Determinants of Foreign Direct Investment Inflows in Tanzania

Benjamine Gaspar Miku*, Eliab Luvanda† & Wilhelm Ngasamiaku‡

Abstract
This study examines the determinants of foreign direct investment (FDI) inflows in Tanzania using the Autoregressive Distributed Lag (ARDL) model with data spanning from 1970 to 2023. The ARDL approach was chosen for its robustness in handling non-stationary data with mixed order of integration and capturing both short-term and long-term dynamic relationships. The findings indicate that GDP, exchange rate and trade openness significantly influence FDI inflows. A higher GDP positively affects FDI, reflecting market attractiveness, while trade openness facilitates investment by improving market access. However, the exchange rate negatively affects FDI inflows. Policy recommendations emphasize fostering economic growth, promoting trade liberalization and stabilizing the exchange rate through effective monetary policies. Ensuring economic stability and reducing trade barriers will create a more favorable investment environment, attracting more FDI and promoting long-term economic growth.

Keywords: *Foreign Direct Investment, GDP growth, Trade Openness, ARDL, Multi-national Enterprises*
JEL Classification : *F21; F43; O41.*

1. Introduction

In developing economies particularly in Tanzania, the inflow of foreign direct investment (FDI) has been acknowledged as a stable component of capital inflows that can drive economic growth, as foreign investors typically make long term commitment to the host countries (Esew and Yaroson, 2014; Mugambi and Murunga, 2017). Foreign direct investment is regarded as an external source of financing that can be utilized to promote private sector growth and achieve sustainable development (Alla et al., 2015; Hassan, 2017). In this context, many developing countries have enacted various economic reforms to boost the inflow of foreign direct investment and leverage its benefits (Vinesh et al., 2014). Similarly, some African countries have introduced policy measures to encourage foreign direct investment inflows by enhancing their overall investment policy environment (Suleman et al., 2015). For over twenty years, the Tanzanian government has been actively

* Eastern Africa Statistical Training Centre, Dar es Salaam, Tanzania: benmiku@gmail.com, https://orcid.org/0009-0002-2951-653X (Corresponding Author)
† Senior Lecturer, University of Dar es Salaam, School of Economics, Dar es Salaam, Tanzania: eliabgluvanda@gmil.com
‡ Senior Lecturer, University of Dar es Salaam, School of Economics, Dar es Salaam, Tanzania: ngasamike@yahoo.com, https://orcid.org/0000-0003-3717-3469

 ◆ *https://doi.org/10.56279/ter.v14i2.212*

attracting foreign direct investment by implementing policies and creating a favorable environment for foreign investors.

Foreign direct investment usually involves an investment made by a company or individual in a foreign country, intending to gain significant influence over the management of a business enterprise. Foreign direct investment can be classified in various ways, with common categories including horizontal foreign direct investment, conglomerate and greenfield investment. The Tanzanian government has taken several significant seps to attract foreign direct investment. to support investment-related goals. Tanzania has implemented specific regulatory frameworks for foreign direct investment. According to the United Nations Conference in Trade and Development (UNCTAD), 45 out of 50 African countries have established foreign direct investment specific regulatory frameworks. These changes include the creation of specialized schemes to attract investment such as the Export Processing Zones (EPZs) and the establishment of investment promotion facilities and agencies. Some African countries including Tanzania have signed international investment agreements including double taxation treaties and bilateral investment treaties. All these efforts aim at promoting growth and development in the country.

Tanzania, acknowledged as one of the fastest-growing economies in Sub-Saharan Africa, following the regulation changes governing foreign direct investment, the country has attracted USD 684.9 million in foreign direct investment (FDI) inflows in 2020, reflecting a 14-percentage decrease from 2019 partly due to Covid-19 pandemic. Despite this drop, the country's foreign direct investment inflows amounted to USD 1,300.1 billion, representing 2.04 percent of FDI as a percentage of GDP. Foreign direct investment inflows in Tanzania have been decreasing over time since 2013 and the decline was largely noted in almost all economic sectors (Nelson, 2021). Despite the decline, the country still remains as an attractive target and effective destination for foreign direct investment in various sectors including mining, agriculture, tourism and energy. However, what is questionable until today is what exactly determine the inflow of foreign direct investment in Tanzania. The determinants of foreign direct investment inflows in Tanzania have been quite complex, with ongoing debates and analyses among policy makers and researchers. There are conflicting results regarding the factors influencing these inflows (Alla et al., 2015; Anyanwu, 2012; Basemera et al., 2012; Buthe and Milner, 2008; Dlamini et al., 2015; Hailu, 2010; Sichei and Kinyondo, 2012; Workneh, 2014; Yasmin et al., 2003).

The body of literature on foreign direct investment determinants in Tanzania often presents conflicting findings. Some studies may identify certain factors as important for attracting foreign direct investment while others might find

them less significant or even detrimental. For instance, one study might highlight the positive impact of trade openness another might suggest that excessive openness could lead to increased competition and potentially deterring foreign direct investment, Tahman and Andow (2018); Said and Musonda (2014). Additionally, Tanzania's unique social-economic and political context adds another layer of complexity. For instance, the importance of market size or even infrastructure might differ in Tanzania specific-context compared to more developed or differentially structured economies.

The conflicting views on the determinants of foreign direct investment have, however sparked a deeper intellectual curiosity about understanding underlying proximate factors determining foreign direct investment in the country. The inconsistencies in findings highlights the need for clearer, more precise understanding of how various factors influence foreign direct investment in Tanzania. The uncertainty and complexity surrounding foreign direct investment determinants prompted the ongoing debates among policy makers and academician cum researchers alike. Suffice to note that, usually policy makers are obliged to make informed decisions about which policies are to be implemented to attract more foreign direct investment but due to the inconclusiveness of the ongoing debate on effective determinants of foreign direct investment complicate these decisions. This study therefore seeks to empirically identify the determinants of foreign direct investment in Tanzania. The aim is to provide a comprehensive understanding of the factors influencing foreign direct investment in the country with the view to contribute and inform the ongoing academic discourse in the current literatures using robust empirical estimation strategy.

2. Theoretical and Empirical Literature

2.1. Theoretical Literature

2.1.1. Formal Hypothesis Theory of Foreign Direct Investment

The formal hypothesis theory of foreign direct investment (FDI) suggests that specific macroeconomic, institutional and market variables serve as key determinants of foreign direct investment (FDI) inflows. Many of these variables are considered to represent formal hypotheses or theories of foreign direct investment, as they intuitively appear to explain investment patterns. The Formal Hypothesis Theory of foreign direct investment (FDI) was discussed and elaborated upon by authors such as Moosa (2002) particularly in his works *"Foreign Direct Investment: Theory, Evidence and Practice"* and subsequent studies co-authored with Moosa and Cardac (2006). The theory identified the key explanatory variables and distinguished them from those that do not align with established theories, labeling the latter as *"theories based on other factors."* The hypothesized determinants of foreign direct investment include market size (measured by GDP or per capita GDP), which relates to market size hypothesis; wages, which are linked to labor cost

hypothesis; previous foreign direct investment, which serves as a pull factor for new foreign direct investment; trade rate, indicating country openness; real interest rate, reflecting macroeconomic policy; inflation rate, which represents country risk and macroeconomic policy; and domestic investment, representing the business climate. Thus, both intuitive and formal hypotheses are recognized in the literature as primary macroeconomic determinants of foreign direct investment inflows to host countries.

The Formal Hypothesis Theory of foreign direct investment (FDI) rests on several assumptions that guide its framework for explaining the determinants of foreign direct investment inflows. The theory assumes that investors act rationally, making decisions based on measurable economic, political and institutional factors. The theory posits that market size, labour costs, trade openness and macroeconomic stability (i.e., low inflation and consistent exchange rates) are key drivers of foreign direct investment. In addition, the theory assumes that strong governance, low corruption and stable political environments are essential for attracting foreign investors. These assumptions highlight a structured theory-based approach to understanding foreign direct investment determinants.

The Formal Hypothesis Theory of foreign direct investment (FDI) fits well with the determinants of FDI inflows in Tanzania by emphasizing several key factors that influence foreign direct investment inflows in Tanzania. Tanzania's market size driven by a growing Gross Domestic Product (GDP) and strategic geographical location within East Africa align with the market size hypothesis making it attractive for foreign investors. Additionally, macroeconomic stability reflected in moderate inflation, exchange rate stability and trade openness support investor confidence.

2.1.2. Product Cycle Hypothesis Theory

The Product Cycle Hypothesis (PCH) is an important model which offer a well narrated explanation of both the determinants of Foreign Direct Investment (Vernon, 1966; Hirsch 1966) and International Trade (Posner 1961; Hufbauer 1966). The Product Cycle Hypothesis model posits that any product undergoes three stages with the first stage being the introduction of a new product by an innovating firm. Well, this is done in the home market or home country as it is thought that, there is greater demand for such a product. The second stage of a product life cycle is usually the export stage to other countries or other markets and the final stage is the setting up of the foreign direct investment into the countries or market for local production of the product. This last stage of product cycle hypothesis is usually characterized by complete product standardization as well as production techniques which is thought to be not an exclusive possession of the initial product innovator. Actually, the role played by competition notably price competition, will force

such a firm to go and invest onto other host countries in the form of foreign direct investment to seek cost advantages, mainly labour costs.

The theory assumes that technological development and product development occur primarily in developed countries where initial demand is high, however as the product becomes standardized and due to economies of scale as a result of falling production costs the product now shifts to developing countries. The theory assumes limited international competition in early stages and it focuses on manufactured goods rather than services or agriculture.

The theory is relevant in the determinants of foreign direct investment inflows in Tanzania because it explains how FDI patterns evolve as products mature. Tanzania with its relatively low labour costs and emerging market potential became an attractive destination for FDI as industries in the developed countries reached maturity. The theory was used specifically in this study to explain how global shifts in production lifecycles influence FDI inflows into Tanzania.

2.2. Empirical Literature

Serven and Solimano (1992) highlighted the critical role of good governance in fostering foreign direct investment inflows to developing countries. Similarly, Al-Matari et al. (2021) linked foreign direct investment (FDI) inflows to factors such as price stability and gross domestic savings. Meressa (2022) conducted a fixed-effects regression analysis and identified infrastructure, government effectiveness, economic growth, corruption control, trade openness, political stability, human capital and financial development as key positive drivers of foreign direct investment inflows. Conversely, factors like external debt, inflation and regulatory quality were found to have no significant impact.

Additionally, Mohammed (2022) applied the Fully Modified Ordinary Least Squares (FMOLS) approach on the determinants of foreign direct investment in Africa and found that corruption negatively affects foreign direct investment inflows in the African continent, while financial growth and trade openness have positive impacts. Similarly, Abimbola and Oludiran (2018) identified market size (GDP per capita), trade openness and low political risk as significant factors that enhance foreign direct investment attraction.

Youssouf (2017), employed the Bayesian Averaging of Maximum Likelihood Estimation in the determinants of foreign direct investment in Africa and found that foreign direct investment is primarily driven by natural resources and market size, with inflation, infrastructure, human capital and trade openness showing only marginal significance. Meanwhile, political instability and corruption were observed to have minimal influence on the inflows of foreign direct investment. Sane (2016), utilizing the Hausman Specification

test with a random effects model, identified key factors driving foreign direct investment significantly in the Economic Community of West African States (ECOWAS). These included macroeconomic stability, government consumption spending, domestic credit to the private sector, interest rates, gross fixed capital formation, exchange rates, economic freedom, natural resources and market size.

Yang et al. (2020) examined the determinants of foreign direct investment across 29 Chinese regions from 2008 to 2018 using an Ordinary Least Squares (OLS) approach. Their findings revealed that factors such as a large regional market, robust infrastructure and preferential policies positively influenced foreign direct investment, while higher wage costs had a negative impact. Education showed a positive but statistically insignificant effect on the inflows of foreign direct investment. Additionally, the study identified a strong self-reinforcing effect of foreign direct investment within the regions. While there was no convergence in the equilibrium FDI stocks across regions between 1985 and 1995, convergence was observed in the deviations from these equilibrium stocks. However, the study faced limitations, including a short sample period, a limited set of variables, reliance on basic OLS regression, and a lack of consideration for data integration, co-integration properties and potential structural breaks.

Azam and Khan (2021) conducted an empirical analysis using cointegration techniques to explore the macro locational determinants of foreign direct investment in Africa. The study, which covered 19 African countries from 2014 to 2019, utilized both individual country data and panel data analysis methods. Their findings indicated that the most significant long-term determinants of foreign direct investment in Africa are market growth, a less restrictive export-orientation strategy, and the liberalization of foreign direct investment policies. These factors were followed by real effective exchange rates and market size. The openness of the economy was found to have the least impact. The study suggests that improving macroeconomic management, liberalizing foreign direct investment policies and expanding export sectors could enhance Africa's long-term FDI positions.

Furthermore, Suliman and Mollick (2009) employed a panel data regression model with fixed effects to identify the determinants of foreign direct investment (FDI) for a large sample of twenty-nine (29) Sub-Saharan African countries from 1980 to 2003. They examined the impact of human capital development, defined by literacy rates or economic freedom as well as the incidence of war on foreign direct investment flows to these countries. Incorporating these variables alongside several commonly used control variables, they found that literacy rates (human capital), economic and political freedoms and the incidence of war significantly influenced foreign direct investment. The results aligned with their hypotheses: foreign direct

investment inflows increased with higher literacy rates and improvements in political and civil liberties, while occurrences of war had a strongly negative effect on foreign direct investment.

This particular study builds on the existing literature by offering a focused analysis of the determinants of foreign direct investment in Tanzania. While previous studies have explored FDI determinants across multiple African countries or broader regions, this study narrows the focus specifically to Tanzania and hence addressed the need for a more understanding of how FDI determinants operate within the specific social-economic and political context of Tanzania. Additionally, many of the reviewed studies utilize data from periods ending early 2000s. This particular study however uses more recent data thereby capturing the current dynamics of FDI in Tanzania. The use of an ARDL mode in this analysis allows for a more sophisticated analysis of both short-run and long-run relationship between FDI and its determinants offering a methodological contribution to the existing body of literature.

3. Conceptual Framework

The core conceptual framework which explains the determinants of foreign direct investment revolves around the analysis of Multi-National Enterprises (MNEs), specifically through the Eclectic Paradigm or OLI Paradigm proposed by Dunning (2003). This framework examines why MNEs engage in foreign operations by focusing on three key advantages: Ownership, Location, and Internalization (OLI). The model suggests that the presence or absence of these advantages determines a firm's likelihood of investing abroad.

Historically, research indicated that the United States of America manufacturing firms in the United Kingdom had significantly higher labor productivity than local firms, raising questions about the source of this productivity, whether it was due to the inherent qualities of United States of America resources or superior management practices. This scenario was explained by the OLI paradigm, where “Ownership advantages” (O) relate to transferable intangible assets like technology and brand, “Location advantages” (L) pertain to the specific benefits of operating in a particular country, and “Internalization advantages” (I) involve a firm's ability to manage operations internally rather than through partnerships or licensing.

The model highlights that these advantages vary across different industries, regions and firms. In the context of Tanzania, the country's attractiveness for foreign direct investment is shaped by its stable macroeconomic environment, robust gross domestic product (GDP) growth, stable exchange rate, high national savings, trade openness and competitive real interest rates. These factors collectively enhance Tanzania's appeal as an investment destination by providing a predictable and stable business environment, economic potential and favorable returns on investment. The OLI framework thus

provides a comprehensive approach to understanding the motivations behind foreign investment and the specific factors that make Tanzania an attractive destination for foreign direct investment.

4. Empirical Model Specification Derived from Theoretical Literature

The Formal Hypothesis Theory of Foreign Direct Investment and the Product Cycle Hypothesis offer conceptual frameworks from which we can derive a theoretical model for estimating the determinants of foreign direct investment. These theories can be connected to the variables of our study as follows. Using the Formal Hypothesis theory of FDI, which revolves around macroeconomic factors and their impact on foreign direct investment. The idea is that macroeconomic stability (inflation, exchange rate, interest rates) and market potential (GDP) are key drivers. This relationship can be expressed as follows:

$$fdi\_inflw_t = f(gdp_t, infl\_rate_t, exc_t, rint\_rate_t, top_t, infl\_rate_t, g\_nat\_sav_t)$$

Where: fdi_inflw_t Inflow of Foreign Direct Investment, gdp_t Gross Domestic Product, $infl\_rate_t$ Rate of Inflation, exc_t Exchange Rate, $rint\_rate_t$ Real Interest Rate, top_t Trade Openness, and $g\_nat\_sav_t$ Gross National Savings as a Percentage of Gross Domestic Product (A proxy for Domestic Investment).

On the other hand, the Product Cycle Hypothesis Theory suggests that foreign direct investment is driven by the stages of product development. In the context of developing countries like Tanzania, this theory implies that as products mature, firms seek new markets and lower production costs, leading to FDI inflows. The relevant variables under this hypothesis could also include market size (GDP), trade openness and macroeconomic stability (inflation, exchange rate, interest rate) as these factors influence firm's decision to invest abroad. This relationship can be modeled as follows:

$$fdi\_inflw_t = g(gdp_t, infl\_rate_t, exc_t, rint\_rate_t, top_t, infl\_rate_t, g\_nat\_sav_t)$$

Where: fdi_inflw_t Inflow of Foreign Direct Investment, gdp_t Gross Domestic Product, $infl\_rate_t$ Rate of Inflation, exc_t Exchange Rate, $rint\_rate_t$ Real Interest Rate, top_t Trade Openness, and $g\_nat\_sav_t$ Gross National Savings as a Percentage of Gross Domestic Product. To combine these two theories into a single model, we can integrate the functional forms into a single equation while utilizing the ARDL model specification. Thus, the estimation equation becomes:

$$\Delta fdi\_inflw_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \, \Delta fdi\_inflw_{t-i} + \sum_{i=0}^{q_1} \gamma_{1i} \, \Delta gdp_{t-i} + \sum_{i=0}^{q_2} \gamma_{2i} \, \Delta infl\_rate_{t-i} + \sum_{i=0}^{q_3} \gamma_{3i} \, \Delta exc_{t-i} + \sum_{i=0}^{q_4} \gamma_{4i} \, \Delta rint\_rate_{t-i} + \sum_{i=0}^{q_5} \gamma_{5i} \, \Delta top_{t-i} + \sum_{i=0}^{q_6} \gamma_{6i} \, \Delta g\_nat\_sav_{t-i} + \lambda[fdi\_inflw_{t-1} - \delta_1 gdp_{t-1} - \delta_2 infl\_rate_{t-1} + \delta_3 exc_{t-1} + \delta_4 rint\_rate_{t-1} + \delta_5 top_{t-1} + \delta_6 g\_nat\_sav_{t-1}] + \varepsilon_t$$

Where Δfdi_inflw_t is the first difference of foreign direct investment inflows, fdi_inflw_{t-1} is the lagged of FDI inflows, gdp_t Gross Domestic Product, $infl\_rate_t$, rate of Inflation exc_t Exchange Rate, $rint\_rate_t$ Real Interest Rate, top_t Trade Openness, and $g\_nat\_sav_t$ Gross National Savings as a Percentage of Gross Domestic Product, α_0 is the constant term, β_i the coefficient of the lagged difference of the dependent variable, $\gamma_{1i}, \ldots, \gamma_{6i}$ coefficient of the lagged difference of the independent variables, λ coefficient of the error correction term which indicates the speed of adjustment back to the long-run equilibrium, $\delta_1, \ldots, \delta_6$ indicates the long-run coefficients for each independent variable, ε_t is the error term.

5. The ARDL Model

In analysing the determinants of foreign direct investment in Tanzania, the Autoregressive Distributed Lag (ARDL) model was used. The ARDL model is an econometric tool employed to examine both long-term and short-term relationships among various time series variables. In this model, the AR component refers to the lagged values of the dependent variable, which captures the short-term dynamics of the variable interactions. The Distributed Lag Component captures the lagged values of the explanatory variables, reflecting their delayed impacts on the dependent variable over time. An autoregressive distributed lag (ARDL) model, which is based on ordinary least squares (OLS) is suitable for both non-stationary time series and time series with mixed orders of integration. (Pesaran 1997). This model uses a sufficient number of lags to capture the data generating process within a general-to-specific modeling framework (Pesaran and Shin, 1995). A dynamic error correction model (ECM) can be derived from the ARDL model through a simple linear transformation. The model can be derived as follows:

The ARDL (1,1) model is modeled in the following way

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \beta_0 x_t + \beta_1 x_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots [1]$$

The second expression is derived by subtracting y_{t-1} from both sides of equation [1] such that

$$y_t - y_{t-1} = \alpha_0 + \alpha_1 y_{t-1} - y_{t-1} + \beta_0 x_t + \beta_1 x_{t-1} + \varepsilon_t$$

$$\Delta y_t = \alpha_0 + (\alpha_1 - 1) y_{t-1} + \beta_0 x_t + \beta_1 x_{t-1} + \varepsilon_t \quad \ldots [2]$$

At this stage we add $\beta_0 x_{t-1} - \beta_0 x_{t-1}$ in the right-hand side of equation [2] to obtain

$$\Delta y_t = \alpha_0 + (\alpha_1 - 1) y_{t-1} + \beta_0 x_t - \beta_0 x_{t-1} + \beta_1 x_{t-1} + \beta_0 x_{t-1} + \varepsilon_t$$

$$\Delta y_t = \alpha_0 + (\alpha_1 - 1) y_{t-1} + \beta_0 (x_t - x_{t-1}) + (\beta_0 + \beta_1) x_{t-1} + \varepsilon_t \quad \ldots [3]$$

When we simplify expression [3], we obtain the following

$$\Delta y_t = \alpha_0 + (\alpha_1 - 1) y_{t-1} + (\beta_0 + \beta_1) x_{t-1} + \beta_0 \Delta x_t + \varepsilon_t \quad \ldots [4]$$

Equation [4] is the second version of an ARDL (1,1) model and the first version in in equation [3]

Deriving the third expression which includes the error expression of the ARDL will involve two versions of the ARDL model, i.e., the ARDL model with unrestricted constant and the ARDL model with restricted constant.

The ARDL model with unrestricted constant:

The ARDL model is dynamic and as a result it can be considered a short-run model. Therefore, the deterministic components are typically included in the short-run portion of the model. Consequently, an unrestricted constant would mean that the regression constant is included in the short run. We use expression [4] by rewriting it in an error correction term meanwhile excluding α_0.

$$\Delta y_t = \alpha_0 + (\alpha_1 - 1)\left[y_{t-1} + \frac{(\beta_0 + \beta_1)}{(\alpha_1 - 1)} x_{t-1}\right] + \beta_0 \Delta x_t + \varepsilon_t \quad \ldots [5]$$

To re-write equation [5] in a more appropriate way such that $\left[y_{t-1} + \frac{(\beta_0+\beta_1)}{(\alpha_1-1)} x_{t-1}\right]$ represent an error term we thus write:

$$\Delta y_t = \alpha_0 + (-)(1 - \alpha_1)\left[y_{t-1} - \frac{(\beta_0 + \beta_1)}{(\alpha_1 - 1)} x_{t-1}\right] + \beta_0 \Delta x_t + \varepsilon_t \quad \ldots [6]$$

Where $(\alpha_1 - 1) = (-)(1 - \alpha_1)$

$$\Delta y_t = \alpha_0 + (-)(1 - \alpha_1) ECT_{t-1} + \beta_0 \Delta x_t + \varepsilon_t \quad \ldots [7]$$

$(1-\alpha_1)$ is the adjustment factor/speed of adjustment in response to a shock

The ARDL model with restricted constant:

An ARDL model with restricted constant happens when the constant is included in the error correction term. This is the long-run part of the model derived from equation [6] thus;

$$\Delta y_t = \alpha_0 + (-)(1-\alpha_1)\left[y_{t-1} - \frac{(\beta_0+\beta_1)}{(\alpha_1-1)}x_{t-1}\right] + \beta_0\Delta x_t + \varepsilon_t \quad [8]$$

$$\Delta y_t = (-)(1-\alpha_1)\left[\frac{-\alpha_0}{1-\alpha_1} + y_{t-1} - \frac{(\beta_0+\beta_1)}{(1-\alpha_1)}x_{t-1}\right] + \beta_0\Delta x_t + \varepsilon_t \quad [9]$$

$$\Delta y_t = (-)(1-\alpha_1)ECT_{t-1} + \beta_0\Delta x_t + \varepsilon_t \quad [10]$$

The generalized ARDL model is thus given by

$$\Delta y_t = \alpha_0 + \left(\alpha_1+\alpha_2+\cdots\alpha_p-1\right)y_{t-1} + \left(\beta_{10}+\beta_{11}+\cdots\beta_{1q1}\right)\Delta x_{1,t-1} + \left(\beta_{20}+\beta_{21}+\cdots\beta_{2q2}\right)x_{2,t-1} \ldots \left(\beta_{k0}+\beta_{k1}+\cdots\beta_{kqk}\right)x_{k,t-1} + \sum_{i=1}^{p-1}\gamma_i\,\Delta y_{t-1} + \sum_{j=0}^{q1-1}\gamma_{1j}\,\Delta x_{1,t-j} + \sum_{j=0}^{q2-1}\gamma_{2j}\,\Delta x_{2,t-j} + \cdots\sum_{j=0}^{qk-1}\gamma_{kj}\,\Delta x_{k,t-j} + \varepsilon_t \quad [11]$$

Equation [11] can be re-written in a compact form as:

$$\Delta y_t = \alpha_0 + \rho y_{t-1} + \beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \cdots + \beta_k x_{k,t-1} + \sum_{i=1}^{p-1}\gamma_i\,\Delta y_{t-1} + \sum_{j=0}^{q1-1}\gamma_{1j}\,\Delta x_{1,t-j} + \sum_{j=0}^{q2-1}\gamma_{2j}\,\Delta x_{2,t-j} + \cdots\sum_{j=0}^{qk-1}\gamma_{kj}\,\Delta x_{k,t-j} + \varepsilon_t \quad [12]$$

Where $\rho = \alpha_1+\alpha_2+\cdots\alpha_p-1$; $\beta_1 = \beta_{10}+\beta_{11}+\cdots\beta_{1q1}$; $\beta_2 = \beta_{20}+\beta_{21}+\cdots\beta_{2q2}$ and $\beta_k = \beta_{k0}+\beta_{k1}+\cdots\beta_{kqk}$

We can re-write equation [12] further in a more compact way as:

$$\Delta y_t = \alpha_0 + \Phi y_{t-1} + \beta' X_{t-j} + \sum_{i=1}^{p-1}\gamma_i\,\Delta y_{t-i} + \sum_{j=0}^{q-1}\lambda'_j\,\Delta X_{t-j} + \varepsilon_t \quad [13]$$

Where y_t is the dependent variable, y_{t-1} is the lagged dependent variable, Δy_{t-i} is the first difference of the lagged dependent variable, X_{t-j} is the explanatory variable, difference of the lagged dependent variable, ΔX_{t-j} is the first difference of the lagged explanatory variable, α_0 is the constant and ε_t is the error term.

5.1. Data Sources and Measurement Variables

This paper utilizes annual time series data for Tanzania covering the period from 1970 to 2023. Data were sourced from the Bank of Tanzania (BoT) and from the Word Bank database. The variables description and their unit of measurement are presented in Table 1.

Table 2: Variable and their Measurement

S/N	Variable	Notation	Scale of Measurement	Type of Variable	Expected Sign
1.	Inflow of Foreign Direct Investment	fdi_inflw	Ratio Scale	Dependent Variable	
2.	Rate of Inflation	$infl\_rate$	Ratio Scale	Independent Variable	−
3.	Gross Domestic Product	gdp	Ratio Scale	Independent Variable	+
4.	Exchange Rate	exc	Ratio Scale	Independent Variable	+/−
5.	Gross National Savings as a Percentage of Gross Domestic Product (A proxy for Domestic Investment)	g_nat_sav	Ratio Scale	Independent Variable	+
6.	Trade Openness	top	Ratio Scale	Independent Variable	+
7.	Real Interest Rate	$rint\_rate$	Ratio Scale	Independent Variable	−

6. Results and Discussion

6.1. Descriptive Statistics

The descriptive statistics of the variables used in the study have mixed trends as shown in Table 2. The foreign direct investment inflow variable had 54 observations. The behavior of this variable is such that it has the mean of 473,700,000 USD with a minimum value of -8,419,999.9 and a maximum value of 2,087,000,000 USD. This record of a negative FDI inflow by the world bank typically reflects specific economic conditions a country might face rather than a literal negative flow of investment (Kheng, Sun, and Anwar 2017). In the 1980s Tanzania faced with a number of economic challenges focusing on external debt, declining export prices and the impact of structural adjustment policies to mention but a few. Such macroeconomic instability in the country made investors to be cautious about investing in the country with unstable macroeconomic stability due to associated risks, such uncertainties were likely to deter foreign direct investment inflows. With zero record of positive outflow of foreign direct investment, suggest that the country experienced a net disinvestment, where the value of disinvestment (e.g., sale

of assets by foreign investors, repatriation of profits) exceeded the value of new investments entering the country largely due to the impact of Tanzania socialist policies under the Ujamaa program led to inefficiencies in the economy making it less attractive for foreign investors.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
year	54	1996.5	15.732	1970	2023
fdi_inflw	54	4.737e+08	5.889e+08	-8419999.9	2.087e+09
infl_rate	54	14.952	11.122	2.4	36.1
gdp	54	28347526	43051589	3430465	1.615e+08
exc	54	829.791	833.474	6.9	2382.094
g_nat_sav	54	20.961	8.991	4.828	37.855
top	54	20.652	21.972	0.12	70.888
rint_rate	54	1.887	10.316	-26.5	22.649

Source: *Own computations*

The inflation rate exhibits an average of 14.952, accompanied by a notable deviation from this mean of 11.122. It ranges from a minimum of 2.4 percent to a maximum of 36.1 percent. The Gross Domestic Product averages 28,347,526 million Tsh, with a significant deviation from this average of 43,051,589. It ranges from a minimum of 3,430,465 million Tsh to a maximum of 161,500,000 million Tsh. Conversely, the exchange rate averaged 829.791, with a standard deviation of 833.474. It ranged from a minimum of 6.9 Tsh per USD to a maximum of 2382.094 Tsh per USD. The gross national savings as a percentage of GDP averaged 20.652 percent, with a standard deviation of 8.991. It ranged from a minimum of 4.828 percent to a maximum of 37.855 percent. Trade openness is characterized by an average value of 20.652, with a standard deviation of 21.972. It varies between a minimum of 0.12 and a maximum of 70.888. Finally, the real interest rate averages 1.887, with a standard deviation of 10.316. It ranges from a minimum of -26.5 to a maximum of 22.649.

6.2. Correlation Matrix

Table 10 in the appendix section presents the pairwise correlation matrix for the variables used in this study. It reveals a moderate and statistically significant positive linear correlation between the inflow of foreign direct investment and Gross Domestic Product, Gross National Savings as a percentage of GDP, as well as the real interest rate. Additionally, there is a very strong and statistically significant correlation between the inflow of foreign direct investment, trade openness and exchange rate. However, there is a moderate and statistically significant negative correlation between the inflow of foreign direct investment and the rate of inflation.

6.3. Optimal Lag Selection

Before conducting our ARDL estimation, the variables were subjected to optimal lag selection by means of the Akaike Information Criterion (AIC). According to Wooldridge (2015), with annual data, the optimal number of lags is typically small, usually 1 or 2 to avoid losing degrees of freedom. Therefore, the maximum number of lags for the data was set accordingly. It is advised to avoid including too many lags to prevent consuming degrees of freedom and increasing multicollinearity, which would reduce the precision of the estimates by inflating the standard errors relative to the estimated coefficients. Conversely, it is also advised to avoid including too few lags to prevent specification errors. Thus, the lag length was selected based on the AIC criterion, which provided the lowest value, as shown in Table 11 in the appendix section.

6.4. Unit Root Test with Optimal Lag

We used multiple lags to determine the order of integration, a necessary condition for estimating an Autoregressive Distributed Lag (ARDL) model. The unit root test was then performed using the Augmented Dickey-Fuller (ADF) test, with the results presented in Table 3. The unit root test was conducted for all series meanwhile utilizing the optimal lags as determined by the Akaike Information Criterion (AIC). The null hypothesis was that the series of the variables used in the model had a unit root, against the alternative hypothesis that the series were stationary. We failed to reject the null hypothesis for all variables and hence the conclusion is that the variables used have a unit root and they are therefore non-stationary.

Table 4: Unit Root Test with Optimal Lag Length

Variable	Number of lags	Test statistic	Dickey-Fuller critical value			p - value
			1%	5%	10%	
fdi_inflw	2	-0.874	-3.579	-2.929	-2.600	0.7963
infl_rate	2	-1.290	-3.579	-2.929	-2.600	0.6336
gdp	1	0.589	-3.577	-2.928	-2.599	0.9873
exc	1	1.398	-3.577	-2.928	-2.599	0.9971
g_nat_sav	1	-1.089	-3.577	-2.928	-2.599	0.7194
top	1	-1.336	-3.577	-2.928	-2.599	0.6124
rint_rate	4	-0.469	-3.587	-2.933	-2.601	0.8979

Source: *Own computation*

6.5. First Difference Optimal Lag Selection

In part 6.4 of this paper, it has been shown that none of the variables used in this analysis qualifies for stationarity condition as all of them possesses unit root. As a rule of thumb, there arise a need to conduct the first difference optimal lag selection by employing the Akaike Information Criteria (AIC) for all variables since they were not stationary at level. Again, as Wooldridge (2015) suggested, with time series data, the number of lags should be as small as 1 or 2 lags. These lags are said to be appropriate in order not to lose the

degree of freedom and to avoid such econometrics problems such as the problem of multicollinearity, which would compromise the efficiency of parameter estimates. Table 4 provides the first differenced optimal lag determination with the use of AIC.

Table 5: Fist Difference Optimal Lag Selection

Variable	Lag	LL	LR	df	p	AIC
fdi_inflw	0	-352.549				14.4306
	1	-346.689	11.721*	1	0.001	14.2322*
	2	-346.486	.40594	1	0.524	14.2647
	3	-346.214	.54381	1	0.461	14.2945
	4	-344.668	3.0913	1	0.079	14.2722
infl_rate	0	-158.309				6.50241
	1	-156.12	4.378*	1	.62639	6.45388*
	2	-155.61	1.0196	1	0.313	6.47389
	3	-155.605	.01035	1	0.919	6.51449
	4	-155.292	.62639	1	0.429	6.54253
gdp	0	-867.283				35.4401
	1	-867.111	.34467	1	0.557	35.4739
	2	-866.706	.81076	1	0.368	35.4982
	3	-866.613	.18445	1	0.668	35.5352
	4	-862.892	7.442*	1	0.006	35.4242*
exc	0	-281.712				11.5392*
	1	-281.442	.53999	1	0.462	11.569
	2	-281.435	.01294	1	0.909	11.6096
	3	-281.374	.12236	1	0.726	11.6479
	4	-281.007	.73435	1	0.391	11.6737
g_nat_sav	0	-124.847				5.1366*
	1	-124.547	.59887	1	0.439	5.16519
	2	-124.546	.00322	1	0.955	5.20594
	3	-123.988	1.1143	1	0.291	5.22402
	4	-123.805	.36719	1	0.545	5.25734
top	0	-162.255				6.66345*
	1	-161.629	1.2509	1	0.263	6.67874
	2	-161.189	.88098	1	0.348	6.70158
	3	-160.972	.43333	1	0.510	6.73355
	4	-160.835	.27427	1	0.600	6.76877
rint_rate	0	-167.545				6.87939
	1	-164.86	5.3689	1	0.020	6.81063
	2	-162.058	5.6056	1	0.018	6.73705
	3	-158.05	8.0149*	1	0.005	6.6143
	4	-156.351	3.3986	1	0.065	6.58575*

Source: *Own computation*

6.6. First Difference Unit Root Test with Optimal Lags

Since we have a pool of variables which are not stationary, this scenario necessitates the need for performing a unit root test using the once-differenced variables with optimal lag length. First, the series was differenced once to remove trends or seasonality, ensuring the data became stationary. The optimal lag length was then determined using the Akaike Information Criterion (AIC), which helps identify the number of lags that best capture the series dynamics without overfitting. The unit root test was conducted using the Augmented Dickey-Fuller (ADF) test to confirm stationarity. The results

presented in Table 5, show that all variables are now stationary, with p-values for all variables being less than 0.05, indicating rejection of the null hypothesis of a unit root.

Table 6: First Difference Unit Root Test with Optimal Lags

Variable	Number of lags	Test statistic	Dickey-Fuller critical value			p - value
			1%	5%	10%	
fdi_inflw	1	-6.420	-3.579	-2.929	-2.600	0.0000
infl_rate	1	-6.222	-3.579	-2.929	-2.600	0.0000
gdp	1	-3.969	-3.579	-2.929	-2.600	0.0016
exc	0	-6.262	-3.577	-2.928	-2.599	0.0000
g_nat_sav	0	-6.190	-3.577	-2.928	-2.599	0.0000
top	0	-6.022	-3.577	-2.928	-2.599	0.0000
rint_rate	4	-5.185	-3.594	-2.936	-2.602	0.0000

Source: *Own computation*

6.7. Autoregressive Distributive lag (ARDL) Estimation Results

The Autoregressive Distributed Lag (ARDL) model is a well-established econometric technique used to analyze the dynamics between variables over time in time series data. It effectively combines elements of autoregressive models, which capture relationships with a variable's own past values and distributed lag models, which account for the delayed effects of other variables on the current variable of interest. This approach is particularly valuable when dealing with non-stationary variables, such as those exhibiting trends or cycles over time. In this research, we chose the ARDL model because it allows us to capture both short-term adjustments and long-term equilibrium relationships. All of our variables are integrated of order one, which provides a solid rationale for applying the ARDL framework in estimating the determinants of foreign direct investment in Tanzania.

Table 7: ARDL Estimation Results

Sample: 1971 thru 2023 — Number of obs. = 53

R-squared = 0.5855

Adj R-squared = 0.4473

Log likelihood = -1084.1046 — Root MSE = 2.157e+08

D.fdi_inflw	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]
ADJ *fdi_inflw* L1.	-1.110877	.1579805	-7.03	0.000	-1.430422 -.7913312

D.fdi_inflw	**Coefficient**	**Std. err.**	**t**	**P>|t|**	**[95% conf. interval]**
LR *infl_rate*	-7560306	4564559	-1.66	0.106	-1.68e+07 1672385
gdp	11.12493	2.575999	4.32	0.000	5.914481 16.33538
exc	-680372.2	246063.7	-2.77	0.009	-1178083 -182661.3
g_nat_sav	-2402775	6224506	-0.39	0.702	-1.50e+07 1.02e+07
top	3.38e+07	4453922	7.59	0.000	2.48e+07 4.28e+07
rint_rate	835316.1	6353113	0.13	0.896	-1.20e+07 1.37e+07
SR *infl_rate* D1.	1286892	5770493	0.22	0.825	-1.04e+07 1.30e+07
gdp D1.	-.2024356	4.016626	-0.05	0.960	-8.326828 7.921956
exc D1.	783886.3	512625.1	1.53	0.134	-252996 1820768
g_nat_sav D1.	8489893	1.11e+07	0.76	0.451	-1.40e+07 3.10e+07
top D1.	-1.01e+07	8204931	-1.23	0.227	-2.67e+07 6516814
rint_rate D1.	2699228	5488587	0.49	0.626	-8402487 1.38e+07
_cons	1.76e+08	2.03e+08	0.87	0.390	-2.34e+08 5.87e+08

Source: *Own computations*

Table 6 presents the results of the ARDL estimation. The results show that the model's goodness of fit, as assessed by the R-squared statistic (R^2), is robust (moderate to strong), indicating that 58.55 percent of the variance in the dependent variable can be explained by the independent variables considered in our ARDL model, including their lagged values. The ARDL coefficient estimates are classified into two categories i.e., short-run and long-run coefficients. Analysis of the long-run coefficients reveals that Gross Domestic Product (GDP) is statistically significant and positively determines foreign direct investment inflows. This finding suggests that higher levels of GDP are associated with increased inflows of foreign direct investment in the

long-run. There are several likely causes and explanations for this scenario which include market size and potentiality whereby a higher gross domestic product usually indicates a larger and a more dynamic market which obvious attract FDI due to potential for higher returns on investment. Investors usually and typically seek market where they can achieve significant growth and normally the gross domestic product is a key indicator of market size and consumer demand. Additionally higher gross domestic product is a reflection of economic stability and a positive investment climate. It is usually a signal to investors that the economy is performing well and a well performing economy reduces perceived risks and encourage investment. The study recommends strengthening economic growth policies that stimulate and sustain GDP growth, enhance investment climate by creating a favorable regulatory environment and ensuring legal protection for investors and enhancing ease of doing business.

These results are consistent with the findings buy Chakrabarti (2001) study that used extreme bound analysis (EBA) to examine if any of the conclusions from the existing literature is robust to small changes in the conditioning information set. The findings were such that the EBA upholds the robustness of the correlation between FDI inflow and market size as measured by gross domestic product (GDP). However, the findings also indicates that the relations between FDI and many of the controversial variables such as tax, wage, openness, exchange rate, tariff, growth, and trade balance were highly sensitive to small alterations in the conditioning information set. On the same note, Asiedu (2002) highlighted that economic stability indicated by a consistent GDP growth is crucial for attracting FDI inflows. His findings indicates that countries with stable economic environment are more appealing to foreign investors

Similarly, trade openness also shows a positive and significant determination of foreign direct investment inflows. There are good economic reasons that may suggests this kind of relationship including market access and export potential whereby trade openness facilitates access to international markets, making a country an attractive destination for foreign investors who seek to export goods and services. Investing in a more open economy, multinational companies can use the host country as a base to produce and export to other markets. This finding is consistent with the empirical observations of Jarovic (2004) where he found that trade openness attracts foreign firms by providing easy access to both domestic and international market. This increases accessibility and encourages more FDI inflow into open economies. Based on this finding the study recommends enhancement of trade liberalization policies by reducing tariffs, eliminating non-tariffs barriers and improving trade agreements, strengthening trade infrastructures such as ports, transportation networks and other logistic systems to benefit from the country's trade with the rest of the world.

The other variable of interest is the Exchange rate, whereby it can be seen that the rate of exchange rate portrays a statistically significant negative relationship with the inflow of foreign direct investment. An increase in the exchange rate typically means the depreciation of a country's currency relative to other currencies. When the exchange rate rises, it means that more of the home currency is needed to but one unit of a foreign currency. A weaker local currency due to an increase in exchange rate led to a decline in foreign direct investment due to several reasons notably increased cost of investment whereby a higher exchange rate imply that foreign investors need to spend more of their currency to acquire local assets or establish businesses. The increased cost makes investment less attractive particularly for projects with lower expected returns. Additionally, a depreciating currency would lead to a decrease in an inflow of foreign direct investment because of a reduced profitability. This is because when foreign companies invest and then face a depreciating local currency, any profits they generate will yield less when converted back to their home currency. This potential reduction in profitability can deter foreign investors. Additionally, a depreciating currency leads to a fall in foreign direct investment because of what is known as currency risk. When foreign investors anticipate that the currency will continue to weaken, they may delay or cancel investment decisions due to the uncertainty surrounding future returns.

This negative relationship of foreign direct investment and exchange rate is consistent with several results notably a study by Kyereboah-Coleman and Agyire-Tettey (2008) using data from sub-Saharan Africa with specific focus on Ghana from 1970 to 2002. The findings reveal a statistically significant negative relationship between exchange rate and foreign direct investment inflows indicting that higher exchange rate tend to deter FDI into the country. Hanusch et al. (2018) reported that there is a discouraging impact of an increase in exchange rate with a decrease in the inflow of foreign direct investment in a panel of 80 developing and developed countries using data from 1990 to 2015. Based on this finding, the study recommends stabilization of the exchange rate by implementing monetary policies aimed at stabilizing the exchange rate while reducing volatility. This can be achieved through effective central bank interventions, prudent fiscal management and inflation control.

The gross national savings as a percentage of gross domestic product and the rate of inflation seems to have negative effect in determining the inflow of foreign direct investment. On the other hand, the real rate of interest seems to have a positive effect in determining the inflow of foreign direct investment. However, the effects of these three variables on determining the inflows of foreign direct investment seems to be statistically insignificant. On the other hand, the short-run, the ARDL results shows that inflation rate, exchange

rate, gross national savings as a percentage of gross domestic product and real rate of interest have positive determinants on the inflow of foreign direct investment. On the other hand, the gross domestic product and trade openness variables seems to have a negative impact in determining the inflow of foreign direct investment. However, the effects of all the variables in the short-run seems to be statistically insignificant.

6.8. Autoregressive Distributive Lag (ARDL) Bound Test Results

The ARDL bound test examines whether our set of variables exhibit long-run equilibrium relationships. ARDL bound test involves testing the significance of the coefficients of the lagged levels of the variables in the ARDL model. If these coefficients are jointly statistically significant, it suggests the presence of a long-run relationship among the variables.

According to Pesaran et al. (2001), the ARDL bound test methodology is suitable for both stationary and non-stationary time series data. The long-run relationship imply that the variables are cointegrated meaning that, while individual variables may not be stationary (they may have unit roots) there exist a stable long-run relationship amongst them. It also implies long-run equilibrium in the sense that, the existence of long-run relationship indicates that these variables adjust towards a stable equilibrium over time. This equilibrium pertains to the fundamental economic or theoretical relationship despite short-term disturbances. Lastly long-run equilibrium signifies dynamic adjustment where variables adjust dynamically to deviations from their long-run equilibrium path where short run deviations are corrected gradually over time.

Table 8: ARDL Bound Test Results

	10%		5%		1%		p-value	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
F	2.264	3.554	2.691	4.133	3.687	5.466	0.000	0.002
t	-2.495	-3.978	-2.843	-4.394	-3.543	-5.225	0.000	0.000

Source: *Own computation*

Table 7 presents the ARDL bound test results of our ARDL model estimation. The null hypothesis for the integration orders is such that *I (0):* refer to the null hypothesis that the variables are stationary at level (no long-run relationship) while *I (1)* refer to the null hypothesis that the variable are integrated of order 1 (no long-run relationship). Based on our context since the p-values for both *I (0)* and *I (1)* are less than our desired significance level (0.05), we reject the null hypothesis of no long run relationship. This typically imply that the variables used in this analysis are integrated and they share a stable long-run relationship despite potentially exhibiting short-term fluctuations.

6.9. Zivot-Andrews Test for Structural Breaks

In conducting this investigation into the determinants of foreign direct investment inflows in Tanzania, we were concerned about the potential presence of structural breaks due to policy changes, which could have biased our estimated results. The test results show that the test statistic is -3.353, with a break point identified in 2008 (the 39th observation) and the critical value at the 5% significance level is -4.80. The null hypothesis posits that the time series has a unit root, with no structural break at any point, while the alternative hypothesis suggests the presence of a unit root but with a significant structural break at some point in the series. Since the test statistic of -3.353 does not exceed the critical value of -4.80 at the 5% significance level, we fail to reject the null hypothesis. This indicates that the series does not exhibit a significant structural break, suggesting that the data follows a consistent pattern over time without substantial changes in its underlying structure that would significantly affect its behavior. Figure 1 provides an output sketch of the Zivot-Andrew's test for structural break.

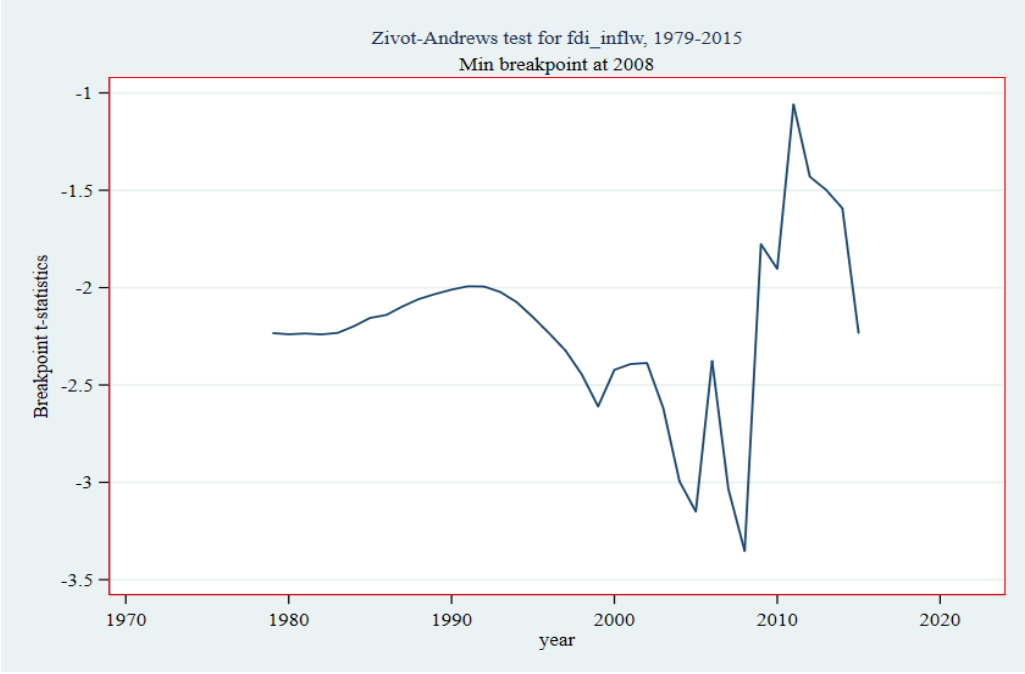

Figure 1: *Zivot-Andrews Test for Structural Breaks*

6.10.Time Series Post Estimation (Diagnostic)Tests

Time series post-estimation or diagnostic tests were also considered in this analysis as they are crucial for validating the assumptions of our time series model and ensuring the robustness of the estimated results. Therefore, we

conducted two diagnostic tests: the serial correlation test and the heteroscedasticity test. The details of these tests are provided in the following sections.

6.10.1. Breusch Godfrey Tests for Serial Correlation

Serial correlation or autocorrelation, is the correlation of a time series with its own past values. It reflects the relationship between a variable's current value and its previous values (Hamilton, 2020). Serial correlation in time series data can affect the reliability of statistical inferences, leading to biased estimated coefficients and invalid inferences. Serial correlation can be positive (where a high value in one period is likely to be followed by a high value in the next period) or negative (where a high value in one period is likely to be followed by a low value in the next period).

In this analysis, we were concerned about the problem of serial correlation and thus conducted a test to determine its presence. The Breusch-Godfrey test was employed, with the null hypothesis *(H_0:)* stating that there is no serial correlation in the residuals and the alternative hypothesis *(H_1:)* stating that there is serial correlation in the residuals. The results presented in Table 8 show a p-value of 0.9849, which is higher than the significance level of 0.05. Therefore, we failed to reject the null hypothesis of no serial correlation. This suggests that there is no enough evidence of serial correlation in the residuals up to the specified lag order indicating that the model's assumptions about the error terms are likely valid.

Table 9: Breusch Godfrey Tests for Serial Correlation

Breusch-Godfrey LM test for autocorrelation chi2	df	Prob>Chi2
0.000	1	0.9849

H_0: No serial correlation

6.10.2. White's Test for Heteroscedasticity

Heteroscedasticity in time series analysis is the phenomenon where the variance of the residuals (errors) is not constant over time. In other words, the variability of the errors changes at different points in time, which violates one of the key assumptions of classical linear regression models that assume homoscedasticity (constant variance of errors). With heteroscedasticity in the data set we are likely to obtain insufficient estimates where the estimated coefficients remain unbiased in the sense that they do not have minimum variance amongst all linear unbiased estimators. Equally speaking, with heteroscedasticity, we are likely to obtain invalid inferences where the standard errors of the estimated coefficients become biased leading to invalid

t-tests and F-tests consequently confidence intervals and hypothesis tests may be unreliable.

Considering all the implications of heteroscedasticity, this analysis utilized the White's test to determine its presence. The test results are detailed in table 9. The White general heteroscedasticity test posits the null hypothesis that there is no heteroscedasticity against the alternative hypothesis of its existence. Upon reviewing the results, it is evident that the p-value is not significant, indicating insufficient evidence to reject the null hypothesis of homoscedasticity.

Table 10: White's Test for Heteroscedasticity

White's test **H0: Homoskedasticity** **Ha: Unrestricted heteroskedasticity** **chi2(50) = 51.00** **Prob > chi2 = 0.4341** **Cameron & Trivedi's decomposition of IM-test chi2**	**df**	**p**
53.00	52	0.4354
.	13	.
.	1	.
Total	64	.

H0: Homoskedasticity

6.10.3.Conclusion and Policy Implications

Following the key findings of this study, the following conclusions can be made while considering the statistically significant determinants of foreign direct investment inflows in Tanzania which are gross domestic product (GDP) exchange rate and trade openness. For the case of gross domestic product, the analysis has indicated that it has a significant positive influence on the inflow of foreign direct investment inflows in Tanzania whereby a higher gross domestic product is associated with increased inflows of foreign direct investment reflecting that a larger and more dynamic market as indicated by gross domestic product attracts foreign investment due to potential for higher returns and economic stability. For the case of trade openness, the following can be considered as a conclusion, that trade openness determines foreign direct investment inflows in a positive way. An open economy facilitates access to international markets and export opportunities, making it attractive for foreign investors. Additionally, the increase in exchange rate (depreciation of the local currency) seems to negatively affect the inflow of foreign direct investment.

These findings and conclusions lead to the following policy implications. First the country has to enhance economic growth policies in a manner that

strengthens policies that promote and sustain economic growth to boost gross domestic product (GDP). A higher gross domestic product is positively associated with increased inflows of foreign direct investment. The actions which can be implemented to ensure this situation is happening include implementing and supporting initiatives that foster economic stability, infrastructure development and sectoral growth. This includes investing in education, innovation and technology to improve productivity and market potential. Additionally, the country needs to promote trade openness by maintaining and expanding trade liberalization policies to further open the economy to international markets. Trade openness is positively linked to the inflows of foreign direct investment. This can be done by reducing trade barriers such as tariffs and non-tariff barriers. Enhance trade agreements and improve logistics infrastructure to facilitate smoother and more cost-effective trade operations.

Furthermore, the country needs to improve investment climate and creating a more favorable regulatory and business environment to attract and retain foreign direct investment. Investors are drawn to stable and predictable environments. This can be done by simplifying regulatory procedures, ensure legal protections for investors and promote transparency in business practices. This includes streamlining processes for starting and operating businesses and providing clear guidelines for foreign investments. Additionally, strengthening institutional frameworks by developing and maintain robust institutions that support investment and economic stability. Strong institutions contribute to a positive investment climate and investor confidence. Enhancing the efficiency and effectiveness of institutions responsible for economic policies and investment facilitation. This includes improving governance, reducing bureaucratic red tape and ensuring effective implementation of investment-related policies. Lastly, stabilization of the exchange rate by implementing monetary policies aimed at stabilizing the exchange rate while reducing volatility. This can be achieved through effective central bank interventions, prudent fiscal management and inflation control.

7. Areas of Suggestion for Further Research

As digital infrastructure and technological advancements play an increasingly critical role in global investment decisions, further studies could investigate how digitalization, internet penetration and technology influence foreign direct investment inflows into Tanzania. This area of research could explore the effects of technological progress and the growing digital economy on attracting FDI, such studies could provide valuable insights into strategies for leveraging Tanzania's digital infrastructure to enhance foreign direct investment.

References

Abimbola, N.L., & Simeon, O. A., (2018). Major determinants of foreign direct investment in the west African economic and monetary region. *Iranian Economic Review*, *22*(1), 121-162.

Al-Matari, Adelakun, J., & Ogujiuba, K. (2023). A comparative analysis of the determinants of foreign direct investment: The case of top ten recipients of foreign direct investment in Africa. Economies, 11(10), 244.

Alla, O. A. Y., Abdelmawla, M. A., Mohamed, A. A. A., & Mudawi, S. K. M. (2015). Evaluation of foreign direct investment inflow in Sudan: An empirical investigation (1990-2013). *Journal of Business Studies Quarterly*, *7*(2), 149.

Anyanwu, J. C. (2012). Why does foreign direct investment go where it goes? New evidence from African countries. *Annals of economics and finance*, *13*(2), 425-462.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: is Africa different? *World development*, *30*(1), 107-119.

Azam, M., and Khan, A. U. (2021), Impact of Public Debt on Foreign Direct Investment in Pakistan: A Quantitative Approach. Journal of Finance and Economics, Vol. 3, No. 8, pp. 4225–4231.

Basemera, S., Mutenyo, J., Hisali, E., & Bbaale, E. (2012). Foreign direct investment inflows to East Africa: Do institutions matter. *Journal of Business Management and Applied Economics*, *5*, 49-71.

Büthe, T., & Milner, H. V. (2008). The politics of foreign direct investment into developing countries: increasing FDI through international trade agreements? *American journal of political science*, *52*(4), 741-762.

Chakrabarti, A. (2001). The determinants of foreign direct investments: Sensitivity analyses of cross-country regressions. *kyklos*, *54*(1), 89-114.

Dlamini, M., Masuku, M., & Raufu, M. (2015). Determinants of foreign direct investment inflows in swaziland's agricultural sector. *Journal of Economics and Sustainable Development*, *6*(15), 150-158.

Dunning, J. H. (2003). The eclectic (OLI) paradigm of international production. *International business and the eclectic paradigm: Developing the OLI framework*, 21.

Esew, N. G., & Yaroson, E. (2014). Institutional quality and foreign direct investment (FDI) in Nigeria: A prognosis. *IOSR Journal of humanities and social science*, *19*(6), 37-45.

Hailu, Z. A. (2010). Demand side factors affecting the inflow of foreign direct investment to African countries: does capital market matter? *International journal of business and management*, *5*(5), 104.

Hamilton, J. D. (2020). *Time series analysis*. Princeton university press.

Hanusch, M., Nguyen, H., & Algu, Y. (2018). *Exchange rate volatility and FDI inflows: Evidence from cross-country panel data*. World Bank.

Hassan, M. (2017). Determinants of foreign direct investment in the middle east region: An empirical analysis. *Asian Social Science*, *13*(11), 47-53.

Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American economic review*, *94*(3), 605-627.

Kheng, V., Sun, S., & Anwar, S. (2017). Foreign direct investment and human capital in developing countries: a panel data approach. *Economic change and Restructuring*, *50*, 341-365.

Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Effect of exchange-rate volatility on foreign direct investment in Sub-Saharan Africa: The case of Ghana. *The Journal of Risk Finance*, *9*(1), 52-70.

Meressa, H. A. (2022). Determinants of foreign direct investment inflows to COMESA member countries: an integration of institutional and socio-economic factors. *Journal of Innovation and Entrepreneurship*, *11*(1), 68.

Mohammed, B. S. (2022). Determinants of foreign direct investment in Sub-Saharan African countries. *International Journal of Business and Applied Economics*, *1*(1), 1-12.

Moosa, Imad A. (2002). Foreign Direct investment: Theory, Evidence and Practice. London: Palgrave.

Hufbauer, G. C. (1966). Progressivity and Horizontal Equity in Personal Income Taxation. *The Southwestern Social Science Quarterly*, 181-190.

Mugambi, P. K., & Murunga, J. (2017). Effect of external debt service on foreign direct investment inflows in Kenya. *European Journal of Economics, Law and Politics*, *4*(3), 1-13.

Neumayer, E., & Spess, L. (2005). Do bilateral investment treaties increase foreign direct investment to developing countries? *World development*, *33*(10), 1567-1585.

Nelson, V. D. (2021). Foreign Direct Investment in Tanzania. An Analysis of its Investment Laws. *Journal of Global and Area Studies (JGA)*, *5*(2), 79-98.

Pesaran, M. H., & Shin, Y. (1995). *An autoregressive distributed lag modelling approach to cointegration analysis* (Vol. 9514). Cambridge, UK: Department of Applied Economics, University of Cambridge.

Pesaran, M. H., & Pesaran, B. (1997). Working with Microfit 4.0: Interactive econometric analysis. *(No Title)*.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.

Posner, Michael V., (1961). "International Trade and Technical Change". Oxford Economic Papers, N.S., Vol. 13, Oxford, pp.

Rogoff, M. K., & Reinhart, M. C. (2003). *FDI to Africa: The role of price stability and currency instability*. International Monetary Fund.

Said, A., & Musonda, F. (2014). "The Long-term Effects of Trade Liberalization on Foreign Direct Investment in Tanzania." African Journal of Economic Policy, 22(3), 45-67.

Sane, M. (2016). Determinants of foreign direct investment inflows to ECOWAS member countries: Panel data modelling and estimation. *Modern Economy*, *7*(12), 1517-1542.

Serven, L., & Solimano, A. (1992). Private investment and macroeconomic adjustment: A survey. *The World Bank Research Observer*, *7*(1), 95-114.

Sichei, M. M., & Kinyondo, G. (2012). Determinants of foreign direct investment in Africa: A panel data analysis. *Global Journal of Management and Business Research*, *12*(18), 85-97.

Suleiman, N. N., Kaliappan, S. R., & Ismail, N. W. (2015). Determinants of Foreign Direct Investment: Empirical Evidence from Southern Africa

Customs Union (SACU) Countries. *International Journal of Economics & Management*, *9*(1).
Suliman, A. H., & Mollick, A. V. (2009). Human capital development, war and foreign direct investment in sub-Saharan Africa. *Oxford Development Studies*, *37*(1), 47-61.
Tahmad, A. M. I., & Adow, A. H. (2018). The impact of trade openness on foreign direct investment in Sudan by sector in the 1990-2017 period: an empirical analysis. *Economic annals-XXI*, (172), 14-22.
Vernon. Raymond (1966). "The Product Cycle Hypothesis in a New International Environment". Oxford Bulletin of Economics and Statistics, Vol. 41, Oxford, pp. 255
Vinesh, S. R., Boopendra, S., & Hemraze, D. (2014). Determinants of foreign direct investment in SADC: An empirical analysis. *The Business & Management Review*, *4*(4), 146.
Workneh, A. M. (2014). Factors affecting FDI flow in Ethiopia: An empirical investigation. *European Journal of Business and Management*, *6*(20), 118-126.
Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Cengage learning.
Yang, J. H., Wang, W., Wang, K. L., & Yeh, C. Y. (2018). Capital intensity, natural resources, and institutional risk preferences in Chinese Outward Foreign Direct Investment. *International Review of Economics & Finance*, *55*, 259-272.
Yasmin, B., Hussain, A., & Chaudhary, M. A. (2003). Analysis of factors affecting foreign direct investment in developing countries. *Pakistan Economic and Social Review*, 59-75.
Youssouf, N. N. (2017). Robust FDI Determinants in Sub-Saharan African Countries. *Applied Economics and Finance*, *4*(5), 21-30.

Appendix:

Table 11: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) *fdi_inflw*	1.000						
(2) *infl_rate*	-0.551	1.000					
	(0.000)						
(3) *gdp*	0.567	-0.477	1.000				
	(0.000)	(0.000)					
(4) *exc*	0.832	-0.633	0.824	1.000			
	(0.000)	(0.000)	(0.000)				
(5) *g_nat_sav*	0.600	-0.721	0.731	0.739	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)			
(6) *top*	0.898	-0.498	0.373	0.794	0.487	1.000	
	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)		
(7) *rint_rate*	0.575	-0.367	0.655	0.784	0.466	0.552	1.000

(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)

Source: Researcher's computation

Table 12: Optimal Lag Length Selection

Variable	Lag	LL	LR	df	p	AIC
fdi_inflw	0	-390.518				15.6607
	1	-357.628	65.779	1	0.000	14.3851
	2	-352.757	9.7433*	1	0.002	14.2303*
	3	-352.643	0.22804	1	0.633	14.2657
	4	-352.243	0.79898	1	0.371	14.2897
infl_rate	0	-191.53				7.70121
	1	-160.254	62.553*	1	0.000	6.49014
	2	-159.013	2.4801	1	0.115	6.48054*
	3	-158.881	.26452	1	0.607	6.51525
	4	-158.741	.2802	1	0.597	6.54964
gdp	0	-950.621				38.0649
	1	-884.223	132.8*	1	0.000	35.4489*
	2	-884.163	.11996	1	0.729	35.4865
	3	-883.904	.51829	1	0.472	35.5162
	4	-883.76	.2888	1	0.591	35.5504
exc	0	-406.615				16.3046
	1	-286.079	241.07*	1	0.000	11.5232*
	2	-286.012	.13367	1	0.715	11.5605
	3	-285.88	.26478	1	0.607	11.5952
	4	-285.872	.0155	1	0.901	11.6349
g_nat_sav	0	-180.935				7.2774
	1	-126.925	108.02*	1	0.000	5.15701*
	2	-126.356	1.1383	1	0.286	5.17424
	3	-126.318	.07662	1	0.782	5.21271
	4	-125.215	2.2047	1	0.138	5.20862
top	0	-225.049				9.04194
	1	-164.339	121.42*	1	0.000	6.65355*
	2	-163.464	1.7502	1	0.186	6.65855
	3	-162.755	1.4166	1	0.234	6.67022
	4	-162.673	.165	1	0.685	6.70692
rint_rate	0	-183.924				7.39695
	1	-166.87	34.108	1	0.000	6.7548
	2	-165.796	2.1474	1	0.143	6.75185
	3	-163.966	3.6606	1	0.056	6.71864
	4	-160.483	6.9656*	1	0.008	6.61933*

Source: Own computation