

Foreign Direct Investment–Trade Balance Nexus in Sub-Saharan Africa

Patrick Kagambo John Nahabwe^{1,2}, *Willy Rwamparagi Kagarura², Benjamin Musiita¹

¹Mbarara University of Science and Technology, Uganda

²Kabale University, Uganda

Email: *wkagarura@kab.ac.ug

Corresponding Author: Willy Rwamparagi Kagarura

Abstract: We investigate the nexus between foreign direct investment (FDI) and trade balance in Sub-Saharan Africa (SSA). We employ balanced annual panel data for 20 SSA countries spanning the period 2005–2024, sourced from the World Development Bank. To address potential endogeneity, unobserved heterogeneity, and dynamic panel bias, we utilize the Generalized Method of Moments (GMM) estimator. Empirical results reveal that both lagged trade balance and FDI exert a positive and statistically significant influence on the current trade balance. The coefficient of the lagged trade balance (0.2617) indicates partial adjustment dynamics, suggesting that approximately 26.2% of past trade balance conditions persist into the current period. Furthermore, the FDI coefficient (0.1035) implies that a 10% increase in FDI inflows leads to an estimated 1.03% improvement in the trade balance, *ceteris paribus*. The findings underscore the critical role of FDI in strengthening external sector performance in SSA by enhancing export capacity, improving productive efficiency, and alleviating foreign exchange constraints. We conclude that FDI is a significant driver of trade balance sustainability in the region. We recommend policies aimed at attracting export-oriented FDI, enhancing domestic absorptive capacity through strategic investments in human capital and infrastructure, and implementing complementary trade and industrial policies to maximize FDI spillovers.

Keywords: *Generalized Method of Moments, Foreign direct investment, Trade Balance, Sub-Saharan Africa*

1. Introduction

Sub-Saharan Africa (SSA) has historically occupied a central position in global production and trade, often characterized as a region of abundance and resource richness. Early historical and religious accounts portray parts of SSA, particularly Ancient Egypt, Ethiopia, and Sudan, as vital food baskets that sustained surrounding regions. Biblical narratives frequently reference the migration of peoples, including the Jews, to these areas in search of food during periods of famine (Genesis 41–47). Beyond religious texts, Africa's prominence in global commerce was reinforced through major historical trade systems such as the Trans-Saharan Trade and the Trans-Atlantic Trade, through which commodities, including slaves, gold, ivory, spices, textiles, and agricultural products, flowed to Europe, the Middle East, and the Americas (Austen, 2010; Hopkins, 2019).

Early economic thought further reinforced the perception of Africa as a region of immense wealth and opportunity. Mercantilism viewed Africa as a critical source of raw materials necessary for European industrial expansion. Similarly, Adam Smith, in his book *The Wealth of Nations*, acknowledged the natural endowments of Africa, emphasizing the importance of trade, specialization, and openness in harnessing such abundance (Smith, 1776). Collectively, these perspectives framed SSA as a region with strong potential for sustained trade surpluses and global competitiveness.

However, this historical narrative sharply contrasts with contemporary realities. Since the mid-1970s, most SSA economies have experienced a persistent deterioration in their trade balances, characterized by rising import dependence, limited export diversification, and vulnerability to external shocks (UNCTAD, 2019; World Bank, 2024). This paradox of a resource-rich region facing chronic external imbalances raises critical questions about the structural drivers of trade performance in SSA.

Foreign direct investment (FDI) has emerged as a key factor in shaping external sector outcomes, given its potential to enhance productive capacity, facilitate technology transfer, and promote export-oriented industrialization. While existing empirical studies have examined the relationship between FDI and trade, the evidence for SSA remains inconclusive and fragmented, with limited focus on dynamic interactions and endogeneity concerns. Moreover, few studies comprehensively analyze the FDI–trade balance nexus using recent data and robust econometric techniques across a broad sample of SSA countries.

We address these gaps by examining the dynamic relationship between FDI and trade balance in SSA using a panel of 20 countries over the period 2005–2024. By employing the Generalized Method of Moments (GMM) framework, we provide more reliable estimates that account for endogeneity and country-specific effects. Our findings are expected to offer important policy insights on how SSA economies can leverage FDI to restore external balance, enhance export performance, and achieve sustainable economic development.

2. Literature Review

The relationship between FDI and trade balance has attracted extensive debate in international economics. Traditional theory suggests that FDI can either complement or substitute trade flows. On one hand, export-oriented FDI enhances production capacity and promotes exports, thereby improving trade balance (Markusen & Venables, 1999). On the other hand, market-seeking FDI may increase imports through intermediate inputs and profit repatriation, potentially worsening the trade balance (Blonigen, 2001).

Empirical evidence remains mixed. Studies such as those by Borensztein et al. (1998) find that FDI contributes positively to growth and export performance when host countries possess sufficient human capital. Conversely, Aizenman & Noy (2006) highlight a bidirectional relationship between FDI and trade, suggesting that the net effect on trade balance depends on the structure and orientation of FDI. More recent studies emphasize the role of absorptive capacity, institutional quality, and sectoral allocation of FDI in determining its trade effects (Alfaro et al., 2010). These findings indicate that the FDI–trade balance nexus is context-specific and influenced by structural characteristics of host economies.

In SSA, the literature points to structural constraints that limit the effectiveness of FDI in improving trade outcomes. FDI inflows into SSA have historically been concentrated in extractive industries, particularly oil and minerals, which generate limited export diversification and weak linkages with domestic economies (UNCTAD, 2019). As a result, the potential of FDI to improve trade balance remains underutilized.

Empirical studies in SSA provide inconclusive results. For instance, Asiedu (2002) finds that while FDI inflows to Africa are influenced by market size and natural resources, their impact on trade performance is limited. Ndikumana & Verick (2008) argue that FDI in SSA often leads to enclave economies with minimal spillover effects. However, recent evidence suggests that FDI directed toward manufacturing and services can positively influence export performance and reduce trade deficits (Abbes et al., 2015). These divergent findings highlight the importance of sectoral composition and policy environment in shaping the FDI–trade balance relationship in SSA.

Country-level studies within SSA further underscore the heterogeneity of the FDI–trade balance nexus. In Uganda, studies indicate that FDI has contributed to export growth in sectors such as telecommunications and agro-processing, although its impact on the overall trade balance remains limited due to high import dependence (Ssemanda, 2025). Similarly, research in Nigeria shows that FDI inflows into the oil sector have not significantly improved the trade balance due to volatility in global oil prices and import-intensive production structures (Akinlo, 2004).

In Kenya, findings suggest that FDI in manufacturing has modestly enhanced export diversification, yet persistent trade deficits remain due to structural inefficiencies (Saddimbah, 2014). These country-specific studies reveal that while FDI has the potential to improve trade outcomes, its effectiveness is often constrained by weak industrial bases, limited value addition, and inadequate infrastructure.

Our study is anchored in three key theoretical perspectives: Firstly, the Eclectic Paradigm (OLI Framework) developed by John Dunning explains FDI flows based on Ownership, Location, and Internalization advantages (Dunning, 1991). This theory suggests that countries with abundant natural resources and favorable investment climates attract FDI, which can influence trade patterns.

Secondly, the Dependency Theory posits that developing countries, including those in SSA, are integrated into the global economy in a manner that perpetuates dependence on primary commodity exports and foreign capital, limiting their ability to achieve favorable trade balances (Prebisch, 1962; Frank, 1967).

Thirdly, the Export-Led Growth Theory argues that increased investment, including FDI, can stimulate export expansion, enhance productivity, and improve trade balance (Balassa, 1978). This theory is particularly relevant in assessing whether FDI contributes to export-oriented industrialization in SSA.

The conceptual framework of this study posits that trade balance is mainly influenced by foreign direct investment. FDI is expected to affect the trade balance through multiple channels, including increased production capacity, technology transfer, export promotion, and import substitution. The framework, therefore, assumes a dynamic relationship, where past trade balance also influences current outcomes, justifying the inclusion of lagged dependent variables in the empirical model.

Despite extensive literature, significant gaps remain. Firstly, many studies focus on either trade or FDI independently, with limited emphasis on their dynamic interaction. Secondly, existing studies on SSA often rely on static estimation techniques that fail to address endogeneity. Thirdly, there is limited cross-country evidence incorporating recent trends and structural changes in SSA economies.

Our study contributes to the literature by employing recent panel data (2005–2024) and a dynamic GMM approach to provide robust evidence on the FDI–trade balance nexus in SSA. It further integrates theoretical insights with empirical analysis to offer policy-relevant conclusions for improving external sector performance.

3. Data and Method

We employ a quantitative, longitudinal research design based on panel data econometrics to investigate the dynamic relationship between FDI and trade balance in SSA. A panel design is appropriate because it captures both cross-country heterogeneity and temporal dynamics, thereby improving efficiency and reducing omitted variable bias (Baltagi, 2021).

We utilize balanced annual panel data for 20 SSA countries covering the period 2005–2024. Data are sourced from the World Bank’s World Development Indicators (WDI), which ensures consistency, comparability, and reliability across countries. The selection of this period is motivated by the need to capture recent trends in FDI inflows, globalization, and trade performance in SSA.

The sample consists of 20 SSA countries (Appendix 9) selected using purposive sampling based on data availability and completeness for all variables over the study period. This approach ensures a balanced panel structure, which enhances the reliability of dynamic panel estimators and avoids biases associated with missing data (Wooldridge, 2010; Nahabwe & Kagarura, 2026). Although purposive sampling limits generalizability to all SSA countries, it is justified by the need for consistent time-series observations across countries.

Data for all variables are obtained from the World Development Indicators (WDI) of the World Bank, a widely used and credible source for cross-country macroeconomic analysis (World Bank, 2023). The dependent variable is trade balance (TB), measured as exports minus imports in absolute terms ($TB = |X - M|$), reflects the difference between a country’s exports (X) and imports (M) and is a key indicator of a nation’s economic health and external sector performance (Krugman et al., 2018; Salvatore, 2016; Nahabwe et al., 2025). The independent variable is net inflows of foreign direct investment (BoP, current US\$) (World Bank 2024).

To account for the persistence of the trade balance and potential dynamic adjustments, the study specifies the following dynamic panel model:

The core equation for trade balance is specified as:

$$TB_{it} = \alpha_0 + \alpha_1 TB_{it-1} + \beta_1 FDI_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

Where:

TB_{it} : Trade balance in country i at time t

TB_{it-1} : Lagged dependent variable capturing trade balance persistence

FDI_{it} : Foreign direct investment in country i at time t

ε_{it} : Error term. (Nahabwe & Kagarura, 2026)

TB and FDI are first transformed using natural logarithms to enhance econometric reliability and interpretability. Logarithmic transformation compresses large numerical scales and reduces the influence of extreme values, which are common in cross-country macroeconomic data. For instance, while the absolute distance between 10 and 10^{10} is enormous, their logarithmic values differ modestly (from 1 to 10), making relationships more stable and comparable. This transformation also helps linearize potentially nonlinear relationships, mitigate heteroskedasticity, and allows estimated coefficients to be interpreted as elasticities, which is particularly useful for policy analysis in international trade and investment studies (Wooldridge, 2010; Baltagi, 2021; Nahabwe & Kagarura, 2026).

We employ the System Generalized Method of Moments (System GMM) estimator, developed by Arellano & Bover (1995) and Blundell & Bond (1998), to estimate the dynamic panel model. System GMM is preferred to the conventional Difference GMM estimator of Arellano & Bond (1991) because it combines equations in first differences with equations in levels, thereby improving instrument strength and estimation efficiency, particularly when the variables exhibit persistence over time. The estimator is particularly suitable for this analysis for several reasons. Firstly, it effectively addresses potential endogeneity arising from reverse causality between trade balance and foreign direct investment. Secondly, it controls for unobserved country-specific heterogeneity and dynamic panel bias associated with the inclusion of a lagged dependent variable. Thirdly, System GMM produces more reliable and efficient estimates than Difference GMM when lagged levels are weak instruments for differenced variables. Finally, it is well-suited for panel datasets characterized by a relatively small number of cross-sectional units and a longer time dimension, a common feature of macroeconomic studies in Sub-Saharan Africa (Roodman, 2009).

GMM estimator is expressed as:

$$\hat{\theta}_{GMM} = \underset{\theta}{\operatorname{argmin}} \left[\frac{1}{n} \sum_{i=1}^n g(X_i, \theta) \right]' W_n \left[\frac{1}{n} \sum_{i=1}^n g(X_i, \theta) \right] \dots\dots\dots (2)$$

Where:

$g(X_i, \theta) = \frac{1}{n} \sum_{i=1}^n Z_i' \varepsilon_i(\theta)$ is the vector of moment conditions,

W_n : A consistent estimate of the weighting matrix,

θ : Vector of structural parameters (Arellano & Bond 1991; Blundell & Bond 1998; Nahabwe & Kagarura, 2026).

Empirical analysis proceeds in several stages. Firstly, descriptive statistics are computed to summarize the distribution and trends of the variables. Secondly, panel unit root tests using Levin-Lin-Chu and Im-Pesaran-Shin are applied to assess stationarity properties of the variables (Levin et al., 2002; Im et al., 2003). Thirdly, the dynamic panel model is estimated using system GMM.

Lagged levels of the endogenous variables are used as internal instruments, consistent with standard practice in dynamic panel estimation. The validity of the instruments is assessed using the Hansen test of over-identifying restrictions, while the Arellano-Bond test for serial correlation is employed to ensure the absence of second-order autocorrelation in the differenced residuals (Nahabwe & Kagarura, 2026).

To ensure the validity of the results, diagnostic tests are conducted. The Arellano-Bond test for serial correlation is used to verify the absence of second-order autocorrelation in the differenced residuals, while the Hansen test of over-identifying restrictions is employed to assess the validity of the instruments. Additionally, robustness checks, including alternative model specifications and sensitivity analyses, are performed to confirm the stability of the findings.

By integrating dynamic panel modeling with robust instrumentation, this study provides a methodologically rigorous framework for analyzing the FDI-trade balance nexus in SSA. The use of System GMM not only addresses key econometric challenges but also enhances the credibility and policy relevance of the empirical results.

4. Results and Discussion

The summary statistics for the key variables, log of trade balance (LNTB) and log of foreign direct investment (LNFDI) are presented in Appendix 1. The mean values of LNTB (22.78683) and LNFDI (19.74268) indicate

relatively stable average levels across the sampled countries over the study period. The proximity between the mean and median values for both variables suggests a fairly symmetric distribution.

The standard deviations (1.315174 for LNTB and 1.427882 for LNFDI) indicate moderate variability, implying that while there are fluctuations in trade balance and FDI inflows, these variations are not excessively dispersed. The skewness values reveal that LNTB is moderately positively skewed (0.558564), indicating a longer right tail, whereas LNFDI is slightly negatively skewed (-0.138906), suggesting a near-symmetric distribution.

Kurtosis values exceeding 3 (3.541903 for LNTB and 3.826509 for LNFDI) indicate leptokurtic distributions, implying the presence of heavier tails and potential outliers. This is further confirmed by the Jarque–Bera statistics, which are statistically significant ($p < 0.01$) for both variables, leading to the rejection of the null hypothesis of normality. Such non-normality is common in macroeconomic panel data, particularly in developing regions characterized by structural changes and external shocks (Baltagi, 2021).

We examine stationarity of trade balance (LNTB), government expenditure (LNFDI), using Im, Pesaran, and Shin unit root test (Appendices 2–5). Results indicate that all variables are non-stationary in levels, as the null hypothesis of a unit root cannot be rejected at conventional significance levels ($p > 0.05$). This confirms the presence of unit roots in the series. However, after first differencing, the null hypothesis of a unit root is rejected for each variable ($p < 0.05$), implying that all variables become stationary at first difference, that is, integrated of order one, $I(1)$. These findings justify the adoption of a dynamic panel modeling approach and the use of the GMM, which is well-suited for handling non-stationary macroeconomic variables in panel settings (Arellano & Bover, 1995; Blundell & Bond, 1998; Nahabwe & Kagarura, 2026).

Generalized Method of Moments (GMM) model results (Appendix: 6)

$$\Delta \widehat{LNTB} = 0.261720 \Delta LNTB_{it-1} + 0.103497 \Delta LNFDI \dots\dots\dots (3)$$

Hence,

$$\hat{\theta}_{GMM} = \begin{bmatrix} 0.261720 \\ 0.103497 \end{bmatrix}$$

The dynamic panel estimation results provide strong evidence in support of a positive relationship between FDI and trade balance in SSA. The lagged dependent variable, $LNTB_{(it-1)}$, is positive and statistically significant with a coefficient of 0.261720. This finding indicates partial adjustment dynamics, implying that approximately 26.2% of past trade balance conditions persist into the current period. In other words, the trade balance in SSA exhibits moderate inertia, reflecting structural rigidities and slow adjustment to external shocks.

The coefficient of FDI ($\beta_1 = 0.103497$) is positive and highly statistically significant ($p = 0.0000$), indicating a robust effect of FDI on trade balance. Specifically, a 10% increase in FDI inflows is associated with an approximate 1.03% improvement in trade balance, *ceteris paribus*. This result suggests that FDI contributes to enhancing export capacity, improving production efficiency, and easing foreign exchange constraints in SSA economies.

Diagnostic tests confirm the reliability of the estimated model. Although the residuals deviate from normality as evidenced by a kurtosis value of 4.8 and a Jarque–Bera probability of 0.00, this does not invalidate the results. In panel data contexts, particularly for developing economies, non-normality often arises due to structural breaks, commodity price volatility, and policy shifts (Baltagi, 2021). Importantly, the Generalized Method of Moments (GMM) estimator does not rely on the assumption of normally distributed errors but instead depends on valid moment conditions (Arellano & Bond, 1991).

Furthermore, the Hansen J-statistic yields a probability value of 0.394788, indicating failure to reject the null hypothesis of instrument validity. This confirms that the instruments used in the GMM estimation are appropriate, exogenous, and free from over-identification bias. The result also suggests the absence of instrument proliferation, thereby reinforcing the robustness of the estimates (Roodman, 2009).

The Arellano–Bond serial correlation tests (Appendix 10) show statistically significant first-order autocorrelation (AR(1): $p < 0.05$), which is expected in first-differenced models, and no second-order autocorrelation (AR(2): $p > 0.05$), confirming the consistency of the GMM estimator and the validity of moment conditions (Arellano & Bond, 1991).

The positive and statistically significant effect of FDI on trade balance supports the export-enhancing hypothesis of FDI, which argues that foreign investment improves productive efficiency, facilitates technology transfer, and strengthens integration into global value chains (Markusen & Venables, 1999). This finding is consistent with Borensztein et al. (1998) and Abbes et al. (2015), who emphasize the export-boosting potential of FDI in developing economies.

However, despite statistical significance, the magnitude of the effect remains relatively modest. This limited economic impact can be explained by structural constraints in Sub-Saharan Africa, including low levels of industrialization, weak forward and backward linkages between foreign firms and domestic enterprises, limited absorptive capacity, and high dependence on imported intermediate and capital goods. As a result, a substantial portion of FDI inflows does not fully translate into sustained improvements in the trade balance. The persistence of the trade balance, as indicated by the significant lagged dependent variable, further reinforces the presence of structural rigidities such as narrow export bases, inadequate infrastructure, and import dependency, which dampen the overall impact of FDI. These findings therefore suggest that while FDI contributes positively to trade balance improvement, its effectiveness is conditional on structural transformation and complementary domestic policies that enhance productive capacity and export diversification in Sub-Saharan Africa.

5. Conclusion and Recommendations

Limitations

Despite the methodological rigor and robustness of the empirical strategy, this study is subject to several limitations relating to research design, sample selection, data, and analytical procedures, which should be considered when interpreting the findings.

Firstly, the study adopts a quantitative panel data design, which, while suitable for capturing macro-level relationships, inherently abstracts from country-specific institutional, political, and structural nuances that may influence the FDI–trade balance nexus. Such aggregation may mask heterogeneity across countries, particularly in SSA, where economies differ significantly in terms of resource endowments, policy regimes, and stages of development (Baltagi, 2021). Consequently, the findings may not fully capture micro-level dynamics or sector-specific effects of FDI.

Secondly, the use of purposive sampling to select 20 SSA countries based on data availability introduces potential sample selection bias. Countries with incomplete or inconsistent data are excluded, which may systematically omit fragile or conflict-affected economies where the FDI–trade relationship could differ markedly. This limits the generalizability of the results to the entire SSA region (Wooldridge, 2010).

Thirdly, the study relies on secondary data obtained from the World Bank's World Development Indicators. While widely and standardized, such data may be subject to measurement errors, reporting inconsistencies, and revisions over time, particularly in developing economies with weaker statistical systems (Jerven, 2013). In addition, key variables such as trade balance and FDI are measured in aggregate terms, which constrains the ability to distinguish between different types of FDI (e.g., greenfield vs. mergers and acquisitions) and their potentially divergent effects on trade outcomes.

Fourthly, although the GMM estimator effectively addresses endogeneity and dynamic panel bias, it is not without limitations. The validity of GMM estimates depends critically on the strength and appropriateness of the instruments used. While the Hansen test suggests that the instruments are valid, there remains a risk of weak instruments or instrument proliferation, which can bias estimates and reduce efficiency (Roodman, 2009). Moreover, GMM estimators can be sensitive to model specification and lag structure choices.

Fifthly, the study does not explicitly account for structural breaks, policy regime shifts, or global shocks such as commodity price fluctuations or financial crises that may have influenced both FDI inflows and trade balance during the study period. Ignoring such factors may lead to omitted variable bias and affect the stability of the estimated relationships (Perron, 1989).

Lastly, the analysis focuses primarily on the direct relationship between FDI and trade balance, with limited exploration of transmission channels such as technology spillovers, export diversification, and value chain integration. As a result, the study may not fully capture the mechanisms through which FDI influences external sector performance.

Conclusion

We set out to examine the relationship between FDI and trade balance in SSA within a dynamic panel framework. Drawing on contemporary data and robust econometric techniques, we provide important insights into how external capital inflows interact with the region's external sector performance.

Overall, we establish that FDI constitutes a meaningful, though not singular, driver of trade balance outcomes in SSA. Our findings underscore that the effectiveness of FDI in improving external balances is fundamentally conditioned by the structural characteristics of host economies, including the degree of export diversification, the strength of domestic productive capacity, and the quality of supporting infrastructure. In this regard, FDI should not be viewed merely as a source of capital inflows, but as a strategic instrument whose developmental impact depends on its alignment with broader economic transformation objectives (Borensztein et al., 1998; UNCTAD, 2019).

Our study further highlights the dynamic nature of trade balance adjustment in SSA, reflecting persistent structural rigidities and gradual responses to policy and external shocks. This persistence points to the need for sustained and coordinated policy interventions rather than short-term measures. It also reinforces the argument that improving trade balance is a cumulative process shaped by both historical conditions and current economic policies (Baltagi, 2021).

Importantly, our study contributes to the ongoing debate by demonstrating that while FDI can support external sector improvement, its impact is neither automatic nor uniform across countries. Instead, it is influenced by absorptive capacity, institutional quality, and the sectoral composition of investment. This finding aligns with the broader development literature, which emphasizes the complementary role of domestic policies in maximizing the benefits of globalization (Alfaro et al., 2010).

In sum, the study advances the understanding of the FDI–trade balance nexus in SSA by integrating theory, empirics, and policy considerations. It calls for a strategic reorientation of investment policies toward productivity-enhancing and export-oriented activities, alongside efforts to strengthen domestic capabilities. Such an approach is essential for translating FDI inflows into sustainable improvements in trade balance and long-term economic development.

Recommendations

Drawing from the study's findings on the FDI–trade balance nexus in SSA, this section presents policy, programmatic, and research recommendations aimed at enhancing the contribution of FDI to external sector performance and sustainable development.

Firstly, governments in SSA should prioritize attracting export-oriented and productivity-enhancing FDI rather than purely market-seeking or extractive investments. This can be achieved through targeted investment policies, fiscal incentives, and the establishment of special economic zones that promote manufacturing and value addition. Evidence suggests that export-oriented FDI is more likely to improve trade balance by expanding domestic production and exports (Markusen & Venables, 1999; UNCTAD, 2019).

Secondly, policymakers should strengthen domestic absorptive capacity by investing in human capital, infrastructure, and technological capabilities. The effectiveness of FDI in improving trade outcomes depends critically on the host country's ability to absorb and utilize foreign technologies and managerial skills

(Borensztein et al., 1998). Improved infrastructure, particularly in transport, energy, and digital systems, can reduce production costs and enhance export competitiveness.

Thirdly, SSA countries should implement complementary trade and industrial policies that promote export diversification and reduce import dependence. This includes supporting local industries, encouraging backward and forward linkages between foreign and domestic firms, and fostering participation in global value chains. Such measures enhance the spillover effects of FDI and strengthen the structural transformation of economies (Alfaro et al., 2010).

Fourthly, maintaining macroeconomic stability, including stable exchange rates, low inflation, and prudent fiscal management, is essential for sustaining the positive effects of FDI on the trade balance. Macroeconomic instability can undermine investor confidence and distort trade dynamics, thereby weakening the potential benefits of FDI (Aizenman & Noy, 2006).

At the program level, governments and regional bodies should design and implement investment facilitation programs that streamline regulatory procedures, reduce bureaucratic barriers, and improve the ease of doing business. Transparent and predictable regulatory frameworks are critical in attracting high-quality FDI.

Additionally, there is a need to promote sector-specific investment programs, particularly in agro-processing, manufacturing, and services, where SSA has comparative advantages. These programs should focus on enhancing value addition, improving supply chain efficiency, and increasing export capacity.

Regional integration initiatives, such as the African Continental Free Trade Area (AfCFTA), should be leveraged to create larger and more integrated markets, thereby attracting FDI that targets regional value chains rather than fragmented national markets. This can significantly enhance trade competitiveness and reduce structural trade imbalances.

Future research could extend the current study by incorporating disaggregated sectoral data to distinguish between different types of FDI (e.g., manufacturing vs. extractive industries) and their differential impacts on trade balance. Such analysis would provide deeper insights into the channels through which FDI influences external sector performance.

Further studies could also explore country-specific case studies or adopt mixed-method approaches to capture institutional, political, and structural factors that are not easily quantified in macro-panel models. This would complement the findings of this study and provide more nuanced policy guidance.

More still, future research could consider the role of emerging factors, such as digital trade, green investment, and global value chain reconfigurations, in shaping the FDI–trade balance relationship. These factors are increasingly relevant in the evolving global economic landscape.

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Appendices

Appendix 1: Descriptive statistics

	LNTB	LNFDI
Mean	22.78683	19.74268
Median	22.72746	19.73548
Maximum	26.52293	24.42848
Minimum	20.05782	14.39035
Std. Dev.	1.315174	1.427882
Skewness	0.558564	-0.138906
Kurtosis	3.541903	3.826509
Jarque-Bera	25.69394	12.67161
Probability	0.000003	0.001772
Sum	9114.733	7897.07
Sum Sq. Dev.	690.1437	813.5001
Observations	400	400

Appendix 2: Unit root test, LNTB (in Level)

Panel unit root test: Summary

Series: LNTB

Date: 04/06/26 Time: 08:36

Sample: 2005 2024

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.36325	0.0004	20	360
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.78989	0.2148	20	360
ADF - Fisher Chi-square	50.4277	0.1249	20	360
PP - Fisher Chi-square	58.0121	0.0326	20	380

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Appendix 3: Unit root test, LNTB (in First Difference)

Panel unit root test: Summary

Series: D(LNTB)

Date: 04/06/26 Time: 08:38

Sample: 2005 2024

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.17086	0.0000	20	340
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.35184	0.0000	20	340
ADF - Fisher Chi-square	112.028	0.0000	20	340
PP - Fisher Chi-square	146.681	0.0000	20	360

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Appendix 4: Unit root test, LNFDI (in Level)

Panel unit root test: Summary

Series: LNFDI

Date: 04/06/26 Time: 08:39

Sample: 2005 2024

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.21843	0.5865	20	360
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.30251	0.0964	20	360
ADF - Fisher Chi-square	67.1179	0.0046	20	360
PP - Fisher Chi-square	86.3939	0.0000	20	380

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Appendix 5: Unit root test, LNFDI (in First Difference)

Panel unit root test: Summary

Series: D(LNFDI)

Date: 04/06/26 Time: 08:42

Sample: 2005 2024

Exogenous variables: Individual effects

User-specified lags: 1

Newey-West automatic bandwidth selection and Bartlett kernel Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.97847	0.0000	20	340

Null: Unit root (assumes individual unit root process)

Im, Pesaran and Shin W-stat	-7.91604	0.0000	20	340
ADF - Fisher Chi-square	143.440	0.0000	20	340
PP - Fisher Chi-square	378.024	0.0000	20	360

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Appendix 6: Generalized Method of Moments regression results

Dependent Variable: D(LNTB)

Method: Panel Generalized Method of Moments

Transformation: First Differences

Date: 04/06/26 Time: 09:05

Sample (adjusted): 2008 2024

Periods included: 17

Cross-sections included: 20

Total panel (balanced) observations: 340

White period (period correlation) instrument weighting matrix

White period (cross-section cluster) standard errors & covariance (d.f. corrected)

Standard error and t-statistic probabilities adjusted for clustering

Instrument specification: @DYN(D(LNTB),-2) (-1)

Constant added to instrument list.

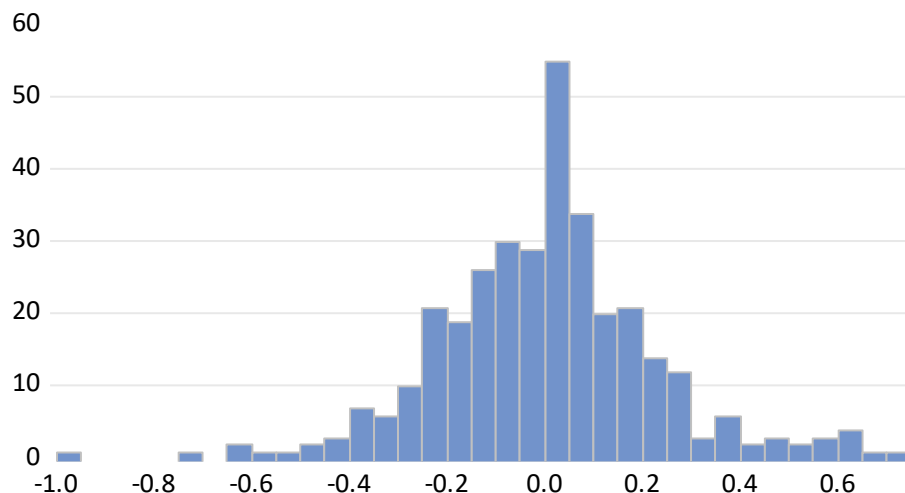
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNTB(-1))	0.261720	0.011367	23.02365	0.0000
D(LNFDI)	0.103497	0.011011	9.399820	0.0000

Effects Specification

Cross-section fixed (first differences)

Mean dependent var	-0.003348	S.D. dependent var	0.206568
S.E. of regression	0.227847	Sum squared resid	17.54695
J-statistic	18.95195	Instrument rank	20
Prob(J-statistic)	0.394788		

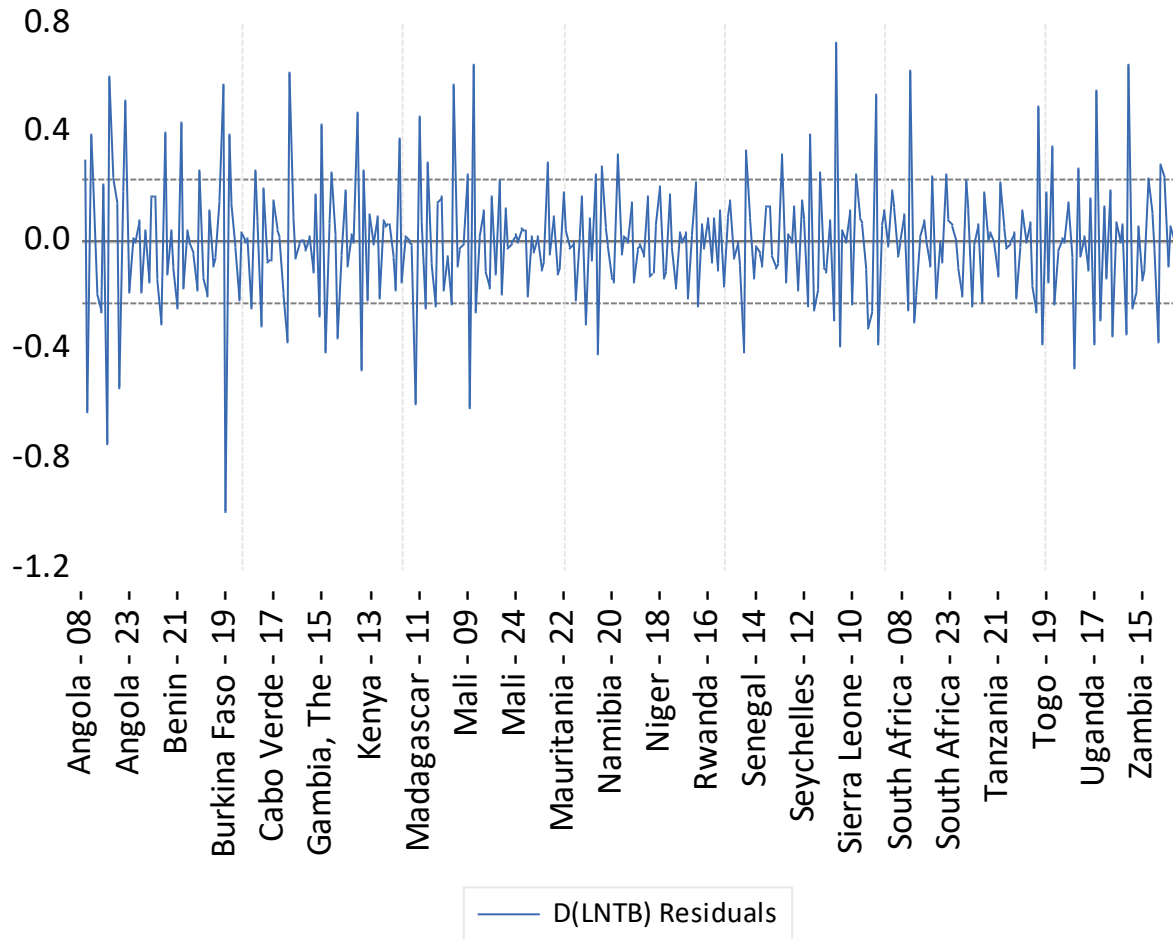
Appendix 7: Normality test



Series: Standardized Residuals
Sample 2008 2024
Observations 340

Mean 0.000804
Median 0.000000
Maximum 0.730893
Minimum -0.992795
Std. Dev. 0.227509
Skewness 0.043946
Kurtosis 4.802798

Jarque-Bera 46.15227
Probability 0.000000

Appendix 8: Graph of residuals**Appendix 9: List of Sub-Saharan Africa countries in the study**

Angola	Gambia, The	Mauritania	Senegal	Tanzania
Benin	Kenya	Namibia	Seychelles	Togo
Burkina Faso	Madagascar	Niger	Sierra Leone	Uganda
Cabo Verde	Mali	Rwanda	South Africa	Zambia

Appendix 10: Serial Correlation Test

Arellano-Bond Serial Correlation Test

Equation: Untitled

Date: 06/08/26 Time: 14:03

Sample: 2005 2024

Included observations: 340

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-3.657367	-8.833164	2.415170	0.0003
AR(2)	-0.332117	-0.342711	1.031901	0.7398