo, 2022; Eregha & Oziegbe, 2016; Qayyum et al., 2014; Sungsoo et al., 2017; Truen et al., 2016) with the latter finding that foreign debt had a negative impact. However, Dambula (2020) found an insignificant relationship between ODA and growth. Despite this body of research, studies encompassing various capital flows simultaneously are scant, particularly those focusing on Malawi.

Furthermore, for a structurally vulnerable and an economy largely dependent on external resources, Malawi's vulnerability to external shocks (adverse weather, macroeconomic and political instability, pandemics and global economic downturns) can have detrimental effects on the economy which can impact its ability to realize large positive impacts of capital flows, since these could be muted. Consequently, it would be implausible to assume that the impact of capital flows on growth are symmetric. That is to say that positive shocks and negative shocks are unlikely to affect growth in the same way. Therefore, it is important for policy makers to understand which shocks have a more positive impact and which have an adverse impact on growth. Given this gap in the literature, this study aims to investigate the asymmetric impact of external debt, FDI, remittances, and ODA on economic growth in Malawi since they are crucial sources of external finance that can significantly influence the country's growth trajectory.

The study contributes to the literature and addresses a significant gap by investigating both symmetric and asymmetric effects of capital flows on economic growth. The NARDL model (asymmetric) results are compared to the ARDL model (symmetric) results, with the primary objective of highlighting the NARDL model's contribution and deeper insight into each capital flow's unique impact on growth. Second, the study dives into relatively overlooked forms of capital flows, such as Remittances and Official Development Assistance in Malawi. In addition, by focusing on Malawi, a low-income, heavily indebted poor country (HIPC), this study aims to fill a critical gap in the literature, offering nuanced insights on a single-country study that might be overlooked in broader regional or global analyses. Understanding how capital flows influence economic growth would form an excellent starting point for authorities deciding whether to liberalise the capital account in Malawi.

The rest of the study is organised as follows: Section 2 provides a background of Malawi's capital flow history. Section 3 discusses theoretical and empirical literature, Section 4 discusses the data and method, Section 5 discusses the results, and Section 6 concludes.

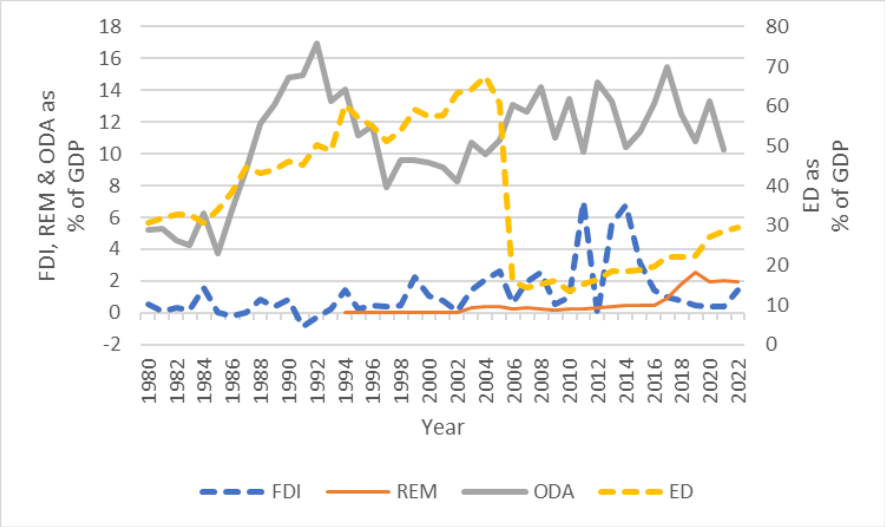
## 2. CAPITAL FLOW DYNAMICS IN MALAWI

Malawi is a small, landlocked nation in southeastern Africa. Economically, Malawi frequently experiences trade deficits due to a lack of import substitutes and the limited presence of domestic industries (Dambula, 2020). Due to different factors, the country has experienced fluctuations in its economic growth over the years.

Amid these economic dynamics, Malawi has become a focal point for discussions on capital account liberalisation. While the current account underwent liberalisation in 2014/2015, there has been increasing debate amongst economists in Malawi for the capital account to be liberalised. The general belief is that liberalisation will potentially increase capital flows in the form of FDI, External Debt (ED), and Remittances (REM), eventually leading to economic growth. Despite this generally accepted policy stance, there is a lack of empirical studies examining capital flows' impact on growth in Malawi.

Figure 1 below shows that External Debt and Official Development Assistance comprise a larger proportion of GDP than FDI and Remittances. FDI and Official Development Assistance fluctuate much more than Remittances, which exhibits a smoother upward trend.

Figure 1: Capital Flow Trends (1980-2022)




*Notes: Author compilations using data from World Development Indicators (WDI), (2023)*

External Debt trends highlight international financial assistance's influence on Malawi's economy. External Debt exhibited an upward trend in the earlier years, growing from 30.5% of GDP in 1984 to 44.7% of GDP in 1987, and during this same period, GDP growth dropped from 5.3% to -0.21% in 1986. Proving that an increase in external debt hurts growth. In the early 1990s, Malawi faced severe droughts, deteriorating terms of trade, suspended support due to governance issues and overspending, and political unrest due to calls for a multiparty system. As a result of these events, GDP growth suffered. However, an increase in debt during these periods stimulated economic growth. Growth picked up around 1994 following political stability, and inflation and the fiscal deficit reduced, possibly due to adopting the Enhanced Structural Adjustment Facility (ESAF) Program (IMF, 2000). However, growth decreased to -4.97% in 2001, caused by adverse weather conditions and economic policy challenges. Revealing Malawi's vulnerability to internal and external shocks. Due to Malawi's macroeconomic issues, external debt continued to grow and reached 67.5% of GDP in 2004 but dropped by 44.89% between 2005-2006. This drop was a result of Malawi having its pre-2004 debt to the World Bank and African Development Bank and pre-2003 debt to the IMF cancelled through the Heavily Indebted Poor Countries (HIPC) initiative and the Multilateral Debt Relief (MDRI) Initiative. In October of 2006, Paris Club creditors cancelled most of Malawi's debt owed to them. This drastically reduced Malawi's external debt by the end of 2006 (Mbewe, 2007). Consequently, GDP rose, suggesting that reducing external debt increases economic growth. Following this, Malawi's external debt has grown steadily, reaching 22.4% of GDP in 2019 and rising from 27.0% in 2020 to about 30.0% in 2021 due to the assistance received

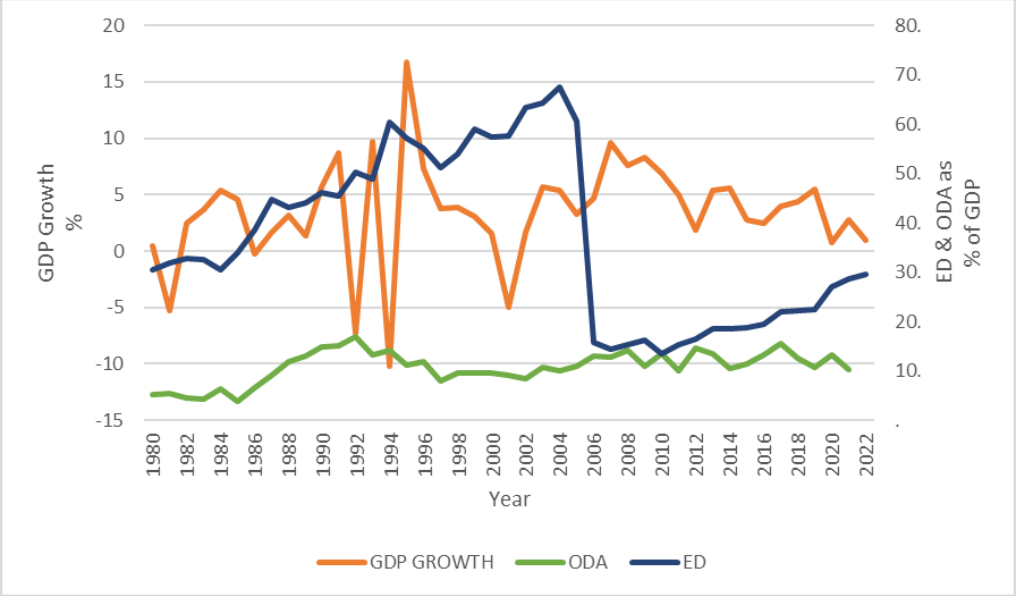
to aid Malawi during the COVID-19 pandemic. Visually, we can see that trends in external debt significantly influence GDP growth trends. As observed, external debt relief in the prior years reduced Malawi's debt in 2006, contributing to improved economic stability.

Official Development Assistance (ODA) is a capital flow important to Malawi's growth, which often fluctuates depending on Malawi's economic climate. ODA inflows into Malawi have predominantly consisted of grants , with sectors like health, education and agriculture receiving a considerable amount of funds. Nonetheless, ODA has also largely been provided in times of crisis, such as, political unrest, economic challenges and adverse weather shocks (IMF, 2010, 2021). For instance, during times of stability, ODA declined. Yet, during political instability, economic shocks, and weather shocks, ODA would increase and provide economic support. For example, when Malawi faced political unrest and climate shocks in 1992, ODA was disbursed to serve as a buffer during these crises, reaching 17% of GDP (see Figure 2). However, assistance declined due to rising concerns of mismanagement, falling to 7.9% of GDP in 1997 (IMF, 2000). After 1998, aid remained stable following the reinstatement of reforms, signalling fiscal prudence to donors. In 2009, ODA declined due to global financial constraints (2008/2009 Global Financial Crisis) but saw a temporary rise to 13% of GDP before dropping in 2011. The 2012 increase coincided with a massive 48.8% devaluation of the Malawi Kwacha, encouraging additional international support. ODA levels continued to oscillate before rising to 15.4% of GDP in 2017 and dropping as economic conditions improved and reforms were reinforced.

Capturing remittance data is a practice that only took shape in the early 1990s. According to IOM (2015), the lack of inward remittance data in Malawi is attributed to the lack of data collection mechanisms and regulatory frameworks; thus, remittances data for this study starts in 1994. Between 1994 and 2001, remittances declined steadily from 0.04% to 0.02% of GDP; this downward trend is also observed with GDP growth in the same period.

However, after 2002, remittances rose from 0.17% to 0.42% of GDP in 2005, most likely to cushion against the food crisis, and GDP growth consequently rose, reaching a 5.4% growth rate from -4.97% in 2001. However, from 2005 to 2007, as remittances declined, growth rose steadily, indicating that the need for remittances declined with improved economic conditions.

Figure 2: GDP growth vs External Debt & Official Development (1980-2022)



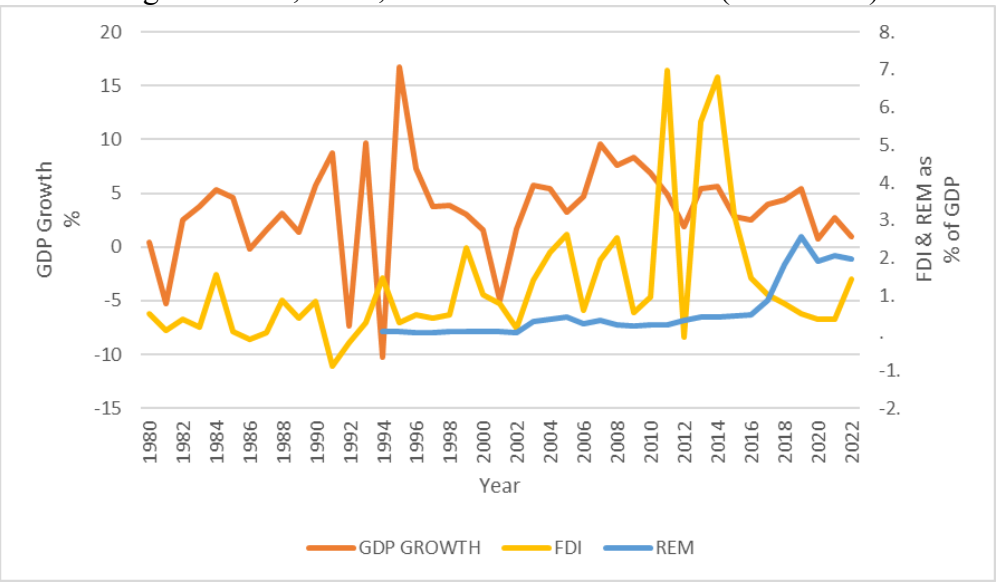

*Notes: Author compilations using data from World Development Indicators (WDI), (2023)*

In 2008, GDP growth decreased, possibly due to the global financial crisis, and remittances followed suit. However, when growth decreased to 1.9% in 2012, remittances increased. These trends show that remittances have a buffering effect during economic downturns, such as the food crisis in 2001 and the devaluation of the Malawi Kwacha in 2012.

In 2014, further steps were taken to implement more advanced systems that capture inward transfers and encourage diaspora remittances to boost Malawi's economic activity and development. Consequently, Malawi has seen a significant increase in remittances from the diaspora beginning in 2016, reaching a peak of 2.6% of GDP in 2019 (see Figure 3). This upward trajectory took a hit around 2020, which may be attributed to the COVID-19 pandemic, but picked up after 2021.

FDI trends also offer insights into Malawi's economic fluctuations. In the 1980s, GDP growth and FDI inflows followed the same trend. In 1991, FDI reached -0.89% of GDP, reflecting a net outflow of FDI, due to the political climate at the time. However, FDI began to rise in 1992, reaching 1.45% of GDP in 1994, while GDP growth was at an all-time low of -10.2%. However, 1995 saw a spike in growth, reaching 16.7%.

Figure 3: FDI, REM, and GDP Growth Trends (1980-2022)




*Notes: Author compilations using data from World Development Indicators (WDI), (2023)*

A surge in FDI was seen in 1999, which, according to the IMF (2000) can be attributed to external sector reforms implemented in prior years. These include eliminating non-tariff barriers and, reducing tariffs, and removing restrictions on non-resident capital movements, which liberalised trade and investment and fostered a favourable environment for FDI. Despite FDI increasing, growth declined, which could be attributed to Malawi's inability to realise growth through investment due to food security issues, adverse weather and unstable macroeconomic conditions, which are key conditions for FDI absorption highlighted by (Ben Mim et al., 2022; Chavula & Awel, 2024; Kinoshita & Lu, 2006). FDI decreased between 2009 and 2010, which can be attributed to the impact of the Global Financial Crisis. However, in 2011 it rose to 6.97% of GDP, the highest recorded FDI figure driven by major investment by Paladin Africa Limited in the mining sector (World Bank, 2019). In 2012, net FDI inflows reached -0.1% of GDP, reflecting yet another net withdrawal of FDI, which may be attributed to the reduced investor confidence which led to a capital flight response from investors as well as reduced inward investment, triggered by foreign exchange shortages and the massive devaluation of the Malawi Kwacha; which further triggered a rise in inflation (IMF, 2012, 2013). That same year GDP growth dropped to 1.9%.

Observing these trends allows us to see that each capital flow has influenced Malawi's economic growth. For instance, an increase in external debt generally causes a decrease in growth, although it sometimes offers a buffer to destabilising events. Remittances also provided a buffer during economic downturns and decreases during times of stability. When official development assistance

and FDI fluctuated, GDP growth often mirrored these trends, indicating their significant role in the country's economic performance; however, in some periods (i.e. 1994, 1999 and 2011), FDI would not mirror growth due to external factors and political instability. Although examining these trends can provide insight into the impact of capital flow on growth, a deeper analysis is required to understand the underlying relationships between the variables. Understanding these dynamics is crucial for forming policies that harness these flows to stabilise and boost economic growth.

## 3. LITERATURE REVIEW

### 3.1 Theoretical Literature

Theories such as financial liberalisation theories, neoclassical growth theories, endogenous growth theories, and globalisation and trade theories provide a good foundation for discussing how capital flows influence economic growth.

The neoclassical Solow-Swan framework has influenced many of the existing growth models (Andersen & Gruen, 1995). This framework emphasises that capital, labour, and technological progress increase growth. The model expands on this by highlighting that capital accumulation can raise output, higher savings can lead to increased investments, which increase capital and lead to growth, and the importance of capital moving freely to drive growth through foreign investment. However, the Solow-Swan model does not account for internal innovations or policies as a growth driver but determines growth exogenously.

The Endogenous growth theory provides a solution to the limitations highlighted in the neoclassical framework by offering an approach that proposes that internal forces rather than external forces drive economic growth. Consequently, changes in per capita growth are not solely explained by exogenous technological change (Romer, 1994). The Endogenous growth theory, founded in the Solow-Swan framework, incorporates human capital, innovation, and knowledge as additional explanatory variables. These variables help to provide evidence that economic growth can be influenced by internal forces and not only external forces (Agbloyor et al., 2014). This provides a basis for examining the impact of capital flows such as FDI, Remittances, Official Development Assistance, and External debt on economic growth. FDI, for example, brings in new advanced technologies and skills, external debt when channelled in productive sectors can lead to long term growth, and remittances provide households with funds to invest in health and education,

contributing to economic growth. The endogenous growth theories advanced by Romer (1989), help us understand that technological change is made possible through profit-maximising agents who drive technological advancements that influence the endogenous growth model. This model helps explain how FDI inflows can increase production output through spillover effects and externalities. Thus, these models explain how FDI facilitates technology diffusion, consequently driving growth, (Makki & Somwaru, 2004).

Furthermore, other factors play a crucial role, as highlighted by Anderson and Gruen (1995), who state that a country's balance of payments (BOP) position impacts the magnitude or pace of output growth through various mechanisms. International capital flows reflected in the BOP help countries overcome the limitations of low domestic savings on investment and growth. Prasad et al. (2003) further echo this, adding that financially liberalised nations benefit more than countries that are not as open since capital flows directly impact economic growth through increased domestic savings, lower capital costs, technology transfer, and indirect benefits such as improved production specialisation and enhanced macroeconomic policies and institutions driven by competitive pressures. This is why the International Monetary Fund (IMF) encourages countries to liberalise their capital accounts to benefit from capital flows. However, FDI inflows do not always yield positive results, and issues of capital flight may arise as a risk. According to Seetanah and Khadaroo (2009) limited growth can occur if significant reverse flows occur through profit remittances and multinational corporations operating in sectors with low competition, displacing domestic savings and investment, eventually leading to adverse effects on the external balance.

In addition to FDI, Remittances play a vital role in economic growth. Remittances, defined as individual-level financial movements, are an often overlooked yet significant contributor to economic stability and growth, especially in developing countries. These are transfers either in cash or goods from individuals in one country to another. Remittances offer an alternative source of finance for individuals, giving those who lack funding access to funds for consumption, savings, and investment and are considered a more stable form of capital as they exhibit consistency (Ratha et al., 2016).

Another important capital flow is Official Development Assistance (ODA). OECD (2021) defines ODA as government aid that promotes and specifically targets developing countries' economic development and welfare. It can take various forms, such as grants or loans. The motivation for

governments in developing countries to acquire official development assistance stems from mitigating low domestic savings and a need to cover budgetary deficits Qayyum, Din, and Haider (2014), and to serve as a short-term remedy to initiate economic advancement, Dambula (2020). Theories such as the Two-Gap Model and the Endogenous Growth Theory suggest that aid can increase economic growth by bridging the savings gap in developing countries (Eregha & Oziegbe, 2016).

Aside from FDI, Remittances, and Official Development Assistance flows, developing countries tend to experience a high volume of capital flows in the form of external debt. External Debt is defined as a country's total debt to foreign creditors, which includes governments, international organisations, and private entities. It is made up of private and public sector debt. External debt can assist countries in accessing funds and resources to increase growth and development, (Krugman, 1988; Sachs, 1989).

The theories emphasise the significant roles of FDI, remittances, ODA, and external debt in steering economic growth. FDI and Remittances contribute to growth through technology diffusion, human capital development through education and capacity building, and increased household investments in small businesses or health and education. ODA supports development projects by bridging the savings gap, while ED provides essential resources for growth but requires careful management to avoid financial crises. Considering the theoretical foundations established, the next section comprehensively reviews studies documenting the nexus between capital flows and economic growth.

### 3.2 Empirical Literature

Studies on the impact of capital flows on economic growth yield diverse results. Some have been conducted for individual countries, others as panels within a region or different demographics, and some examine specific or multiple capital flows. This section explores the various studies, research methods, findings, and literature gaps.

Remittances are an important capital flow for developing economies, primarily supporting household consumption. However, their impact on economic growth varies, depending on the allocation of funds within the recipient economy. Studies by Fromentin and Leon (2019), Meyer and Shera (2017), and Sobiech (2019) suggest remittances spur growth through credit and

financial development, particularly in countries with low financial development. Conversely, Benhamou and Cassin (2021), found that investing remittances in education initially increases growth through production. However, these effects dissipate, resulting in an Inverted U-shape, indicating a non-linear relationship. Adarkwa (2021) found a positive relationship between economic growth and remittances in Senegal and Nigeria but an adverse relationship for Cape Verde and Cameroon. The author attributed the differences to the heterogeneous nature of the West African economies, which a simple model cannot capture. Using a non-profit-driven model, Chami, Fullenkamp and Jahjah (2003) found a negative relationship between remittances and growth, suggesting that remittances assist during unstable periods, challenging the belief that remittances are a source of capital for economic development. However, Chami et al. (2009) found no significant impact on growth, concluding that remittances can alleviate poverty.

While panel studies offer valuable insights, single-country case studies allow us to explore unique national contexts. Loto and Alao (2019) split remittances into worker[1] and migrant[2] categories to analyse individual effects on growth and found that worker remittances positively impacted growth, while migrant remittances negatively impacted growth in the long and short run. Conversely, Suphian et al. (2017) found that migrant remittances positively impact growth. Yet, Ime, Orok and Udoka (2020) found that worker remittances were insignificant. This implies that aggregate remittances mask how different types of remittances impact growth.

Having explored remittances, foreign direct investment (FDI) is often regarded as a critical driver of economic growth when channelled into productive sectors. FDI research has yielded different findings across variable income levels and regional contexts. Ayenew (2022) found that FDI had a positive impact on growth in the long run but no significant impact in the short run, suggesting a delayed impact on growth. Similarly, positive relationships were found by Seyoum et al. (2015) and Hoang et al. (2010), using Granger causality techniques. Seyoum et al. (2015) included GDP growth and FDI as primary variables, providing a straightforward analysis. However, Hoang et al. (2010) included confounding variables and interaction terms, showing that FDI alone might not drive growth without complementary conditions like trade, labour and domestic investment. Gui-Diby (2014), using interaction terms, also found a positive relationship between FDI and growth

[1] Worker remittances are defined as current transfers made by employees to residents of another country (IMF, 1993).

[2] Migrant remittances are the sum of worker remittances, employee compensation, and migrant transfers as recorded in the IMF Balance of Payments (World Bank).

between 1995 and 2009 and a negative relationship between 1980 and 1994. This shows how interaction and including confounding variables can reveal insightful information.

Although panel studies mainly support a positive relationship, single-country cases have mixed findings. Ramirez (2000) and Blin and Ouattara (2009) found a positive and significant long-run relationship between growth and FDI, using the ARDL method to accommodate a small data set spanning 25 years. In comparison, Tsaurai (2015), Mazumdar (2012) and Akinlo (2004) found an insignificant impact in the long run for Zambia, India and Nigeria, respectively. Tsaurai (2015), investigated two-way causality between Zambia's FDI and exports, while Mazumdar (2012) used a stepwise regression approach in two model versions with GDP and industrial production as dependent variables, which captured diverse economic influences. Collectively, FDI literature proves its significant impact on growth across multiple countries of unique national contexts; however, the relationship between FDI and growth depends on a country's dynamics. The expectation is that inflows of FDI improve growth and outflows are detrimental to growth. However, studies have shown that how countries respond to FDI is dependent on issues such as the country's absorption capacity, human capital, and financial development (Benetrix et al., 2023).

While FDI involves private investments, external debt represents a private and public capital flow aimed at growth and development. Unlike FDI, external debt comes with repayment obligations that influence its long-term impact on growth. Panel studies on the impact of external debt on growth have varying results. For instance, Agyeman et al. (2022) found that external debt negatively impacts economic growth in Sub-Saharan African countries with statistical significance. Wang et al. (2021) support this, using confounding variables like financial repression, financial openness, financial development, Sovereign spread, and Institutional quality. However, regional differences were underexplored. Reinhart and Rogoff (2010) introduced a threshold concept and found that growth declines as debt grows past a particular threshold, implying a non-linear relationship. Although different in methodology, data points and variables, these papers found that external debt dampens growth, especially when there are weak systems and low repayment capacity.

While panel studies have shown a general negative relationship between external debt and growth, single-country case studies provide mixed findings. For example, Tchereni et al. (2013) found an insignificant relationship, concluding that Malawi's reliance on debt is not justifiable. However,

Ramzan and Ahmad (2014), including an interaction between external debt and the macroeconomic policy index, found that external debt had a negative and significant impact in the short and long run, concluding that sound macroeconomic policy can mitigate this negative impact. Using ARDL models, Mbah et al. (2016) and Daka et al. (2017), found a negative and significant relationship between external debt and growth for Nigeria and Zambia. However, Manasseh et al. (2019) found a positive relationship between external debt and growth in Nigeria using a linear regression model. The difference could result from including more control variables and different methods compared to Mbah et al. (2016).

Another important capital flow is official development assistance (ODA), primarily for poverty alleviation and economic development. Panel studies on ODA's impact on growth provide mixed findings. For instance, Dang and Duc (2019) found a positive and significant relationship with growth, with Eregha and Oziegbe (2016) indicating that West Africa gave significant positive results after including inflation and trade openness variables. Showing the importance of including relevant control variables. Some studies have examined how different types of aid impact growth. For example, Minoiu and Reddy (2010) found that development aid has a significant positive long-term relationship with growth; however, non-development aid has no impact, highlighting allocation differences. Contrarily, Mallik (2008) found a negative long-run relationship between ODA and growth in highly indebted countries (including Malawi), pointing out that this may result from a lack of good governance and funds meeting humanitarian needs rather than expanding productivity. However, Qayyum et al. (2014) found no significant impact in developed and developing countries, emphasizing the importance of good governance in reaping aid rewards.

Although panel studies offer insight into the relationship between ODA and growth, single-country cases can give more nuanced insight. Hussen and Lee (2012) found a significant positive impact of ODA on economic growth in Ethiopia. However, aid effectiveness depends on the political and macroeconomic climate. Similarly, Khomba and Trew (2022) showed that aid substantially impacts growth at disbursement but diminishes significantly in Malawi, with aid as a grant positively impacting growth and negatively as a loan. This highlights how different forms of aid can impact an economy. Fashina et al. (2018) estimated two models: the medicine model, where when aid reaches a particular threshold, it is no longer beneficial, and an extended model, where they examine aid and the effect of human capital shocks on growth. They found that in the extended model, aid did not lead to substantial long-run growth, but in the threshold model, aid reached an

optimal point, after which it had a negative impact. Conversely, studies by Dambula (2020) and Mbah & Amassoma (2014) found no significant relationship between ODA and growth in Malawi and Nigeria, respectively, emphasising the role of solid governance and surveillance in promoting growth.

Multiple capital flows in a study offer a broader view of their impact on an economy, further enriching the discussion. Aizenman et al. (2011) and Choong et al. (2010) found a positive relationship between FDI inflows and growth, while external debt has a negative effect, with the stock markets mitigating the negative effect of debt. Chinn and Ito (2006) highlighted that financial openness spurs equity market development, influencing capital flow's impact on economic growth. Adeola and Aziakpono (2022) found a strong positive short and long-run relationship between FDI and growth and a weak long-term link between remittances and ODA and economic growth in Kenya. Although Zardoub and Abed (2019) found an insignificant long-term relationship between FDI and remittances and growth; in the short run, FDI and remittances negatively impact economic growth. However, Rehman and Ahmad (2016) found that net FDI and net remittances positively impact long-term economic growth.

The literature produces different results regarding the impact of capital flows on economic growth, with some countries benefiting and others experiencing adverse effects. IMF (2008) attributes this to demographic and regional differences. For developing countries, solid financial sectors and institutions, macroeconomic policies, and trade openness influence the impact of capital flows on economic growth (Igan et al., 2020; Lindelwa, 2020; McKinnon, 1973; Ndikumana & Sarr, 2019). Nevertheless, despite these factors, developed countries show ambiguous results.

Studies focusing on Malawi are largely scant. For instance, panel studies by Asafo-Agyei and Kodongo (2022), Eregha and Oziegbe (2016), and Qayyum et al. (2014) focused on trends in the Southern African region, offering little in-depth analysis of Malawi's socio-economic environment. This presents an opportunity for tailored research, which provides an in-depth and context-specific analysis, allowing for greater insight that panel studies miss. Single-country studies for Malawi have found different results. Suphian et al. (2017) found that remittances and Official Development Assistance (ODA) positively impact growth, yet Dambula (2020) found an insignificant relationship between ODA and growth. Alternatively, Khomba and Trew (2022) revealed that ODA boosts growth in grant form but dissipates over time. However, in the form of

a loan, it has a negative impact. Tchereni et al. (2013) found an insignificant relationship between external debt and growth. These studies present an opportunity for studies to examine various capital flows to understand how each flow impacts economic growth.

Furthermore, Khomba and Trew (2022) present an opportunity to explore the potential nonlinear relationship between ODA and growth and extend this possibility to other capital flows, in line with Some studies that highlight the asymmetric effects of capital flows on growth. Asymmetry is the disproportionate response of a variable (output in this case) to changes in inputs, resulting in an imbalanced response to shocks (Ungureanu & Matei, 2007). Overlooking nonlinearity can lead to inaccurate predictions because the model is oversimplified, considering real-world economic trends are often irregular (Albu, 2006). Thus, recent studies began exploring the asymmetric effects of capital flows on growth. For instance, Elkhalfi et al. (2024) and Sharaf (2022) found that moderate debt encourages growth, while excessive debt decreases it in emerging countries and Egypt, respectively. However, Abdi et al. (2024) found that both positive changes and lagged negative changes have a positive impact on economic growth for Somalia. Furthermore, Odugbesan et al. (2021) found that positive and negative changes in remittance increase economic growth in the long run in MINT nations (Mexico, Indonesia, Nigeria, and Turkey). However, Benhamou and Cassin (2021) found that growth decreases after a particular threshold of remittance inflow is reached. This was also observed by Fashina et al. (2018) for ODA. These studies highlight the need to explore capital flows' asymmetric impact on growth, necessitating a study tailored to Malawi’s context.

Different methods have been used to analyse capital flow impact on growth, such as Granger causality (Hoang et al. (2010)), which highlights causal relationships between variables but overlooks long-term equilibrium and GMM, which addresses endogeneity but requires large datasets (Ullah et al., 2018). Cointegration methods are used to estimate equilibrium relationships. Cointegration methods include the Johansen cointegration method used by Ali (2014) and Kunwar (2024) who established long and short-run relationships between capital flows and growth; however, this method's drawback is that it cannot be applied when variables are integrated in a different order (e.g., Shrestha & Bhatta (2018)). The Engle and Granger (1987) cointegration method is rarely used since it struggles with handling multivariate systems and lacks robustness due to its two-step approach. However, the ARDL model can simultaneously model long-run and short-run relationships among variables, is robust in handling small sample sizes, and can be used

when variables are integrated of different orders, such as I(0) and I(1) variables (Pesaran et al., 2001). Extending this, the NARDL model captures asymmetries to determine nonlinear relationships between variables (MacCarthy et al., 2022; Shin et al., 2014; Tian et al., 2024).

Therefore, this paper examines the impact of capital flows on economic growth by analysing factors contributing to variations in the relationship between capital flows and economic growth in Malawi. This study adopts the ARDL model Shen et al. (2010) and Adeola & Aziakpono (2022) used; however, this will be extended to the NARDL model to better capture asymmetries to provide greater insight (MacCarthy et al., 2022). Considering Malawi's data limitations and relatively small sample size, the NARDL/ARDL method is chosen for this study because it balances robustness and feasibility. Furthermore, by incorporating underexplored flows like Remittances and official development assistance, this research will provide a detailed understanding of the multifaceted impact of these variables on economic growth, focusing on Malawi's unique economic context. This study will add to existing literature and contribute valuable insights to the local and global understanding of the asymmetric impact of capital flows on growth, which could help inform policy decisions. The following section highlights the sample period and data sources and discusses the method used for analysis.

## 4. DATA AND METHOD

To investigate the impact of capital flows on economic growth, we use annual data from 1980-2022, with remittances starting from 1994-2022, due to lack of data. Capital flows, all expressed as a percentage of GDP include Remittances (REM) proxied by personal transfers and compensation of employees received, Official Development Assistance (ODA) proxied by net official development received, Foreign Direct Investment (FDI) proxied by net FDI inflows, and External Debt (ED) proxied by Total external debt encompassing debt owed to non-residents repayable in currency, goods, or services, comprising of private and public sector debt.

inspired by Khungwa (2007), and Ramzan and Ahmad (2014), this study includes control variables that can also influence growth, such as human capital (HC), inflation (INFR), domestic investment (DI), financial sector development (FSD), and trade openness (TO), to avoid omitting important variables (misspecification) that lead to inaccuracies. These are sourced from and calculated as follows: Trade openness (TO) (exports plus imports) divided by GDP, sourced from the African Development Bank (2023) and GDP from the World Bank's World Development

Indicators (WDI) (2023). Human Capital (HC) is proxied by Secondary School enrolment rates, sourced from the World Bank (2023). Domestic investment (DI) is proxied by gross fixed capital formation expressed as a percentage of GDP sourced from the African Development Bank (2023). Financial Sector Development (FSD) is proxied by private sector credit as a percentage of GDP and sourced from the International Monetary Fund's International Financial Statistics (IFS) (2023). The inflation rate (INFR) is proxied by the annual inflation rate sourced from the World Development Indicators (WDI).

All variables except FDI undergo logarithmic transformation to stabilise variance and mitigate the impact of outliers. FDI data had four negative points, which cannot be logged; consequently, the Inverse Hyperbolic Sine (IHS) transformation was applied to approximate the variable's natural logarithm and allow for retaining negative observations. It is important to note that the coefficients from IHS-transformed variables require retransformation for percentage change interpretation, particularly for small or zero values (Bellemare & Wichman, 2020). Therefore, as suggested by Friedline et al. (2015) and Mckenzie (2023) the IHS transformed coefficient must be treated as a directional impact rather than interpreted as an exact percentage change, ensuring that sensitivity to units remains.

This study estimates four models, one for each capital flow, and incorporates dummies that capture unique structural changes identified through breakpoint tests for each capital flow (see Table A1). In the FDI model, DUM_FDI captures the response to the 2012 devaluation of the Malawi Kwacha, which triggered a capital flight response by foreign investors, taking the value of 1 for the 2013 break and 0 otherwise. DUM_GFC captures the 2008/2009 Global Financial Crisis and takes the value of 1 in 2008 and 2009 and 0 otherwise. The ODA model uses DUM_ODA to capture the increase in foreign assistance due to the food crisis, taking 1 for 2002 and 0 otherwise, and DUM_POL to capture political unrest, taking 1 for 1992 to 1994 and 0 otherwise. In the External Debt model, a debt relief dummy DUM_DTR captures pre-2003 and 2004 cancelled debt, and DUM_GFC for the Global Financial Crisis, which was used by (De Broeck et al., 2018). In the remittances model, DUM_REM captures the improved policies and data collection, taking 1 from 2016 onwards and 0 otherwise. Historical events, such as political unrest and the global financial crisis, were included due to their documented effect on capital flows. Each model, except remittances, includes at most two dummies. The remittances model includes one dummy due to the smaller sample size.

To investigate the impact of capital flows on economic growth, we specify the following equation (1):

$$LNY_t = \beta_0 + \beta_1 LNCF + \beta_2 LNDI + \beta_3 LNHC + \beta_4 LNINFR + \beta_5 LNFSD + \beta_6 LNTO + \varepsilon_t \quad (1)$$

Where LNYt is the natural logarithm of GDP (dependent variable), $CF_t$ represents capital flows (external debt, official development assistance, remittances and FDI), $LNDI_t$ is domestic investment, $LNHC_t$ is human capital, $LNINF_t$ is inflation, $LNFSD_t$ represents financial sector development and, $LNTO_t$ is trade openness.

This study adopts the ARDL model used by (Shen et al., 2010) and Adeola & Aziakpono (2022). Trade Openness and Financial Sector Development variables are added to suit Malawi's context. The ARDL Model is presented in equation (2) as follows:

$$\Delta LNY_t = \beta_0 + \beta_1 LNY_{t-i} + \beta_2 LNX_{t-i} + \beta_3 LNCF_{t-i} + \varphi ECT_{t-i} + \sum_{i=1}^{n} \tau_i \Delta LNY_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LNX_{t-i} + \sum_{i=1}^{n} \delta_i \Delta LNCF_{t-i} + \varepsilon_t \quad (2)$$

Where $LNX_{t-i}$ represents the lagged values of the explanatory variables (LNTO, LNINF, LNHC, LNFSD, LNDI). $LNY_{t-i}$ represents lagged values of the dependent variable (GDP). $\Delta LNY_{t-i}$ captures the short-run dynamics of the dependent variable (GDP) by examining changes in the dependent and explanatory variables. The coefficient ($\varphi$) of the error correction term (ECT) captures the speed of adjustment to equilibrium and the coefficients, long-run coefficients are captured by β and a short run by τ, γ, and δ.

To examine the asymmetric impact of capital flows on growth, we use the NARDL approach, presented in Equation (3) as follows:

$$\Delta Y = \beta_0 + \beta_1 Y_{t-i} + \beta_2 X_{t-i} + \beta_3^+ CF_{t-i}^+ + \beta_4^- CF_{t-i}^- + \varphi ECT_{t-i} + \sum_{i=1}^{n} \tau_i \Delta Y_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta X_{t-i} + \sum_{i=1}^{n} \delta_1^+ \Delta CF_{t-1}^+ + \sum_{i=1}^{n} \delta_2^- \Delta CF_{t-1}^- + \varepsilon_t \quad (3)$$

Where $CF_{t-i}$ represents lagged values of capital flow variables and $X_{t-i}$ represents confounding explanatory variables. $\beta_3^+ CF_{t-i}^+ + \beta_4^- CF_{t-i}^-$ represents long-run asymmetric level effects of the capital flow variables and $\delta_1^+ \Delta CF_{t-i}^+ + \delta_2^- \Delta CF_{t-i}^-$ represents short-run asymmetric effects of the capital flow variables, decomposed into positive and negative shocks.

Unit root tests, such as the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, assess whether variables are stationary. The NARDL/ARDL model is appropriate when variables have different orders of integration. For example, one variable may be I(0) (stationary), while another may be I(1) (stationary at first difference). It can also be applied when all variables are I(1). The key is to ensure that there are no I(2) variables, as they would invalidate the model's assumptions.

Asymmetry is tested using a Wald test; if present, a NARDL model will be used for estimation. The NARDL model captures asymmetric relationships between the dependent and independent variables by decomposing the independent variables into positive and negative changes and allowing them to affect the dependent variable differently (Abdi et al., 2024; Shin et al., 2014). In this case, external debt, official development assistance, remittances and FDI will be categorised as nonlinear; therefore, they will be decomposed into positive and negative shocks.

If the model does not contain I(2) variables, bounds testing will be used to determine whether cointegration (long-run relationship) exists between the variables in the NARDL models. The bounds test estimates two regressions: one with only the lagged levels of variables (the short-run model) and the other with both levels and first differences (the long-run model). An F test is then performed to check whether the coefficients on the levels are jointly equal to zero. Cointegration is evident if the F statistic exceeds the upper and lower bound, confirming a stable long-term relationship among variables and justifying using the NARDL model; however, if it is below the lower bound, there is no cointegration, and if it is between the lower and upper bounds then results are inconclusive. Following the estimation of the NARDL models, diagnostics tests will be performed to test the performance and stability of the model. Furthermore, to show the extent to which linear models are misspecified when asymmetries are ignored, we estimate ARDL models and compare the results of the NARDL and ARDL models

The following section will analyse and discuss the results of the NARDL model estimations for each model/capital flow (external debt, foreign direct investment, remittances, official development assistance) to establish its impact on economic growth.

## 5. ANALYSIS & RESULTS

This section will present and discuss the pre-estimation results, including stationarity tests, asymmetry tests, bounds tests, and interpretation of the short- and long-run relationships from the NARDL/ARDL models.

Table 1: Descriptive statistics

| Variable | Mean | Standard Dev | Min. | Max. | Kurtosis |
|---|---|---|---|---|---|
| GDP | 22.3553 | 0.4773 | 21.6682 | 23.1488 | 1.7233 |
| External Debt | 3.6839 | 0.7265 | 2.3104 | 4.7665 | 1.8675 |
| IHS_FDI | 0.8126 | 0.7632 | -0.8051 | 2.6409 | 3.1272 |
| Remittances | -1.5719 | 1.6021 | -4.0993 | 0.9353 | 1.8713 |
| Official Dev. Assistance | 2.5039 | 0.3611 | 1.8699 | 3.3103 | 2.1888 |
| Inflation | 2.7838 | 0.5609 | 2.0030 | 4.4228 | 2.9963 |
| Fin Sect. Dev | 1.7944 | 0.5089 | 0.6353 | 2.5322 | 2.3693 |
| Human Capital | 3.2775 | 0.3367 | 2.7216 | 3.6947 | 1.4143 |
| Domestic investment | 1.9284 | 0.4215 | 1.1656 | 2.7772 | 2.2872 |
| Trade openness | -1.4216 | 0.2864 | -2.0881 | -0.9060 | 2.1091 |

Source: author's compilation and values obtained from EViews (Version 12)

Table 1 presents descriptive statistics for each variable included in the study. The standard deviations show that most variables exhibit moderate variability. Human capital has a mean of 3.28 and a small range of 0.9. In contrast, Remittances have a relatively wide range between the maximum and minimum values compared to the others, and standard deviations ranging from 0.29 to 1.60 show overall moderate variability. A kurtosis of 3 indicates a normal distribution; thus, inflation demonstrates a normal distribution relative to the other variables, and human capital has a kurtosis of 1.4, indicating less extreme values.

Table 2 presents the correlation matrix for our variables, which helps ascertain the possibility of multicollinearity if the correlation coefficient is greater than 0.8 and the relationships between the variables, for instance, the negative correlation between GDP and External debt indicates a possible negative relationship. Furthermore, despite the high correlation of 0.8826 between GDP and remittances, this study still includes remittances as its is a capital flow of interest.

Table 2: Correlation matrix

| | LNY | LNED | IHS_FDI | LNREM | LNODA | LNDI | LNHC | LNINFR | LNFSD | LNTO |
|---|---|---|---|---|---|---|---|---|---|---|
| **LNY** | 1.0000 | | | | | | | | | |
| **LNED** | -0.7306 | 1.0000 | | | | | | | | |
| **IHS_FDI** | 0.2772 | -0.2731 | 1.0000 | | | | | | | |
| **LNREM** | 0.8826 | -0.6312 | 0.3075 | 1.0000 | | | | | | |
| **LNODA** | -0.3644 | 0.5646 | -0.1629 | -0.3071 | 1.0000 | | | | | |
| **LNDI** | 0.4554 | -0.7264 | 0.2569 | 0.6086 | -0.3700 | 1.0000 | | | | |
| **LNHC** | 0.7488 | -0.5994 | 0.2984 | 0.5509 | -0.4641 | 0.2689 | 1.0000 | | | |
| **LNINFR** | -0.4247 | 0.6186 | -0.0940 | -0.4990 | 0.7401 | -0.5599 | -0.3737 | 1.0000 | | |
| **LNFSD** | 0.7292 | -0.6386 | 0.2896 | 0.5712 | 0.0163 | 0.4270 | 0.3590 | -0.1208 | 1.0000 | |
| **LNTO** | -0.0663 | -0.3546 | 0.2605 | 0.0322 | -0.3331 | 0.5122 | 0.1999 | -0.4693 | -0.0972 | 1.0000 |

Source: author's compilation and values obtained from EViews (Version 12)

To ensure all the variables are either integrated of order I(0) or I(1), unit root tests are conducted using the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. The results in Tables 3A and 3B show that most variables were integrated of order I(1) except for foreign direct investment, official development assistance and inflation, which were I(0).

Table 3A: ADF Unit Root Test

| | ADF | | | | |
|---|---|---|---|---|---|
| | Levels | | 1st Difference | | |
| **Variable** | **Intercept** | **Intercept + Trend** | **Intercept** | **Intercept + Trend** | **CONCLUSION** |
| **GDP** | 0.9864 | 0.2086 | 0.0000*** | 0.0000*** | I(1) |
| **FDI** | 0.0004*** | 0.0000*** | | | I(0) |
| **Remittances** | 0.8147 | 0.1789 | 0.0001*** | 0.0006*** | I(1) |
| **External debt** | 0.6291 | 0.6248 | 0.0000*** | 0.0002*** | I(1) |
| **Official Dev. Assistance** | 0.0246** | 0.0967* | | | I(0) |
| **Inflation** | 0.0212** | 0.0680* | | | I(0) |
| **Human capital** | 0.6593 | 0.7469 | 0.0000*** | 0.0000*** | I(1) |
| **Domestic investment** | 0.4039 | 0.2389 | 0.0000*** | 0.0000*** | I(1) |
| **Financial sector dev.** | 0.3171 | 0.6709 | 0.0000*** | 0.0000*** | I(1) |
| **Trade openness** | 0.6032 | 0.9944 | 0.0000*** | 0.0000*** | I(1) |

Source: author's compilation and values obtained from EViews 12
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively*
Notes: *Table records P values*

A joint symmetry test examined long-run, short-run, and joint symmetry. Table 4 presents the short and long-run results, while Table A3 (Appendix) presents Joint symmetry results. The results indicate significant long-run and joint asymmetry in all four models, while short-run asymmetry was present in three.

Table 3B: PP Unit Root Test Results

| | PP | | | | |
|---|---|---|---|---|---|
| | Levels | | 1st Difference | | |
| **Variable** | **Intercept** | **Intercept + Trend** | **Intercept** | **Intercept +Trend** | **CONCLUSION** |
| **GDP** | 0.9933 | 0.2086 | 0.0000*** | 0.0000*** | I(1) |
| **FDI** | 0.0003*** | 0.0000*** | | | I(0) |
| **Remittances** | 0.8749 | 0.1191 | 0.0001*** | 0.0006*** | I(1) |
| **External debt** | 0.6126 | 0.5741 | 0.0000*** | 0.0002*** | I(1) |
| **Official Dev. Assistance** | 0.0325** | 0.1194 | | | I(0) |
| **Inflation** | 0.0250** | 0.0841* | | | I(0) |
| **Human capital** | 0.6599 | 0.6620 | 0.0000*** | 0.0000*** | I(1) |
| **Domestic investment** | 0.4088 | 0.1958 | 0.0000*** | 0.0000*** | I(1) |
| **Financial sector dev.** | 0.2900 | 0.6819 | 0.0000*** | 0.0000*** | I(1) |
| **Trade openness** | 0.6978 | 0.9733 | 0.0000*** | 0.0000*** | I(1) |

Source: author's compilation and values obtained from EViews 12
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively*
Notes: *Table records P values*

ODA did not exhibit any significant short-run asymmetry, but exhibited weak joint asymmetry at the 10% significance level. Therefore, the short-run ODA results should be interpreted cautiously, as asymmetry is absent in the short run alone, but weakly present when both the long and short run are jointly tested. The long run for ODA is not an issue as there is strong evidence of asymmetry.

Table 4: Long-run and Short-run Symmetry test results

| | Long-run Symmetry | | | Short-run Symmetry | | |
|---|---|---|---|---|---|---|
| **Variable** | **F statistic** | **P-value** | **Conclusion** | **F statistic** | **P-value** | **Conclusion** |
| **External debt** | 38.4213 | 0.0004*** | Asymmetry | 24.954 | 0.0016*** | Asymmetry |
| **Official Dev. Assistance** | 5.2456 | 0.0315** | Asymmetry | 1.8680 | 0.1849 | No Asymmetry |
| **Remittances** | 13.8006 | 0.0030*** | Asymmetry | 7.1318 | 0.0204** | Asymmetry |
| **FDI** | 8.1590 | 0.0095*** | Asymmetry | 4.4597 | 0.0469** | Asymmetry |

Source: author's compilation and values obtained from EViews 13
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively*
Notes: *Table records P values*

The Bounds test for cointegration was then performed to establish cointegration among variables in each model, indicating a stable long-term equilibrium relationship. Table 5 and Table A4 (see Appendix) present the Bounds test results for the NARDL (which reflect the joint asymmetry specification, incorporating both long-run and short-run effects) and ARDL models, respectively. The results show that the F statistics fall above the lower and upper bound at 5% and 10% levels in the NARDL/ARDL models. This confirms the presence of a long-term equilibrium relationship between economic growth and the respective capital flows for all models.

Table 5: Bounds test for the NARDL model

| Model/ Capital Flow | Estimation Model | F-statistic | 95% Lower Bound | 95% Upper Bound | 90% Lower Bound | 90% Upper Bound | Conclusion |
|---|---|---|---|---|---|---|---|
| **External debt** | **NARDL** | 10.753 | 2.523 | 3.829 | 2.152 | 3.296 | Cointegration |
| **Official dev. assistance** | **NARDL** | 5.309 | 2.504 | 3.723 | 2.131 | 3.223 | Cointegration |
| **Remittances** | **NARDL** | 11.259 | 2.730 | 4.163 | 2.277 | 3.498 | Cointegration |
| **IHS_FDI** | **NARDL** | 6.831 | 2.523 | 3.829 | 2.152 | 3.296 | Cointegration |

Source: author's compilation and values obtained from EViews 13

Tables 6 and A5 (Appendix) present long-run NARDL and ARDL coefficient estimates, respectively. Tables 7 and A6 (Appendix) present the short run/Error Correction Model (ECM) NARDL and ARDL estimates, respectively. The error correction term (ECT) must be negative and statistically significant and indicate the speed of adjustment back to long-run equilibrium after a shock. Lags were selected automatically for each model using the Akaike Information Criterion (AIC) (Table A2, Appendix).

This study estimates four models, one for each capital flow. Model 1 for external debt, model 2 for ODA, model 3 for remittances and model 4 for FDI. In model 1, the NARDL (Tables 6 and 7) results show that external debt exhibits asymmetries in the long- and short-run. A 1% increase in lagged external debt increases growth by 0.23%, like findings by Manasseh et al. (2019); while a 1% decrease reduces growth by 0.34%, showing stronger negative responses. In the short run, a 1% increase in debt causes a 0.11% decrease in growth, while a decrease has a smaller negative impact, like Ramzan and Ahmad (2014). Conversely, the ARDL results (table A5) reveal no significant long-run relationship between external debt and growth, just like Tchereni et al. (2013), yet shows a significant short-run negative impact (Table A6), like Daka et al. (2017). However, lagged effects show that prior debt increases growth, echoing (Sachs, 1989). These results highlight how prior debt when used strategically has a positive impact on growth for Malawi, but they also show that a decrease in this debt has a more detrimental effect on growth. The NARDL results show that accounting for asymmetries provides more insight into the impact external debt has on growth, as it provides significant results in the long run, unlike the ARDL results.

Trade openness shows a significant negative relationship with economic growth due to Malawi's status as a net importer (Kwalingana et al., 2009; Raga, 2023), Contradicting the belief that openness encourages growth, (IMF, 2008; Prasad et al., 2003). The error correction term of the

NARDL model indicates a 153% adjustment towards equilibrium, which shows a rapid adjustment, much faster than the ARDL model's adjustment speed of 7.7%. The 153% adjustment speed is above the conventional range and indicates overshooting. This result does align with Pesaran et al. (2001) who suggest that this can occur due to relatively small sample sizes and multiple lags, which increases estimation variability and reduces precision. This is further enforced by findings by Yang & Wen (2018), who had a small sample size of less than 30 and found ECT values of 122% and 183%, for the respective models estimated. However, Pesaran et al. (2001) stressed that an ECT of over -1 does not imply model misspecification but does signal cautious interpretation.

Table 6: Estimated long-run coefficients using the NARDL approach dependent variable is GDP

| **VARIABLE** | **MODEL 1 External debt** | **MODEL 2 Official dev. assistance** | **MODEL 3 Remittances** | **MODEL 4 FDI** |
|---|---|---|---|---|
| **Capital Flows:** | | | | |
| ***External Debt_POS (-1)*** | 0.230555 (0.0000)*** | | | |
| ***External Debt_NEG (-1)*** | -0.342926 (0.0000)*** | | | |
| ***Official Dev. Assistance_POS (-1)*** | | 0.190666 (0.0002)*** | | |
| ***Official Dev. Assistance_NEG (-1)*** | | -0.136411 (0.0474)** | | |
| ***Remittances_POS (-1)*** | | | 0.062763 (0.0006)*** | |
| ***Remittances_NEG (-1)*** | | | -0.235496 (0.0023)*** | |
| ***FDI_POS (-1)*** | | | | 0.071545 (0.0030)*** |
| ***FDI_NEG (-1)*** | | | | -0.009054 (0.7109) |
| **Confounders/Controls:** | | | | |
| ***Domestic Investment*** | | | -0.066911 (0.1566) | |
| ***Domestic Investment(-1)*** | -0.332441 (0.0000)*** | 0.062898 (0.3834) | | 0.136688 (0.0197)** |
| ***Human Capital*** | | | | 0.266627 (0.0044)*** |
| ***Human Capital(-1)*** | -0.689049 (0.0000)*** | -0.126088 (0.4222) | 0.305474 (0.0288)** | |
| ***Inflation Rate*** | | -0.072800 (0.0217)** | | -0.077793 (0.0012)*** |
| ***Inflation Rate (-1)*** | -0.009406 (0.4441) | | 0.007854 (0.7377) | |
| ***Financial Sect. Development*** | | | 0.062871 (0.1993) | -0.023870 (0.4925) |

| | | | | |
|---|---|---|---|---|
| ***Financial Sect. Development (-1)*** | -0.025923<br>(0.4040) | 0.122981<br>(0.0000)*** | | |
| ***Trade Openness*** | | -0.008963<br>(0.8995) | -0.210708<br>(0.0084)*** | |
| ***Trade Openness (-1)*** | 0.033502<br>(0.4214) | | | -0.263697<br>(0.0049)*** |
| ***C*** | 24.37351<br>(0.0000)*** | 21.83812<br>(0.0000)*** | | 20.55688<br>(0.0000)*** |
| **Model Fit:** | | | | |
| **R-Squared** | 0.977973 | 0.805942 | 0.813936 | 0.803433 |
| **Adjusted R-Squared** | 0.880426 | 0.749602 | 0.596861 | 0.742429 |
| **DW-Statistic** | 2.501985 | 1.942226 | 2.356087 | 2.458078 |

Source: author's compilation and values obtained from EViews 13

Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively*.

Notes: *The figure in (brackets) represents the P-values and those without brackets represent the coefficients.*

Notes: *POS (+) represents positive changes/shocks, and NEG (-) represents negative changes/shocks*

In model 2, the NARDL (Table 6) and ARDL (Table A5) results show that ODA significantly contributes to growth. However, the growth responses are stronger for the NARDL. The NARDL indicates that positive shocks improve growth while negative shocks reduce growth. This aligns with the Two-Gap Model and Endogenous growth theory, which suggest that ODA contributes to growth, although other studies like Mallik (2008) found a negative impact. In the short run (Table 7), the results have been decomposed into negative and positive shocks, with the positive shock being significant, while the negative shock is not statistically significant. This is unsurprising as the joint symmetry was weakly significant, and the isolated short-run test was insignificant. Nonetheless, we proceed to estimate the model with a joint asymmetry specification, as the joint asymmetry test suggests that the combined effect of both shocks may still matter. Therefore, short-run ODA results should be interpreted with caution, as the short-run asymmetry may also be present but weak in the joint specification. Overall, these results are unsurprising considering the role that ODA plays in Malawi. With most aid being channelled into sectors such as health, education and agriculture, the long-term impact on growth is positive and significant. However, short term insignificance could also signal the role ODA plays in assisting with shocks (i.e aid towards natural disaster and food shortage relief provided in the early 2000s). Furthermore, Granger causality results (Appendix, Table A10) indicate no causality in either direction, which means that ODA does not Granger cause GDP and neither does GDP Granger cause ODA. This does not mean that long-run impact does not exist as in the NARDL and ARDL models, but rather highlights the delayed impact that ODA has on the economic growth of Malawi.

The ARDL (Table A6) results suggest that ODA does not significantly impact economic growth in the short run, consistent with (Eregha & Oziegbe, 2016). In the ARDL model, human capital has a positive relationship with growth, yet the NARDL model finds a negative one. The error correction term indicates a 13.4% adjustment towards equilibrium. Domestic investment has a negative relationship with growth. These results show the importance of analysing asymmetries, as they allow us to capture disparities that linear models cannot.

In model 3, the NARDL (Tables 6 and 7) results indicate that remittances exhibit long and short-run asymmetries. A 1% increase in prior years' remittances leads to a 0.063% increase in growth, yet a 1% decrease leads to a larger 0.24% decrease in growth. Similarly, in the short run(Table 7), a 1% increase in remittances increases growth by 0.02%, while a decrease reduces growth by 0.07%, highlighting stronger negative responses. The ARDL (Table A5) model further confirms a positive relationship in the long run between remittances and growth, consistent with the findings of Suphian et al. (2017) and Sobiech (2019), reflecting the common belief that remittances contribute to growth (IOM, 2015). However, no significant relationship was found in the short run (Table A6) due to limited data, and short-run lags were absent, making it hard to capture lagged effects in small samples. This result may also imply that remittances initially go towards investments or serve as a buffer, which has no immediate impact on growth (Chami et al., 2009). In the ARDL and NARDL models, human capital has a positive relationship with growth. The NARDL model has a faster adjustment speed of 52% compared to the ARDL model's 42%. These results highlight the importance of encouraging diaspora remittances to Malawi as they contribute towards economic growth through their role in supporting and educating households and providing households with the resources for investments; however, it is important to take note that a reduction of these flows has a more detrimental effect on growth. Thus it is wise for policy makers to encourage inflows.

In model 4 of the NARDL (Table 6) model, FDI has a positive and significant long-run impact on growth, yet a decrease in FDI has no significant impact. In the short run (Table 7), growth has a larger response to positive shocks than adverse FDI shocks, which supports the positive impact of FDI on growth found by Choong et al. (2010). The ARDL (Table A5) model finds that FDI has no significant long-run relationship with growth, like Tsaurai (2015), contrasting the expectations in theory. It is likely a result of absorption capacity conditions that could allow the country to benefit from FDI (Ben Mim et al., 2022; Chavula & Awel, 2024). In the short run (Table A6), the negative

coefficient on the IHS-transformed FDI variable indicates a decrease in growth at 10% significance, consistent with (Joo & Shawl, 2023). However, lagged IHS_FDI positively impacts growth, supporting the theory that FDI builds capacity. In the NARDL and ARDL models, human capital and domestic investment have a positive relationship with growth. Yet, trade openness and inflation have a negative relationship with growth. The NARDL has a faster adjustment speed of 63% compared to the ARDL, which has an adjustment speed of 10%. These results show that although Malawi has struggled to attract FDI over the years, due to the investment climate and macroeconomic factors such as high inflation, exchange rate misalignments and exchange rate shortages (which have reduced investor confidence), prior FDI has a positive impact on long-term growth. Thus, creating a conducive environment for investment is essential for Malawi to reap the benefits of FDI. Furthermore, Granger causality results (Appendix, Table A10) show that FDI does not Granger cause GDP, but GDP Granger causes FDI. This indicates that past values of GDP help predict FDI, cementing the importance of a stable macroeconomic environment to attract FDI. The results are consistent in that FDI does not immediately increase growth but can support it in the long term with improved macroeconomic conditions.

Table 7: Error correction representation for each NARDL model dependent variable is D(GDP Growth)

| VARIABLE | MODEL 1: External debt | MODEL 2: Official Dev. Assistance | MODEL 3: Remittances | MODEL 4: FDI |
|---|---|---|---|---|
| ***D(GDP(−1))*** | 0.572152 | -0.124197 | | -0.080598 |
| | (0.0000)*** | (0.2019) | | (0.3672) |
| ***D(GDP(−2))*** | 0.781108 | | | 0.153672 |
| | (0.0000)*** | | | (0.0637)*** |
| ***D(GDP(−3))*** | 0.313605 | | | 0.276931 |
| | (0.0009)*** | | | (0.0032)*** |
| ***D(External debt_POS)*** | -0.107283 | | | |
| | (0.0007)*** | | | |
| ***D(External debt_NEG)*** | -0.066129 | | | |
| | (0.0000)*** | | | |
| ***D(External debt_POS(-1))*** | -0.272482 | | | |
| | (0.0000)*** | | | |
| ***D(External debt_NEG(-1))*** | 0.290925 | | | |
| | (0.0000)*** | | | |
| ***D(External debt_POS(-2))*** | -0.127082 | | | |
| | (0.0001)*** | | | |
| ***D(External debt_NEG(-2))*** | 0.100518 | | | |
| | (0.0000)*** | | | |
| **D(Official Dev. Assistance_POS)** | | 0.058593 | | |
| | | (0.0051)*** | | |
| **D(Official Dev. Assistance_NEG)** | | -0.035584 | | |
| | | (0.1512) | | |
| ***D(Remittances_POS)*** | | | 0.019349 | |
| | | | (0.0004)*** | |
| ***D(Remittances_NEG)*** | | | 0.078872 | |

| VARIABLE | MODEL 1: External debt | MODEL 2: Official Dev. Assistance | MODEL 3: Remittances | MODEL 4: FDI |
|---|---|---|---|---|
| | | | (0.0000)*** | |
| ***D(FDI_POS)*** | | | | 0.032383 (0.0008)*** |
| ***D(FDI_NEG)*** | | | | -0.024140 (0.0013)*** |
| ***Confounders**:* | | | | |
| ***D(Domestic investment)*** | -0.188834 (0.0000)*** | -0.026641 (0.1633) | | -0.051484 (0.0069)*** |
| ***D(Domestic investment(−1))*** | 0.254415 (0.0000)*** | | | |
| ***D(Domestic investment(−2))*** | 0.096255 (0.0000)*** | | | |
| ***D(Trade openness)*** | -0.045602 (0.0984)* | | -0.041213 (0.0336)** | -0.062640 (0.0131)** |
| ***D(Financial sector dev.)*** | 0.019653 (0.1365) | | | |
| ***D(Financial sector dev.(-1))*** | 0.011472 (0.4037) | | | |
| ***D(Financial sector dev.(-2))*** | 0.087829 (0.0000)*** | | | |
| ***D(Human capital)*** | -0.389618 (0.0000)*** | 0.051468 (0.2760) | 0.076173 (0.0986)* | |
| ***D(Human capital(−1))*** | 0.160020 (0.0012)*** | 0.247739 (0.0000)*** | | |
| ***D(Inflation Rate)*** | -0.014441 (0.0679)* | | -0.019321 (0.0036)*** | |
| ***D(Inflation Rate(-1))*** | 0.028947 (0.0007)*** | | | |
| ***DUM_ED*** | -0.084872 (0.0000)*** | | | |
| ***DUM_GFC*** | -0.097776 (0.0000)*** | | | 0.018307 (0.3232) |
| **DUM_ODA** | | -0.053080 (0.0006)*** | | |
| **DUM_POL** | | -0.051279 (0.0015)*** | | |
| ***DUM_REM*** | | | 0.014155 (0.0277)** | |
| ***DUM_FDI*** | | | | 0.018077 (0.5565) |
| ***CointEq(−1)**** | -1.531680 (0.0000)*** | -0.561094 (0.0000)*** | -0.519104 (0.0000)*** | -0.631822 (0.0000)*** |
| **Model Fit:** | | | | |
| **R-Squared** | 0.977973 | 0.805942 | 0.813936 | 0.803433 |
| **Adjusted R-Squared** | 0.880426 | 0.749602 | 0.596861 | 0.742429 |
| **DW-Statistic** | 2.501985 | 1.942226 | 2.356087 | 2.458078 |

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Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively.*

*Notes: The figure in (brackets) represents the P-values and those without brackets represent the coefficients.*

*Notes: POS (+) represents positive changes/shocks, and NEG (-) represents negative changes/shocks*

While political unrest (DUM_POL) may have affected not just ODA but also FDI and external debt, it was only incorporated into the ODA model. Due to the relatively small sample size of the data, each model was limited to having up to two dummy variables only to avoid overparameterisation and ensure parsimony. Nonetheless, a separate NARDL estimation incorporating the political unrest dummy was conducted for the FDI and external debt models, where most of the results remained qualitatively unchanged. However, the short-run asymmetry test was not relevant for the FDI model because there were no short-run decomposition terms; hence the model without the political unrest dummy (DUM_POL) is preferred. Results can be found in Tables A7 and A8 of the Appendix.

All diagnostics and stability tests for the ARDL models produce satisfactory results, as presented in Table A9 and Figure A2 (Appendix). However, for the NARDL models (Table A9 and Figure A1 (Appendix)) for external debt and FDI, the serial correlation test results were conflicting: the Chi-square statistic (<0.05) indicated serial correlation, while the F-statistic (>0.05) did not. Studies by Gorsuch and Lehmann (2018) and Larntz (1978) state that this is common in small sample sizes. Deschamps (1996) discusses that the F-statistic and the Chi-square test are derived from the Lagrange Multiplier (LM) test and how the F-statistic provides more accurate LM test[3] critical values in small samples, as it accounts for sample size adjustments, and the chi-square statistic underestimates the critical value in small samples. Nevertheless, both approximations converge as the sample size increases. This, therefore, gives some confidence in the serial correlation results using the F-statistic. Furthermore, since other diagnostics were satisfactory and the F-statistic did not indicate serial correlation, the difference is considered but does not impair overall robustness. For the remittances model, the CUSUM test confirmed stability. Yet, the CUSUM-of-squares test identified instability, which can be attributed to end-of-sample shifts due to small sample periods or structural breaks (Caporale & Pittis, 2004). However, considering other diagnostics performed well, this difference is noted but not considered a significant limitation. Lastly, all models' Durbin-Watson Statistics fall within the acceptable range of 1.5-2.5, which is close to two (Lee, 2016).

[3] Breusch-Godfrey Serial Correlation LM Test.

## 6. CONCLUSION

This study aimed to examine the effect of asymmetries in the capital flows and growth nexus using a NARDL model to help answer how different forms of capital flows impact economic growth and compare these to the ARDL models' symmetric results. Using data from 1980-2022, this study investigated the asymmetric effects of external debt, foreign direct investment, remittances, and official development assistance on economic growth and compared them to the symmetric results. These selected capital flows are important sources of external finance that can significantly influence the country's economic growth. By focusing on Malawi, we uncover its unique dynamics in relation to how capital flows impact growth by exploring both the asymmetric and symmetric effects, giving fresh insight into existing literature.

In the long run, asymmetries were identified in the NARDL model. For instance, in all models, an increase in inflows positively impacted growth, implying that an increase in debt, ODA, remittances and FDI positively affected the economy. However, the magnitude of the impact on growth by the decrease was more prominent for external debt and remittances than the positive effects, while the positive impact of increased inflows was larger for ODA and FDI. Conversely, in the ARDL models, remittances and official development assistance significantly impact economic growth positively, which resounds findings by (Dang & Duc, 2019; Meyer & Shera, 2017). On the other hand, no significant relationship between External Debt and economic growth was found in the long run, similar to findings by Tchereni et al. (2013) and like Tsaurai (2015) this study did not find a statistically significant relationship between FDI and economic growth in the long run.

In the short run, NARDL estimates for the ODA model were still interpreted, although with caution, since no significant asymmetry was found in the short run but showed weak joint asymmetry. The positive shock was statistically significant, yet the negative shock was insignificant. However, external debt, FDI and remittances all showed significant asymmetric effects. An increase in external debt harms growth, yet a decrease in debt positively affects debt. On the other hand, for remittances, both an increase and decrease in remittances have a positive impact on growth, with the decrease having a greater impact. Lastly, for FDI, an increase in FDI has a larger positive impact on growth, yet a decrease has a smaller negative impact on growth. Similarly, for the ARDL models, external debt and FDI harmed growth. However, Lagged FDI and External Debt positively and significantly impacted growth, implying that an increase in External

Debt and FDI in prior periods increases current economic growth. In contrast, ODA and Remittances did not significantly affect growth.

Overall, this study uncovered that the ARDL model showed weaker significance, i.e., remittances showed no significant short-term impact on growth and nor did external debt and FDI in the long run. However, more dynamics were revealed under the NARDL model when asymmetry was considered. Furthermore, a linear model assumes that positive and negative shocks have the same effect; however, the NARDL can pick up disparities, i.e. in the remittances model, negative shocks have a larger detrimental impact than positive shocks. This shows that models that fail to account for asymmetry where it exists are misspecified and undermine the results.

A significant limitation of this study is the relatively short time series for remittances, which might affect the robustness of our findings. In addition, limited or incomplete data for specific variables hindered the inclusion of other capital flow variables that would have been vital to our analysis. For example, Portfolio investments, a significant capital flow, were not included due to missing data points between years. Furthermore, disaggregated remittances and official development assistance data were not readily available for Malawi, which would have helped to give a more thorough analysis.

Future research should consider reanalysing remittances using a more extensive data set for more robust findings. In addition, examining the micro-level impacts of remittances like Fromentin and Leon (2019) and examining disaggregated Remittances (e.g., Migrants and workers) and disaggregated Official Development Assistance (e.g., loans and aid) could provide deeper insights into their role in economic development. Incorporating institutional quality and corruption variables (essential confounding variables included in the literature) could also help us better understand the factors influencing economic growth. Furthermore, exploring potential threshold effects to determine whether there is a threshold at which capital flows cease to impact growth can offer more insights not captured by the methods used in this study.

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## 8. APPENDIX

**Table A1:** Chow Breakpoint Test Results

| Variable | Break Date | F-Statistic | P-value |
|---|---|---|---|
| **External debt** | 2005 | 138.3734 | 0.0000 |
| **FDI** | 2013 | 4.561866 | 0.0387 |
| **Remittances** | 2016 | 26.60509 | 0.0000 |
| **Official development assistance** | 2002 | 4.235085 | 0.0460 |

**Table A2:** Lag Structure, Akaike Information Criterion (AIC)

| Model Type | NARDL | ARDL |
|---|---|---|
| Model 1: External Debt | (4,3,3,2,2,2,3) | (1,2,2,0,0,0,0) |
| Model 2: Official Dev. Assistance | (2,1,1,0,0,2,1) | (1,1,1,0,0,0,0,) |
| Model 3: Remittances | (1,0,0,1,1,1,1) | (1,2,1,0,0,0,0) |
| Model 4: FDI | (4,1,0,0,0,1,1) | (1,0,0,1,0,1,0) |

**Table A3:** Joint symmetry results

| | Joint Symmetry | |
|---|---|---|
| **Variable** | **F-statistic** | **P-value** |
| **External Debt** | 19.21458 | 0.0014 |
| **Official Dev. Assistance** | 2.625501 | 0.0940 |
| **Remittances** | 7.546691 | 0.0075 |
| **FDI** | 4.090764 | 0.0316 |

**Table A4: Bounds Test for ARDL Models**

| Model/ Capital Flow | Estimation Model | F-statistic | 95% Lower Bound | 95% Upper Bound | 90% Lower Bound | 90% Upper Bound | Conclusion |
|---|---|---|---|---|---|---|---|
| **External debt** | **ARDL** | 5.164 | 2.27 | 3.28 | 1.99 | 2.94 | Cointegration |
| **Official dev. assistance** | **ARDL** | 3.330 | 2.27 | 3.28 | 1.99 | 2.94 | Cointegration |
| **Remittances** | **ARDL** | 6.420 | 2.27 | 3.28 | 1.99 | 2.94 | Cointegration |
| **IHS_FDI** | **ARDL** | 10.396 | 2.27 | 3.28 | 1.99 | 2.94 | Cointegration |

**Table A5**: Estimated long-run coefficients using the ARDL approach dependent variable GDP

| VARIABLE | MODEL 1 External debt | MODEL 2 Official dev. assistance | MODEL 3: Remittances | MODEL 4: FDI |
|---|---|---|---|---|
| ***Capital Flows:*** | | | | |
| ***External Debt*** | -0.973744<br>*(0.1849)* | | | |
| ***Official Dev. Assistance*** | | 0.489481<br>(0.0247)** | | |
| ***Remittances*** | | | 0.111495<br>*(0.0003)*** | |
| ***FDI*** | | | | -0.033434<br>(0.8362) |
| **Confounders/Controls:** | | | | |
| ***Domestic Investment*** | 0.134361<br>*(0.7946)* | 0.261166<br>(0.4102) | 0.033576<br>*(0.6579)* | 0.943993<br>(0.0018)*** |
| ***Human Capital*** | 0.169274<br>*(0.8089)* | 0.786271<br>(0.0133)** | 0.748135<br>*(0.0000)*** | 0.846938<br>*(0.0002)*** |
| ***Inflation Rate*** | -0.078509<br>*(0.6305)* | -0.083468<br>(0.4746) | -0.066776<br>*(0.1998)* | -0.200155<br>(0.0904)* |
| ***Financial Sect. Development*** | -1.022610<br>*(0.1418)* | 0.004160<br>(0.9793) | 0.234240<br>*(0.0001)*** | -0.316518<br>(0.1289) |
| ***Trade Openness*** | -0.797034<br>*(0.0700)** | -0.617208<br>(0.0183)** | -0.231503<br>*(0.0554)* | -1.025487<br>(0.0033)*** |
| ***C*** | 26.45014<br>*(0.0002)**** | 17.34564<br>(0.0000)*** | 19.66068<br>*(0.0000)**** | 16.86933<br>(*0.0000)**** |
| **Model fit:** | | | | |
| **R-Squared** | 0.667367 | 0.557074 | 0.579759 | 0.701191 |
| **Adjusted R-Squared** | 0.608668 | 0.509190 | 0.529330 | 0.658503 |
| **DW-Statistic** | 2.452237 | 2.067922 | 2.499694 | 2.300702 |

Source: *author's compilation and values obtained from EViews 12*
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively.*
Notes: *The figures in (brackets) are P-values; those without are coefficients.*
Notes: *POS (+) =positive shocks, NEG (-) = negative changes*

**Table A6:** Error correction representation for each ARDL model dependent variable is D(GDP).

| VARIABLE | MODEL 1 External debt | MODEL 2: Official dev. assistance | MODEL 3: Remittances | MODEL 4: FDI |
|---|---|---|---|---|
| **Capital flows;** | | | | |
| **D(External debt)** | -0.026951 *(0.0762)** | | | |
| **D(External debt (-1))** | 0.047096 *(0.0078)**** | | | |
| **D(Official dev. assistance)** | | 0.017949 (0.3222) | | |
| **D(FDI)** | | | | -0.009413 (0.0800)* |
| **D(FDI(-1))** | | | | 0.016264 (0.0047)*** |
| **Confounders:** | | | | |
| **D(Domestic investment)** | -0.067153 (0.0021)*** | -0.054602 (0.0243)** | | -0.049751 (0.0116)** |
| **D(Domestic investment(-1))** | 0.040413 *(0.0431)*** | | | |
| **D(Financial sect. development)** | | | 0.000395 (0.9857) | |
| **D(Inflation)** | | | -0.049259 *(0.0007)**** | |
| **Dummies:** | | | | |
| **DUM_ED** | 0.009917 (0.2251) | | | - |
| **DUM_GFC** | -0.014266 (0.5189) | | | -0.020414 (0.3282) |
| **DUM_ODA** | | 0.080243 (0.0000) | | - |
| **DUM_POL** | | -0.042791 (0.0350)** | | |
| **DUM_REM** | | | -0.008130 (0.5189) | |
| **DUM_FDI** | | | | 0.119530 *(0.0005)**** |
| **Cointegrating Term:** | | | | |
| **CointEq(-1)*** | -0.077253 *(0.0000)**** | -0.133912 (0.0000)*** | -0.421905 *(0.0000)**** | -0.100020 *(0.0000)**** |
| **Model fit:** | | | | |
| **R-Squared** | 0.667367 | 0.557074 | 0.579759 | 0.701191 |
| **Adjusted R-Squared** | 0.608668 | 0.509190 | 0.529330 | 0.658503 |
| **DW-Statistic** | 2.452237 | 2.067922 | 2.499694 | 2.300702 |

Source: author's compilation and values obtained from EViews

Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively.*

*Notes: The figure in (brackets) represents the P-values and those without brackets represent the coefficients.*

**Table A7**: Estimated long-run coefficients using the NARDL approach (with DUM_POL) dependent variable is GDP

| VARIABLE | MODEL 1 | MODEL 4 |
|---|---|---|
| | **External debt** | **FDI** |
| **D(GDP(-1))** | -1.674933 (0.0067)*** | -0.766274 |
| | | (0.0003)*** |
| **Capital Flows:** | | |
| ***External Debt_POS (-1)*** | 0.367208 | |
| | (0.0087)*** | |
| ***External Debt_NEG (-1)*** | -0.579614 | |
| | (0.0134)** | |
| ***FDI_POS (-1)*** | | 0.036741 |
| | | (0.0053)*** |
| ***FDI_NEG (-1)*** | | -0.030131 |
| | | (0.0056)*** |
| **Confounders/Controls:** | | |
| ***Domestic Investment(-1)*** | -0.561114 | 0.083163 |
| | (0.0170)** | (0.0039)*** |
| ***Human Capital(-1)*** | -1.088696 | 0.138021 |
| | (0.0071)*** | (0.0865)* |
| ***Inflation Rate*** | | -0.029285 |
| | | (0.0444)** |
| ***Inflation Rate (-1)*** | -0.007444 | |
| | (0.7634) | |
| ***Financial Sect. Development*** | | -0.007930 |
| | | (0.6335) |
| ***Financial Sect. Development (-1)*** | -0.053852 | |
| | (0.4095) | |
| ***Trade Openness (-1)*** | 0.028638 | -0.128445 |
| | (0.7403) | (0.0090)*** |
| ***C*** | 40.59194 | 15.99929 |
| | (0.0062)*** | (0.0003)*** |
| **R-Squared** | 0.979926 | 0.830754 |
| **Adjusted R-Squared** | 0.847438 | 0.693746 |
| **DW-Statistic** | 2.895209 | 2.078355 |

**Table A8:** Error correction representation for each NARDL model (with DUM_POL) dependent variable is D(GDP Growth)

| VARIABLE | MODEL 1: External debt | MODEL 4: FDI |
|---|---|---|
| ***D(GDP(−1))*** | 0.742277 | 0.055432 |
| | (0.1480) | (0.7026) |
| ***D(GDP(−2))*** | 0.918332 | 0.387408 |
| | (0.0800)* | (0.0323)** |
| ***D(GDP(−3))*** | 0.340237 | 0.303102 |
| | (0.1503) | (0.0353)** |
| ***D(External debt_POS)*** | -0.129090 | |
| | (0.1123) | |
| ***D(External debt_NEG)*** | -0.077733 | |
| | (0.0899)* | |
| ***D(External debt_POS(-1))*** | -0.286148 | |
| | (0.0184)** | |
| ***D(External debt_NEG(-1))*** | 0.311459 | |
| | (0.0149)** | |
| ***D(External debt_POS(-2))*** | -0.125860 | |
| | (0.0664)* | |
| ***D(External debt_NEG(-2))*** | 0.109658 | |
| | (0.0454)** | |
| ***D(FDI_POS)*** | | - |
| ***D(FDI_NEG)*** | | - |
| ***Confounders**:* | | |
| ***D(Domestic investment)*** | -0.212256 | -0.046857 |
| | (0.0167)** | (0.0088)*** |
| ***D(Domestic investment(−1))*** | 0.268851 | |
| | (0.0286)** | |
| ***D(Domestic investment(−2))*** | 0.095948 (0.1517)** | |
| ***D(Trade openness)*** | -0.112140 | -0.041715 |
| | (0.1430) | (0.0672)* |
| ***D(Trade openness(-1))*** | -0.121411 | |
| | (0.1515) | |
| ***D(Financial sector dev.)*** | -0.025451 | |
| | (0.6609) | |
| ***D(Financial sector dev.(-1))*** | 0.014560 | |

| VARIABLE | MODEL 1: External debt | MODEL 4: FDI |
|---|---|---|
| | (0.6572) | |
| *D(Financial sector dev.(-2))* | 0.102977 | |
| | (0.0687)* | |
| *D(Human capital)* | -0.425833 | 0.039558 |
| | (0.0267)** | (0.3932) |
| *D(Human capital(−1))* | 0.046495 | |
| | (0.8169)* | |
| *D(Human capital(−2))* | -0.088353 | |
| | (0.5234) | |
| *D(Inflation Rate)* | -0.014818 | |
| | (0.4606) | |
| *D(Inflation Rate(-1))* | 0.031368 | |
| | (0.0946)** | |
| *DUM_ED* | -0.102273 | |
| | (0.1009) | |
| *DUM_FDI* | | -0.023463 |
| | | (0.3043) |
| *DUM_GFC* | -0.103357 | 0.027400 |
| | (0.0650)* | (0.1083) |
| DUM_POL | -0.017124 | -0.050433 |
| | (0.6318) | (0.0006)*** |
| *CointEq(−1)** | -1.674933 | -0.766274 |
| | (0.0000)*** | (0.0000)*** |
| **Model Fit:** | | |
| **R-Squared** | 0.979926 | 0.830754 |
| **Adjusted R-Squared** | 0.847438 | 0.742429 |
| **DW-Statistic** | 2.895209 | 2.078355 |

**Table A9:** ARDL and NARDL Diagnostics Tests

| | | ARDL | | NARDL | | |
|---|---|---|---|---|---|---|
| **Model** | **Null hypothesis: $H_0$** | **LM/ $\chi^2$(chi-squared statistic)Version** | **F Version** | **LM/ $\chi^2$(chi-squared statistic)Version** | **F Version** | **CONCLUSION** |
| **Model 1: External Debt** | **A: No Serial Correlation** | 0.1743 | 0.3284 | 0.0031*** | 0.4160 | No serial correlation |
| | **B: Functional Form** | | 0.6003 | | 0.9080 | Well specified |
| | **C: Normality** | 0.2778 | | 0.0510 | | Normal distribution |
| | **D: Homoscedasticity** | 0.6292 | 0.7096 | 0.8362 | 0.9833 | Homoscedastic |
| **Model 2: Official Development Assistance** | **A: No Serial Correlation** | 0.4175 | 0.5517 | 0.4397 | 0.6509 | No serial correlation |
| | **B: Functional Form** | | 0.3046 | | 0.1096 | Well specified |
| | **C: Normality** | 0.1107 | | 0.7362 | | Normal distribution |
| | **D: Homoscedasticity** | 0.1467 | 0.1339 | 0.5170 | 0.6060 | Homoscedastic |
| **Model 3: Remittances** | **A: No Serial Correlation** | 0.0546 | 0.1669 | 0.1281 | 0.4379 | No serial correlation |
| | **B: Functional Form** | | 0.6533 | | 0.2898 | Well specified |
| | **C: Normality** | 0.3721 | | 0.6809 | | Normal distribution |
| | **D: Homoscedasticity** | 0.1477 | 0.1286 | 0.6442 | 0.7900 | Homoscedastic |
| **Model 4: Foreign Direct Investment** | **A: No Serial Correlation** | 0.2598 | 0.4131 | 0.0150** | 0.1000 | No serial correlation |
| | **B: Functional Form** | | 0.9685 | | 0.3896 | Well specified |
| | **C: Normality** | 0.7590 | | 0.8599 | | Normal distribution |
| | **D: Homoscedasticity** | 0.2814 | 0.2999 | 0.4370 | 0.5103 | Homoscedastic |

Source: *author's compilation and values obtained from EViews 12 for ARDL and EViews 13 for NARDL*
Notes: *Table records P values.*
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively.*
Notes: T*he **LM/$\chi^2$ Version** reports chi-squared statistics for serial correlation (Breusch-Godfrey), normality (Jarque-Bera), and homoskedasticity (Breusch-Pagan) tests. The **F Version** provides F-statistics for serial correlation, functional form and homoskedasticity*

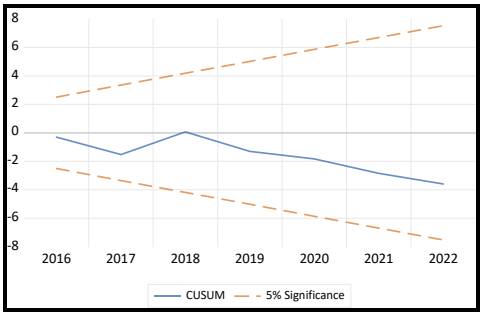
**Table A10: Pairwise Granger Causality Test Results**

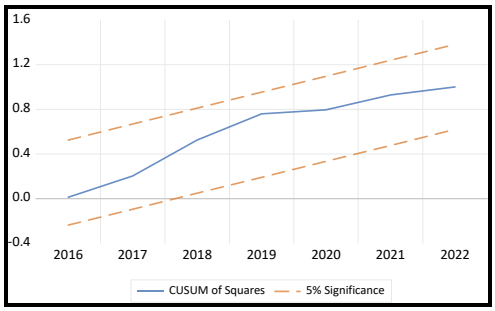
| **Null hypothesis** | **Lag order** | **F-statistic** | **P-Value** |
|---|---|---|---|
| LNY does not Granger Cause IHS_FDI | 2 | 3.87316 | 0.0300** |
| IHS_FDI does not Granger-cause LNY | | 0.76519 | 0.4727 |
| | | | |
| LNY does not Granger Cause LNODA | 2 | 0.36965 | 0.6936 |
| LNODA does not Granger-cause LNY | | 0.47865 | 0.6235 |

Source: *author's compilation and values obtained from EViews 14*
Notes: **, **, and *** represent the significance levels of 0.10, 0.05, and 0.01, respectively*

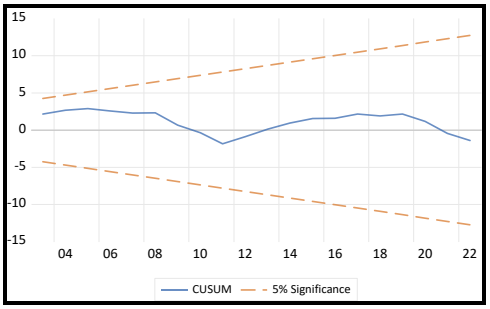
**Figure A1: NARDL CUSUM and CUSUM Q Test Results**

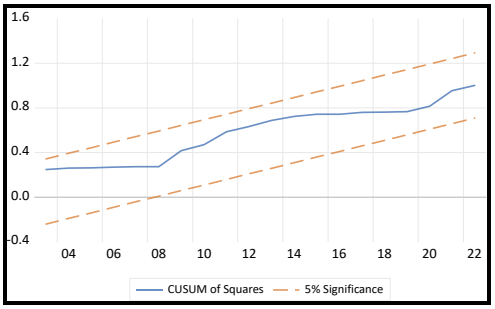
**Model 1: EXTERNAL DEBT**



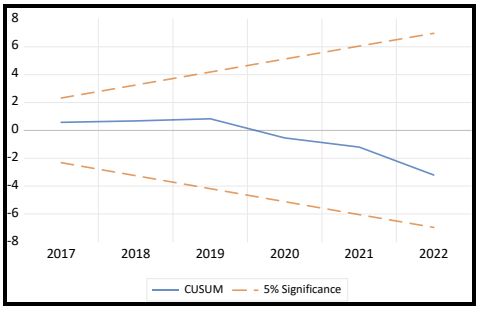



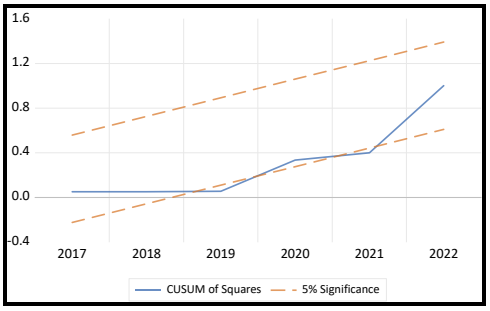

**MODEL2: OFFICIAL DEVELOPMENT ASSISTANCE**



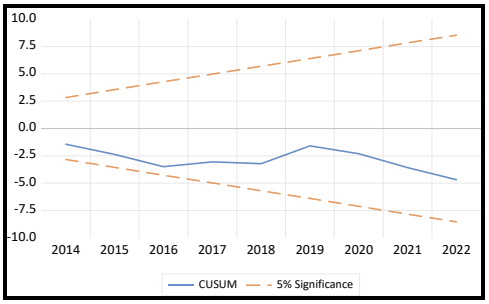



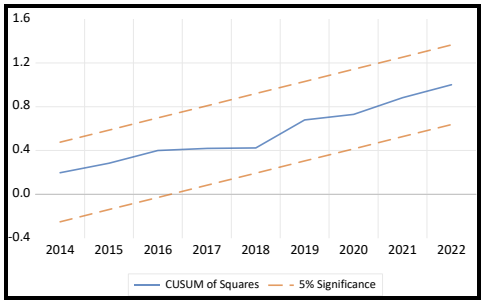

**MODEL 3: REMITTANCES**




**MODEL 4: FOREIGN DIRECT INVESTMENT**

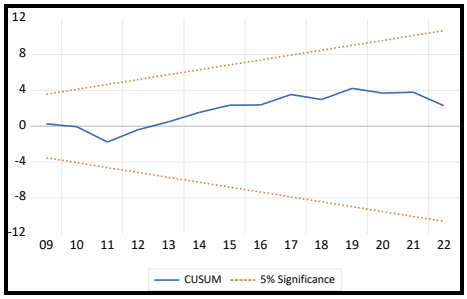


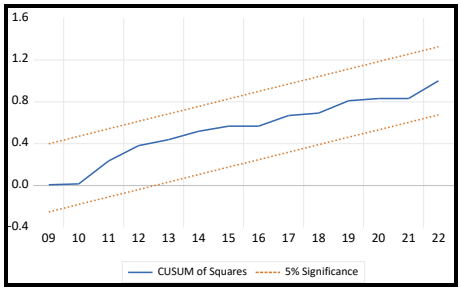




Source: author's compilation and values obtained from EViews 13
Notes: The CUSUM-Q plots indicate stability throughout the observation period.

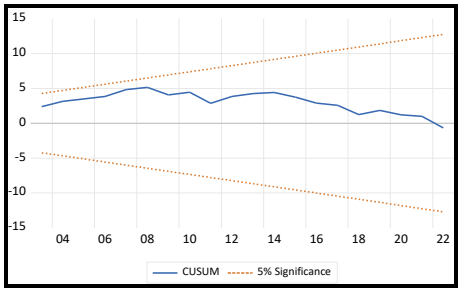
**Figure A2: ARDL CUSUM and CUSUM Q Test Results**

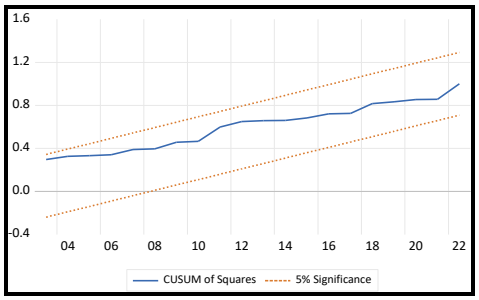
## MODEL 1: EXTERNAL DEBT



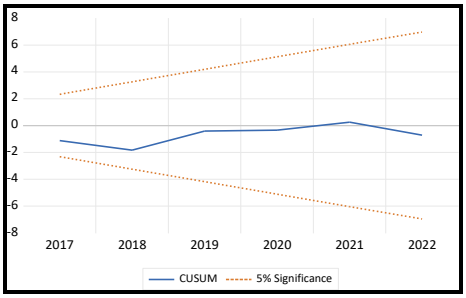



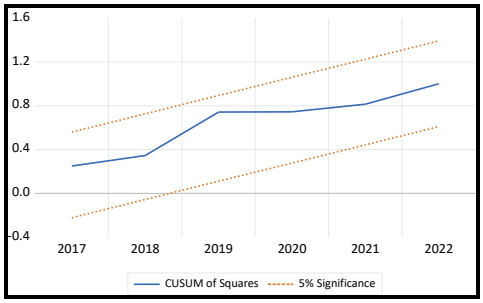

## MODEL 2: OFFICIAL DEVELOPMENT ASSISTANCE



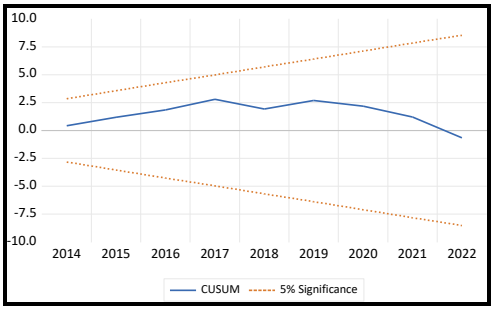



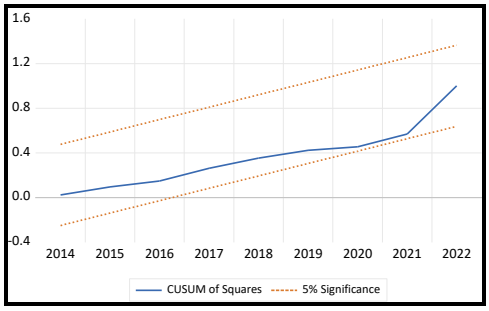

## MODEL 3: REMITTANCES




## MODEL 4: FOREIGN DIRECT INVESTMENT




Source: author's compilation and values obtained from EViews 12

Notes: The CUSUM-Q plots indicate stability throughout the observation period.