# The impact of foreign direct investment on the international competitiveness of the agricultural sector in Tanzania

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**Abstract.** The agricultural sector in Tanzania, being an important source of employment, production and exports, is one of the key sectors for the country's economy, and being a promising direction for foreign direct investment (FDI), it has the opportunity to further modernize and increase its productivity. The aim of this paper is to investigate the interaction between Foreign Direct Investment (FDI) in Tanzania, the investment attractiveness of the agricultural sector, the relative comparative advantage (RCA) in agricultural exports and GDP. This will allow to assess the impact of FDI on the competitiveness of the agricultural sector in Tanzania. The paper uses the Vector Error Correction Model (VECM), Granger causality test and impulse response function analysis. The modelling is carried out on the basis of data covering the period 1999–2022 and coming from the integrated database of the World Integrated Trade Solution (WITS) and World Bank Group. Based on the research results, it can be concluded that the increase in FDI stocks is conducive to the development of the agricultural sector in Tanzania. Inward FDI stocks do not improve its competitiveness in the long or short term. This article can be considered as filling the methodological and empirical gap in the research on the relationship between FDI and the international competitiveness of the agricultural sector in Tanzania. The novelty of this study is the use of the investment attractiveness index in the study of the Tanzanian agricultural sector. This indicator can be considered as a kind of barometer of the effectiveness of investment policy and can be the basis for creating predictive and reporting tools useful for both investors and policy makers.
**Keywords:** FDI, RCA, GDP, Tanzania, agriculture sector, VECM
**JEL:** O11, F40, C51

# Wpływ bezpośrednich inwestycji zagranicznych na międzynarodową konkurencyjność sektora rolniczego Tanzanii

**Streszczenie.** Sektor rolniczy Tanzanii będąc ważnym źródłem zatrudnienia, produkcji i eksportu jest jednym z kluczowych dla gospodarki tego kraju, a stanowiąc perspektywiczny kierunek dla bezpośrednich inwestycji zagranicznych (BIZ) ma szansę na dalszą modernizację i zwiększenie swojej

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produktywności. Celem niniejszego artykułu jest zbadanie interakcji między bezpośrednimi inwestycjami zagranicznymi (BIZ) w sektorze rolniczym w Tanzanii, atrakcyjnością inwestycyjną tego sektora, względną przewagą komparatywną (RCA) w eksporcie produktów rolnych oraz PKB. Pozwoli to na ocenę wpływu BIZ na konkurencyjność sektora rolniczego w Tanzanii. W artykule zastosowano model wektorowej korekty błędem (VECM), test przyczynowości Grangera i analizę funkcji odpowiedzi na impuls. Modelowanie przeprowadzono na podstawie danych obejmujących lata 1999–2022 i pochodzących ze zintegrowanej bazy danych World Integrated Trade Solution (WITS) i World Bank Group. Na podstawie wyników badania można stwierdzić, że wzrost zasobów BIZ sprzyja rozwojowi sektora rolniczego w Tanzanii. BIZ nie poprawiają jego konkurencyjności w długim ani w krótkim okresie. Niniejszy artykuł można uznać za uzupełnienie luki metodologicznej i luki empirycznej w badaniach relacji między BIZ oraz międzynarodową konkurencyjnością sektora rolniczego w Tanzanii. Za nowość w tym opracowaniu należy uznać zastosowanie indeksu atrakcyjności inwestycyjnej w badaniu tanzańskiego sektora rolniczego. Wskaźnik ten można uznać jako swego rodzaju barometr skuteczności polityki inwestycyjnej i może on być podstawą tworzenia narzędzi predykcyjnych i raportowania przydatnych zarówno dla inwestorów jak i decydentów politycznych.

**Słowa kluczowe:** BIZ, RCA, PKB, Tanzania, sektor rolniczy, VECM

# 1. Introduction

Agriculture is the dominant sector of the Tanzanian economy, providing employment for about 65% of the population. It generates almost 1/3 of the country's Gross Domestic Product (GDP), which gives it second place after the services sector. Agriculture is not only the food base for the country's inhabitants, but also significantly supports its exports, which has a direct impact on the trade balance. The strong international position of Tanzanian agriculture compared to other African countries is confirmed, for example, by Mabeta (2025). The most important export products of Tanzanian agriculture include coffee, tea, cotton, cloves, tobacco and cashew nuts. It is worth noting that the export of agricultural products could be even greater, but recently it has been severely limited by strict international sanitary and phytosanitary regulations (Luhwago et al., 2023). Improving the quality and efficiency of agricultural production in Tanzania can overcome these limitations, which will strengthen its role in generating economic growth. However, this requires the modernization of the agricultural economy, which is difficult to carry out in the short term without external investors. The agricultural sector in Tanzania has been very attractive to foreign investors for many years. In recent decades, in particular, it has attracted significant foreign direct investment (FDI), which has contributed to strengthening supply chains and increasing the intensity of agricultural production.

The magnet attracting foreign investment is the great wealth of natural resources in Tanzania, which consists of relatively abundant arable soils, including fertile soils (mainly volcanic located in mountainous regions, e.g. around Kilimanjaro and alluvial located in river valleys), a favorable climate occurring in various varieties conducive to multidirectional agricultural production, rich hydrological resources providing opportunities for the expansion of irrigation systems for agricultural crops (thanks to numerous rivers and lakes), as well as the availability of cheap labour force. Foreign investment in the agricultural sector would not have been possible without the economic reforms in Tanzania, which ultimately enabled the private sector to engage in economic activity first, and then opened the country to the inflow of foreign capital. The inflow of FDI was also supported by Tanzania's achievement of economic and political stability. FDI resources in Tanzania's agricultural sector in 2019 and 2020 exceeded USD 1.5 billion, which constituted over 10% of the total FDI resources in Tanzania (Bank of Tanzania, 2023). In the following two years, these resources decreased by half, but were still almost twice as large as, for example, construction. A significant part of investment in the agricultural sector is directed to the sisal, sugar cane and barley sub-sectors, which, as shown by Msuya (2007), significantly improved the productivity of not only large enterprises with foreign capital, but also small farmers, who dominate in Tanzania. It should also be emphasized that the progress in Tanzania's agriculture made thanks to the inflow of FDI can significantly improve the quality of life of the country's inhabitants and reduce the sphere of poverty.

FDI inflow clearly creates economic growth in Tanzania, but it is necessary to study that will answer two key research questions: what is the impact of FDI in the agricultural sector and is there a feedback mechanism, i.e. does economic growth also stimulate FDI inflow? Tanzania exports a large part of agricultural products, which probably makes export an important factor in Tanzania's economic growth. This indicates the need to also include export competitiveness in such research and highlight its share in relations with FDI and GDP. There are practically no such studies related to the agricultural sector of Tanzania in the literature. This article attempts to fill this research niche.

The aim of this paper is to investigate the interaction between FDI in Tanzania, the investment attractiveness of the agricultural sector, the relative comparative advantage (RCA) in agricultural exports and GDP. This will allow us to verify the following research hypothesis: the increase in FDI stocks strengthens the competitiveness of the agricultural sector in Tanzania. For this purpose, the Vector Error Correction Model (VECM) will be used. The modelling results are supplemented with the analysis of the course of the FDI impulse response function, and the Granger causality test.

## 2. Literature review

The review of scientific research indicates that among the many research trends devoted to the relations between FDI and the economy, the dominant trends are those devoted to identifying macroeconomic and microeconomic factors attracting FDI and those devoted to examining the impact of FDI on the economy of the country receiving this form of investment. Among the numerous factors determining the inflow of FDI, the literature recurs, among others, the level of economic development and its dynamics, the degree of openness of the economy, its internationalization, transport, energy and telecommunications infrastructure, and the level of technological development, human capital, investment and trade policy, economic and political stability, friendly legal and administrative regulations. The second of the mentioned trends examines various effects brought about by the inflow of FDI on the economy of the country. The subject of the research are both positive effects including technology transfer, job creation, stimulating economic growth and exports, or the so-called spillover effects, as well as negative effects including the elimination of domestic enterprises from the market, transfer of taxes abroad, devastation of the natural environment. Probably the most research concerns the relationship between FDI and GDP.

Vintilă and Mocanu (2023), using panel data regression models and the Granger causality test, conducted an analysis of bilateral relationships between these categories in the period 1997–2020 in emerging European countries. They showed a generally positive impact of foreign direct investment on economic growth in the analysed period, and the relationship in the opposite direction appears only when using a high order of lag variables. Bakirtas and Alpdoğan (2020) studied the economies of the following countries: Brazil, Russia, India, China, and Turkey, in the years 1992–2013 and proved the existence of a positive relationship between gross domestic product and foreign direct investment. In examining the causality of variables, they used Dumitrescu and Hurlin's heterogeneous causality tests for panel data (Dumitrescu & Hurlin, 2012) and the classic Granger causality test. The Granger causality test indicated a unidirectional relationship between gross domestic product and foreign direct investment, while the Dumitrescu-Hurlin procedure showed a bidirectional relationship. The Granger causality test was also used by Sunde (2017), who analysed the dynamic three-way relationships between FDI, exports, and GDP in the South African economy in the years 1990–2014. Due to the cointegration of variables, the author modelled the relationship between them using the Vector Error Correction Model (VECM). He proved, among other things, the existence of

unidirectional causality from foreign direct investment to economic growth, as well as from investment to exports, and a bidirectional relationship between economic growth and exports.

The positive impact of FDI on economic growth was also shown by Tahir et al. (2019), who studied the economies of countries belonging to the South Asian Association for Regional Cooperation in the years 2008–2015. The authors also used the tools of panel econometrics using the fixed effects (FE) estimator. Pečarić et al. (2021) used the VAR model to study the impact of FDI in Croatia on economic growth. They proved that there is a clear impact of GDP dynamics on FDI, while the impact of FDI on the rate of economic growth in Croatia is small. In turn, the bidirectional relationship between FDI and GDP was proven in their research by Adali and Yüksel (2017). They analysed the economies of 30 developing countries using and also used the tools of panel data econometrics with the causality test Dumitrescu and Hurlin (2012). Hanafy and Marktanner (2019) studied the impact of FDI in the services sector on economic growth in Egypt in relation to domestic private investment. They showed that reaching a minimum threshold of domestic private investment enabling the absorption of foreign knowledge and technology determines the stimulation of economic growth by FDI. Iamsiraroj and Ulubaşoğlu (2015), using meta-regression analysis conducted on the basis of research results published in several hundred scientific publications, showed that the strength of the impact of FDI on economic growth depends mainly on the absorption capacity of the economy of the FDI receiving country. Their study covered 140 countries in the years 1970–2009 and proved that the impact of investment on economic growth is generally positive. Makiela and Ouattara (2018) used a combination of Bayesian approach and Generalized Method of Moments (GMM) estimator in econometric modelling of the relationship between economic growth and foreign direct investment. They also showed a positive impact of FDI on economic growth in both developing and developed countries.

There are studies that indicate that in certain circumstances, FDI not only does not stimulate economic growth in some economies or sectors, but actually limits it. Alvarado et al. (2017) used panel econometric tools to analyse the impact of foreign direct investment (FDI) on economic growth in 19 Latin American countries between 1980 and 2014. They showed that FDI is not an appropriate mechanism for accelerating economic growth in this region, except for high-income countries. They proved that in upper-middle-income countries, the effect of FDI on GDP is uneven and insignificant, while in lower-middle-income countries it is negative and statistically significant. Meniago and Lartey (2021) also showed that FDI inflows are a destimulant for both economic growth and total factor productivity (TFP) in these countries using a panel of 25 Sub-Saharan African countries based on data from 1980–2014. The authors

used panel regression models and the GMM estimator in their study. Mohamed and Abdulle (2023) showed that shocks in FDI flows to Somalia have an ambiguous effect on the economic growth in this country. Positive shocks to FDI enhance economic growth in Tanzania, but negative shocks reduce economic growth in this country. The authors used the Nonlinear Autoregressive Distributed Lag (NARDL) model using macroeconomic data on the Somali economy from 1971 to 2021. The ambiguous effect of sectoral FDI on the economic growth of European countries was also demonstrated by Sokhanvar (2019). Using the Vector Autoregression Model (VAR), Block Exogenity Wald Tests and the impulse response function, he showed that in five out of seven European Union countries FDI has a negative impact on economic growth.

Foreign trade, especially exports, is also an important area of FDI impact. The relationship between these variables can be complementary or substitutive. Theoretical foundations explaining the impact of FDI on exports can be found in numerous theories, such as Kojima (1975), Porter (1990), and dynamic comparative advantage (Ozawa, 1992). The review of empirical studies indicates that the impact of FDI on the exports of the host country is usually positive. Prasanna (2010) used macroeconomic data on the Indian economy from the periods 1991–1992 and 2006–2007 and using econometric models proved that incoming FDI contributed significantly to the improvement of the export performance of this country in the period under study, but at the same time the Indian manufacturing industry did not stimulate export performance. Kastratović (2024) used panel data on 80 developing countries from the period 2005–2017 and estimated a dynamic model of agricultural exports. Based on the obtained results, he proved that FDI inflows have a positive impact on agricultural exports in both the short and long term. Islam (2022) analysed the economy of Bangladesh from 1995 to 2020. Using the VECM, he also confirmed that export revenues have a statistically significant positive relationship with FDI inflows in the long term, while in the short term this relationship was not clearly confirmed. However, studies do not always confirm the positive impact of FDI on exports. For example, Mohanty and Sethi (2019), examining export results in India in the period 1980–2017, proved that there is a negative impact of FDI on actual exports in the long term, and the way FDI affects exporters depends on the economic sectors of the country. The positive impact of FDI on export competitiveness in Sub-Saharan African economies was also confirmed by Gamariel and Hove (2019). Using the S-GMM methodology for a dynamic panel data model, they demonstrated that this is achieved through the impact of FDI on human capital and domestic productivity.

The literature review leads to the conclusion that both the direction and the strength of the impact of the considered macroeconomic variables depend on numerous conditions that occur in the economies of host countries. Since these conditions change over time, it is advisable to update the results of research on the relationships between these important categories, which will enable effective monitoring of economic development and the formulation of current recommendations and guidelines for decision-makers responsible for the shape of the country's economic policy. It is also worth noting that most empirical studies usually refer to entire economies of countries. There are significantly fewer studies that take into account the relationships between FDI, GDP in a sectoral approach, taking into account other macroeconomic variables, e.g. exports, and those that refer to the economies of African countries are rare. This issue is addressed to some extent in relation to Tanzania in the works of Diyamett et al. (2012), Diyamett and Mutambla (2014), Msuya (2007), but authors limited the empirical research to a minimum, avoiding the application of even basic statistical and econometric tools that would allow for a causal analysis. This article attempts to fill this research gap.

## 3. Research method

The international competitiveness of the agricultural sector can be measured using various indicators, but due to the limited availability of macroeconomic data on this sector in Tanzania, the following indicators were finally considered: Reveal Comparative Advantage (RCA) (Balassa, 1965), the investment attractiveness of this sector and the GDP generated in this sector and the stocks of foreign direct investment invested in it. The relationships between these categories were modeled using the VECM due to the cointegration between the time series of these variables (confirmed by the Johansen test, 1991, 1992). In addition to the VECM equations for short-term relationships, cointegrating equations were also presented, which allowed us to analyse the long-term relationships between variables. The nature of causality between variables was tested using the Granger test, and the response of variables to a shock change in foreign direct investment was presented using the impulse response function.

In this paper, the Revealed Comparative Advantage (RCA) of the agricultural sector was calculated using the following formula:

$$RCA_A = \frac{Ex_{AT}}{Ex_T} \cdot \frac{Ex^R}{Ex_A^R}, \tag{1}$$

where:

$RCA_A$ – is the value of Revealed Comparative Advantage in the agricultural sector,

$Ex_{AT}$ – is the value of exports of the agricultural sector in Tanzania,

$Ex_T$ – is the total value of exports in Tanzania,

$Ex^R$ – is the total value of exports in the reference countries,

$Ex_A^R$ – is the export value of the agricultural sector in the reference countries.

The RCA index greater than 1 indicates a comparative advantage in agricultural exports, while values less than 1 indicate a lack of such an advantage. When calculating the RCA index, all countries in the world were treated as a reference group. In calculating this indicator, a two-digit level of disaggregation of goods was used in accordance with the Standard International Trade Classification (SITC).

The investment attractiveness of the agricultural sector was measured using the RCIA investment attractiveness index, the construction of which is analogous to the construction of the RCA index.

$$RCIA_A = \frac{FDI_{AT}}{FDI_T} : \frac{FDI^R}{FDI_A^R}, \tag{2}$$

where:

$RCIA_A$ – is the value of investment attractiveness index in the agricultural sector,

$FDI_{AT}$ – is the value of inward FDI stocks in the agricultural sector in Tanzania,

$FDI_T$ – is the total value of inward FDI stocks in Tanzania,

$FDI^R$ – is total inward FDI stocks in the reference countries,

$FDI_A^R$ – is the value of inward FDI stocks in the agriculture sector in the reference countries.

The interpretation of the RCIA index is analogous to the RCA index and its values greater than 1 indicate the investment attractiveness of the sector, and values less than 1 indicate the lack of such attractiveness. When calculating the RCIA index value, all countries of the world were treated as a reference group. RCIA index can be a very practical analytical and decision-making tool for economic policy. Thanks to its simple interpretation and international comparison capabilities, it has the potential to: support the allocation of public resources, monitor the effectiveness of investment policies, support strategic planning, and serve as a basis for building predictive and reporting tools. The proposed RCIA index can also serve as an early

warning indicator (announcing deteriorating investment conditions) informing decision-makers about the need to revise investment policy.

The VECM presenting the relationship between variables in the agricultural sector of Tanzania has the following form:

$$\Delta lnGDP_t = \alpha_0 + \sum_{j=1}^{p} \alpha_{1j}\Delta GDP_{t-j} + \sum_{j=1}^{q} \alpha_{2j}\Delta FDI_{t-j} + + \sum_{j=1}^{r} \alpha_{3j}\Delta RCIA_{t-j} +$$
$$\sum_{j=1}^{s} \alpha_{4j}\Delta RCA_{t-j} + \gamma_1 ECT_{t-1} + \varepsilon_{1t} \tag{3}$$

$$\Delta lnFDI_t = \beta_0 + \sum_{j=1}^{p} \beta_{1j}\Delta GDP_{t-j} + \sum_{j=1}^{q} \beta_{2j}\Delta FDI_{t-j} + + \sum_{j=1}^{r} \beta_{3j}\Delta RCIA_{t-j} +$$
$$\sum_{j=1}^{s} \beta_{4j}\Delta RCA_{t-j} + \gamma_2 ECT_{t-1} + \varepsilon_{2t} \tag{4}$$

$$\Delta lnRCIA_t = \delta_0 + \sum_{j=1}^{p} \delta_{1j}\Delta GDP_{t-j} + \sum_{j=1}^{q} \delta_{2j}\Delta FDI_{t-j} + + \sum_{j=1}^{r} \delta_{3j}\Delta RCIA_{t-j} +$$
$$\sum_{j=1}^{s} \delta_{4j}\Delta RCA_{t-j} + \gamma_3 ECT_{t-1} + \varepsilon_{3t} \tag{5}$$

$$\Delta lnRCA_t = \mu_0 + \sum_{j=1}^{p} \mu_{1j}\Delta GDP_{t-j} + \sum_{j=1}^{q} \mu_{2j}\Delta FDI_{t-j} + + \sum_{j=1}^{r} \mu_{3j}\Delta RCIA_{t-j} +$$
$$\sum_{j=1}^{s} \mu_{4j}\Delta RCA_{t-j} + \gamma_4 ECT_{t-1} + \varepsilon_{4t} \tag{6}$$

where:

$ECT$ – error correction term.

The modelling was carried out on the basis of data covering the years 1999–2022. The choice of such a time window was determined by the availability of complete and comparable data. Data from the integrated database of the World Integrated Trade Solution (WITS, https://wits.worldbank.org) were used to calculate the competitiveness indicators of Tanzania's agriculture (RCA). WITS combines the data resources of the following organizations: The World Bank, United Nations Conference on Trade and Development (UNCTAD), International Trade Center, United Nations Statistical Division (UNSD) and the World Trade Organization (WTO). The remaining data was obtained from the World Bank Group database (https://databank.worldbank.org).

## 4. Results

Table 1 presents descriptive statistics of the values of variables used in the analysis: FDI stocks (in millions USD), GDP of Tanzania (in millions USD), RCA and RCIA.

**Table 1**. Descriptive statistics for FDI, GDP, RCA and RCIA variables

| Statistics | FDI | GDP | RCA | RCIA |
|---|---|---|---|---|
| Mean | 9416 | 37028.167 | 16.194 | -0.113 |
| SE (Mean) | 1075.774 | 4181.976 | 1.328 | 0.105 |
| Median | 10281.5 | 33967.000 | 17.647 | -0.124 |
| Standard dev. | 5270.195 | 20487.413 | 6.505 | 0.525 |
| Kurtosis | -1.334 | -1.209 | -1.181 | -0.442 |
| Skewness | 0.110 | 0.316 | -0.333 | 0.160 |
| Min | 1989 | 12056 | 4.009 | -0.989 |
| Max | 18634 | 76140 | 25.333 | 1.093 |

Source: author's study.

Figure 1 illustrates the time series of logarithmised variables (the logarithm operation allowed to stabilise the variance of variables and thus reduce non-stationarity in the time series).

**Figure 1.** Time series graph of lnFDI, lnGDP, lnRCA and lnRCIA
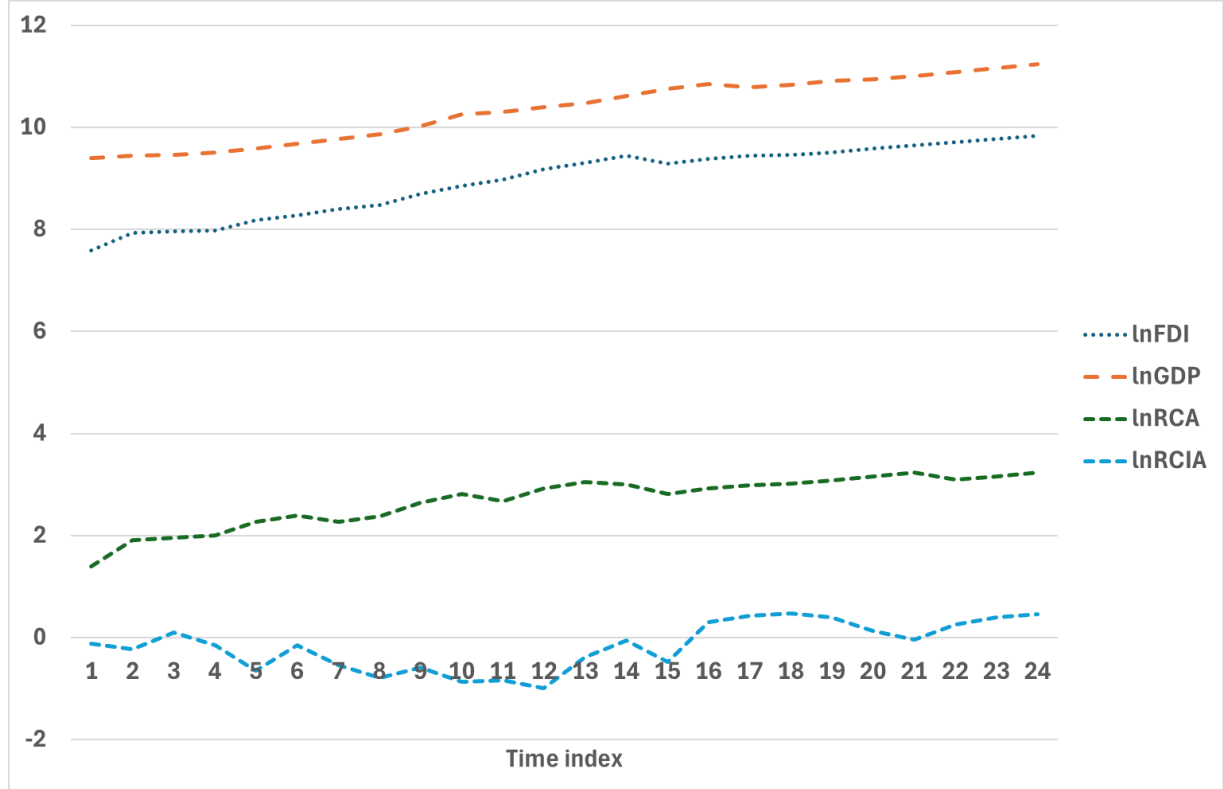


Source: author's study.

In the first step, the logarithmization of GDP, RCIA, RCA and FDI variables was performed, thanks to which the obtained time series were more stable. Then, the stationarity of the time series of the logarithmised variables was tested using the Dickey-Fuller test (ADF test). The results of this test are presented in Table 2.

**Table 2.** ADF test results for time series of macroeconomic variables in the agricultural sector

| Variable name | Variable symbol | ADF test results for | |
| --- | --- | --- | --- |
| | | original variable | first differences of the variable |
| Gross Domestic Product | lnGDP | -0.1273 (0.6321) | -5.3427 (0.0001) |
| Foreign Direct Investment | lnFDI | -0.2109 (0.6024) | -5.1756 (0.0000) |
| Revealed Comparative Investment Attractiveness Index | lnRCIA | -0.7439 (0.3862) | -4.1013 (0.0032) |
| Index of Revealed Comparative Advantage | lnRCA | -0.5124 (0.4502) | -6.7249 (0.0000) |

Source: author's calculation (*p*-values are given in brackets).

As can be seen, the time series before the first differences were calculated were not stationary, and after their calculation they are stationary. Therefore, the time series of the studied variables are integrated in the first degree. Based on the AIC and BIC information criteria (Maddala & Lahiri, 2007), it was assumed that the optimal order of lag of variables is equal to 2 (he lowest values of both criteria are obtained at a delay of 2) (Table 3).

**Table 3.** Information criteria results

| Lag order | AIC | BIC |
| --- | --- | --- |
| 0 | 159.1427 | 163.5211 |
| 1 | 147.2154 | 155.9276 |
| 2 | 130.4077 | 153.9687 |
| 3 | 139.5421 | 217.952 |

Source: author's calculation

The trace test and the maximum eigenvalue test (Johansen, 1991, 1992) were used to examine the cointegration of time series, the results of which are presented in Table 4. The results of these tests prove that at the significance level of 0.05, the variables exhibit cointegration of order 1.

**Table 4.** Time series cointegration test results in Tanzania's agricultural sector

| Statistical hypotheses regarding the number of cointegrating vectors $r$ | Order of cointegration | Eigenvalue | Trace test | Lmax test |
| --- | --- | --- | --- | --- |
| $H_0$: r=0 $H_1$: r>0 | 0 | 0.8946 | 116.76*** | 69.74** |
| $H_0$: r=1 $H_1$: r>1 | 1 | 0.5709 | 47.024 | 26.229 |
| $H_0$: r=2 $H_1$: r>2 | 2 | 0.4341 | 20.796 | 17.647 |
| $H_0$: r=3 $H_1$: r>3 | 3 | 0.0966 | 3.1487 | 3.1487 |

Note. The symbols *, **, *** mark the significance of parameters at the level of 10%, 5% and 1%, respectively.
Source: author's calculation.

The trend component was omitted in the VECM because initial estimates of the model with trend indicated that it was not statistically significant and weakened the estimation efficiency and worsened the results of the model diagnostic tests. The final results of estimating the parameters of the VECM(1) l in the Tanzanian agricultural sector are presented in Table 5. To test the model's stability, a unit root test was used. Figure 2 shows one point lying on a circle with a unit radius, and the remaining points are located inside the circle.

The results indicate that the model is conditionally stable (a point lying on the circle indicates conditionally stability, points inside the circle – stability, no points outside the circle).

**Figure 2.** Unit root test
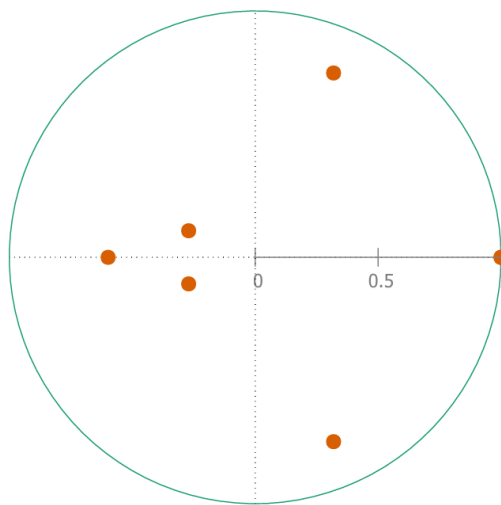


Source: author's study.

To fully verify the VECM, the autocorrelation of residuals, the normality of residuals, and the occurrence of the ARCH effect were also examined. The Multivariate LM test was used to examine autocorrelation, which for subsequent lags 1 and 2 obtained values of 1.302 ($p = 0.257$) and 1.714 ($p = 0.0914$), indicating a lack of significant autocorrelation of residuals. The Doornik-Hansen test for multivariate normality was used to examine the normality of residuals, which was 14.7369 ($p = 0.0644$), therefore the distribution of residuals should be considered consistent with the normal distribution at a significance level of 0.05. In order to detect autoregressive conditional heteroscedasticity, the Multivariate ARCH test was used, the values of which for lag =1 and lag = 2 were 111.284 ($p = 0.207$) and 214.199 ($p = 0.234$), which indicates no effect of variance clustering, therefore the variance of the residuals is homoscedastic. A review of the coefficients in the correlation matrix for the analysed variables does not indicate the presence of excessive collinearity. In summary, the considered VECM(1) model successfully passed diagnostic tests and can be used to investigate relationships between variables and for forecasting.

**Table 5.** Parameter estimation results of the VECM in the agricultural sector in Tanzania

| Explanatory variables | Dependent variable | | | |
|---|---|---|---|---|
| | $\Delta lnGDP$ | $\Delta lnFDI$ | $\Delta lnRCIA$ | $\Delta lnRCA$ |
| *const* | -0.1794*** | -7.0922*** | -2.0327*** | -1.4240*** |
| | (0.0469) | (0.5482) | (0.1305) | (0.3540) |
| $\Delta lnGDP\_1$ | 0.0554** | 0.0516 | 0.0253 | 0.1024* |
| | (0.0206) | (0.0306) | (0.0173) | (0.0554) |
| $\Delta lnFDI\_1$ | 0.0533** | 0.0589** | 0.0712*** | -0.0644** |
| | (0.0227) | (0.0273) | (0.0174) | (0.0273) |
| $\Delta lnRCIA\_1$ | -0.5302 | 0.8357*** | -0.4891** | -0.7555 |
| | (0.3952) | (0.2587) | (0.2044) | (0.4546) |
| $\Delta lnRCA\_1$ | 0.0329** | -0.1373 | -0.0364** | -0.4539** |
| | (0.0151) | (0.0937) | (0.0149) | (0.1897) |
| $ECT\_1$ | -0.0248** | -0.8815*** | -0.0260*** | -0.0531 |
| | (0.0105) | (0.0706) | (0.0068) | (0.0356) |
| $R^2$ | 0.421 | 0.398 | 0.304 | 0.391 |

Note. The symbols *, **, *** mark the significance of parameters at the level of 10%, 5% and 1%, respectively.
Source: author's calculation (standard errors are given in brackets).

Table 5 shows that direct investment in the agricultural sector of Tanzania is the main determinant of economic growth in this country in the short term. A one percent increase in FDI resources in the previous period in Tanzania causes an increase in GDP in the current period by an average of approximately 0.05% *ceteris paribus*. This impact can be interpreted as a result of the transfer of capital, technology, and management that accompanies FDI and contributes to increased productivity and job creation in the agricultural sector. Furthermore, the presence of foreign capital can generate multiplier effects in other sectors, for example, by increasing demand for intermediate goods and services.

A slightly weaker determinant of economic growth in the agricultural sector turned out to be the competitiveness of exports of agricultural products: an increase in the RCA index by 1% in the previous period results in an increase in GDP in the current period by approximately 0.03% on average, while the revealed investment advantage in this sector had no significant impact on the increase Tanzania's economy. A possible reason is that a strongly export-oriented agricultural sector may focus on short-term trade expansion at the expense of long-term capital investments, for example, by utilizing existing resources without reinvesting. Furthermore, the increasing presence of foreign companies can lead to the so-called crowding-out effect – the displacement of domestic producers from export markets, especially if foreign companies have cost or technological advantages, or privileged access to distribution channels.

GDP growth in Tanzania's agricultural sector was largely determined by the level of GDP in the previous period: a 1% increase in this variable in the previous year implied a change in current GDP values by approximately 0.06%.

The impact of economic growth in the agricultural sector in Tanzania was not pro-investment in this sector, but the strongest impact on the FDI stocks is the investment attractiveness of this sector: a 1% increase in the RCIA index in the previous period results in an increase in FDI resources in the current period by an average of approx. 0.84% *ceteris paribus*. This may indicate that the presence of foreign investors creates favourable institutional conditions, infrastructure, and human resources that attract further investors. In the long run, this provides a basis for the formation of investment clusters in the Tanzanian agricultural sector. Diyamett and Mutambla (2014) also reached similar conclusions.

The level of FDI directed to this sector had the greatest positive impact on the investment attractiveness of the agricultural sector in Tanzania: an increase in direct investment resources by 1% in the previous period resulted in an increase in the RCIA index in the current period by an average of approx. 0.07%, *ceteris paribus*. The export advantage in agricultural products limited the investment attractiveness of Tanzania's agricultural sector in the short term: a 1% increase in the RCA index in the previous period resulted in a decrease in the RCIA index in the previous period by an average of approximately 0.04%. This may result from the specificity of the agricultural sector, which generally does not require advanced technologies for development, and enterprises seeking to increase the intensity of product exports in the short term do not always want to improve the investment attractiveness of the agricultural sector. Moreover, it should be remembered that Tanzania mainly exports raw materials and low-processed goods, which in some cases may be low-profit and therefore not attractive from the point of view of return on investment. A similar conclusion was drawn based on the research of Luhwago et al. (2023).

The increase in FDI resources had a negative impact on the export competitiveness of Tanzania's agricultural sector: an increase in the FDI resources index in the previous period by 1% resulted in a decline in the RCA index by approximately 0.06% in the current period, *ceteris paribus*. This may be due to foreign companies importing components or technologies rather than developing local supply chains, which limits net exports. Furthermore, FDI focuses on low-processing goods, whose export advantage erodes over time. This conclusion is confirmed, among others, in the works of Luhwago et al. (2023) and Mabeta (2025).

It should also be noted that the investment attractiveness of the sector was not pro-export. All significant parameter estimates for the ECT_1 variable are negative except for the RCA index, which indicates the convergence of the relevant variables to the long-term equilibrium, with the highest rate of adjustments visible in the case of the FDI variable.

Analysing the significance levels of the estimates of the parameters of the cointegrating vector $\beta$ (Table 6), it should be concluded that direct investment resources and export competitiveness in the agricultural sector can be treated as variables of long-term impact on the economic growth of Tanzania. The analysis of the $\alpha$ vector parameter estimates indicates that the speed of adjustment of the variables in the subsequent equations of the VECM to the long-term relationship is varied and the highest rate of adjustment is visible in the case of direct investments. Therefore, FDI is not only a short-term stimulus but also a lasting growth factor, and its effects manifest themselves with a time lag. This suggests the need for stable and predictable economic policies that support long-term investment flows. This role of FDI in the economies of developing countries is also indicated by scientific articles written by Diyamett et al. (2012) and Msuya (2007).

**Table 6.** Estimation results of the cointegrating vector ($\beta$) and the adjustment vector ($\alpha$) in the agricultural sector in Tanzania

| vector | lnGDP | lnFDI | lnRCIA | lnRCA |
|--------|-------|-------|--------|-------|
| $\beta$ | 1.000*** (0.0000) | 0.7012** (0.3051) | -0.2531* (0.1039) | 0.3751*** (0.0533) |
| $\alpha$ | -0.024*** (0.0094) | -0.8815*** (0.2065) | -0.0260*** (0.0053) | -0.0531 (0.0462) |

Note. The symbols *, **, *** mark the significance of parameters at the level of 10%, 5% and 1%, respectively.
Source: author's calculation (standard errors are given in brackets).

The response of the GDP, RCIA and RCA variables to a one-off impulse in the form of a shock change from FDI directed to the agricultural sector is illustrated in Figure 3. Based on the course of the curves presented, it can be concluded that in the first year after the impulse caused by the increase in FDI resources, the GDP and RCIA variables increased their values, with the strongest increase recorded in the investment attractiveness index. However, a one-off shock change from FDI resulted in a decline in export competitiveness in the first period, and in the second period there was an increase in the RCA index. In the following years, all variables gradually stabilised their values at new levels, with only the GDP value permanently increasing in the long term compared to the original level. In turn, the RCIA and RCA indicators permanently decreased in the long term compared to the base period. The largest scope of changes in the agricultural sector was shown by the investment attractiveness index, and GDP reacted the least to the shock change from FDI.

**Figure 3.** The response of GDP, RCIA and RCA to the impulse from FDI in the agricultural sector
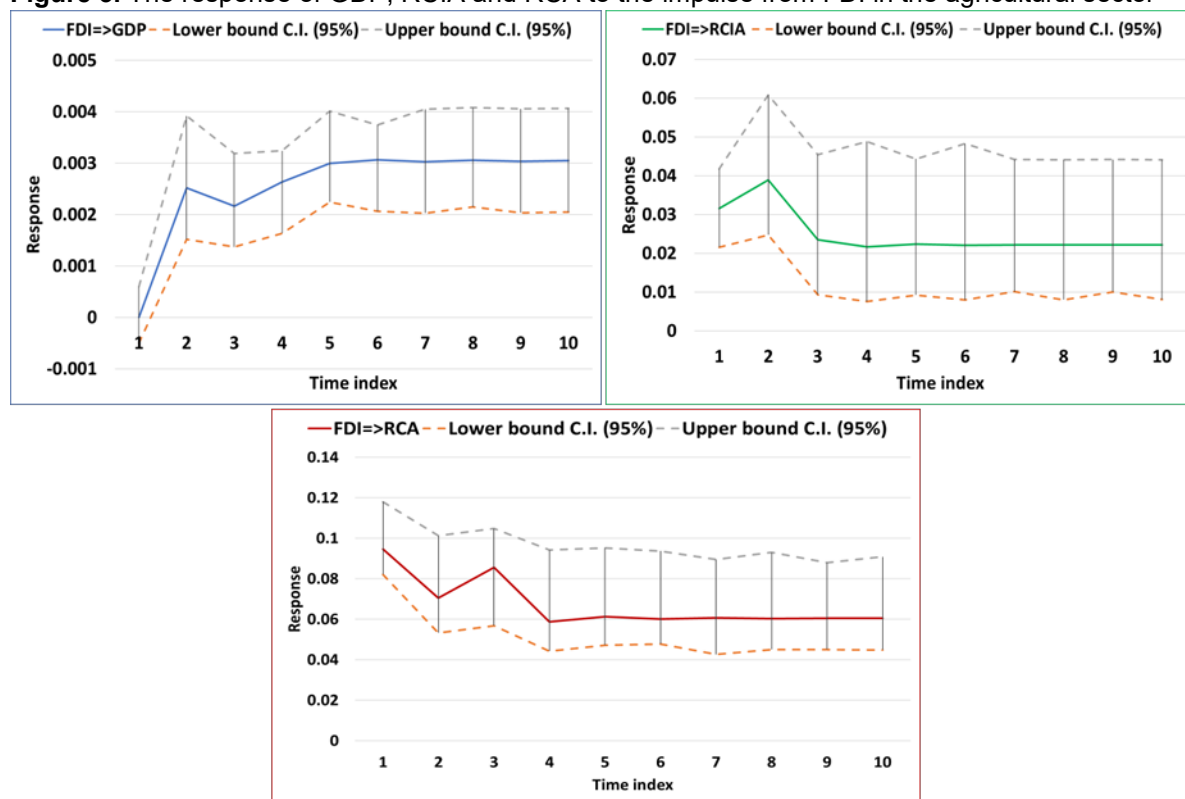


Source: author's study.

In addition to the results of the VECM(1) a Granger causality test was performed for the agricultural sector of the Tanzanian economy (Table 7).

**Table 7.** P-values in the Granger causality test for Tanzania in the agricultural sector

| Explanatory variables | Dependent variable | | | |
|---|---|---|---|---|
| | *GDP* | *FDI* | *RCIA* | *RCA* |
| *GDP* | - | 0.124 | 0.238 | 0.056 |
| *FDI* | 0.003 | - | 0.021 | 0.212 |
| *RCIA* | 0.142 | 0.013 | - | 0.211 |
| *RCA* | 0.018 | 0.003 | 0.014 | - |
| *FDI* | 0.031 | - | 0.037 | 0.142 |
| *RCIA* | 0.010 | 0.027 | - | 0.061 |
| *RCA* | 0.301 | 0.134 | 0.068 | - |

Note. The symbols *, **, *** mark the significance of parameters at the level of 10%, 5% and 1%, respectively.
Source: author's calculation.

Table 7 shows that in the agricultural sector an important Granger cause for Tanzania's economic growth is the increase in inward FDI stocks in this sector and the competitiveness of agricultural exports. This suggests that both the inflow of foreign capital and the sector's ability

to compete on international markets are active development stimuli that initiate growth processes.

In turn, the Granger cause of FDI in the agricultural sector is investment attractiveness and export competitiveness. Therefore, exports can be considered pro-investment in the agricultural sector. Note that FDI stocks are the Granger cause of investment attractiveness in Tanzania. The feedback effect occurring here indicates that the presence of foreign investors improves investment conditions, which may attract further investors to the agricultural sector. This type of conclusion can also be found in the works of Prasanna (2010) and Kastratović (2024).

## 5. Conclusions

The results obtained in this article show the important role of FDI in the development of the agricultural sector in Tanzania. The benefits of the increase in inward FDI stocks in the agricultural sector are visible, among others, in the introduction of modern cultivation technologies, in the increasing mechanization of agriculture and in the construction of a system for irrigation of agricultural fields. At the same time, thanks to FDI, the communication infrastructure is being developed and logistics are improving: new roads are being built connecting regions previously excluded from communication, which allows for the expansion of the area of cultivated land. It should also be remembered that FDI creates jobs in rural areas, where there are no other sources of income. Foreign direct investment visibly increases agricultural production, which not only satisfies the domestic market, but also drives the export of this country. Agricultural products constitute a significant share in the export of this country, but – as the results of this research have shown – FDI does not stimulate the international competitiveness of agricultural exports sufficiently, neither in the long nor in the short term. The main research hypothesis was therefore negatively verified. There may be several reasons for this, including too strong a concentration of FDI on raw materials with low added value, still insufficiently developed local processing and too narrow export diversification. Another important reason for low export competitiveness is weak spillover effects: the scale of FDI is very limited in Tanzania's agricultural sector, which means that knowledge sharing by foreign investors has a limited reach and does not improve the productivity of many farms. In order to use FDI as an instrument to strengthen export competitiveness in the agricultural sector, it is necessary to change the structure of exports: increasing the share of processed products in exports, and therefore increasing the scale of investment in local industrial processing is

necessary. The current, to a large extent, corporate control over the value chain does not favour this, because exported raw materials are often processed only outside Tanzania's borders. In this area, Tanzanian politicians have a lot of catching up to do. It is not only about creating favorable economic, administrative and legal conditions for foreign investors, but also about incentives to increase the scale of investment in the local processing industry. This can be achieved through appropriate financial incentives (e.g. tax relief for investors supporting processing), infrastructure development (e.g. creation of industrial zones for agricultural processing) or creation of a business environment friendly to investors (re-education of bureaucracy, openness to public-private partnership ventures). To sum up, it should be stated that the positive effects of FDI on the development of the agricultural sector are visible, but in order for the benefits for Tanzania from investment to be greater, the scale of FDI must be increased and their share in the area of agricultural processing must be significantly increased. This is a task for decision-makers responsible for economic policy, and in particular for the agricultural sector in this country.

Integrating FDI and export strategies is also crucial. These two policies should be complementary: export promotion activities should be designed to simultaneously increase investment attractiveness (e.g., by improving product quality, providing market information, and developing support services for exporters and investors). It is also crucial to systematically raise the level of RCIA by improving regulatory stability, access to infrastructure, institutional quality, and the transparency of investment procedures in the agricultural sector. In formulating the above recommendations for assistance, the VECM was used in this article. The VECM proposed in this article can be considered a tool for examining the long- and short-term interdependencies between investment and export indicators. It is based, among other things, on the RCIA and RCA indices, which can be easily constructed for various sectors and countries using widely available public statistics data (e.g., Eurostat, UNCTAD, OECD). Such a model can also be applied to studies of foreign investment in the energy, service, and heavy industry sectors. The RCIA index can be used to comparatively examine the investment attractiveness of countries, voivodeships, and regions, etc.

Despite many advantages, this model also has its limitations resulting from its specificity. This is, for example, the inability to take into account bilateral flows of export streams or FDI. Such possibilities are provided by other types of models, e.g. gravity models, and open the way to further in-depth analyses.

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