

Determinants of Private Investment in the Agricultural Sector of Mozambique (2003-2017)

By

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ABSTRACT

Shortly after independence, Mozambique's economy was characterized predominantly by public investment over private investment until 1986. During this period, the public sector was seen as the main economic agent, centralizing most of the available resources. Bearing in mind that investment is one of the main components of aggregate demand for a long-term economic growth, its fluctuations affect significantly the all functioning of an economy and agriculture in particular. This study comes in to unfold and understand the major determinants of the private investment in agriculture, as well as the constraints that represent the main challenges to invest in the sector due to the scarcity of capital. The study adopted an analysis of a theoretical approaches (exploratory and bibliographic) combined with quantitative method based on the macroeconomic model using the Error Correction Model (ECM) to address the questions raised and achieve the objectives. The variables defining the model are the real GDP, GDP of the agrarian sector, public expenditure on infrastructure, real interest rate, inflation rate and arable land; with a data sample from the period of 2003-2017. The results showed that the agrarian sector is influenced by the wealth produced from engineering (infrastructure). This mean that the development of the sector might have political implications through the establishment of relations between small farmers and investors, which could be translated into purchasing power of food products; and consequently, in the alleviation of poverty, the stability of monetary and fiscal policies, and the exclusive use of the land to investors.

Keywords: Determinants, Investment, Private Investment, Agricultural Sector, Economy

ABSTRAK

Tak lama setelah kemerdekaan, ekonomi Mozambik didominasi oleh investasi publik daripada investasi swasta hingga tahun 1986. Selama periode ini, sektor publik dipandang sebagai pelaku ekonomi utama, yang memusatkan sebagian besar sumber daya yang tersedia. Mengingat bahwa investasi merupakan salah satu komponen utama dari permintaan agregat untuk pertumbuhan ekonomi jangka panjang, fluktuasinya secara signifikan mempengaruhi semua fungsi ekonomi dan khususnya pertanian. Studi ini hadir untuk mengungkap dan memahami faktor penentu utama investasi swasta di bidang pertanian, serta kendala yang menjadi tantangan utama untuk berinvestasi di sektor ini karena kelangkaan modal. Studi ini mengadopsi analisis pendekatan teoretis (eksplorasi dan bibliografi) yang dikombinasikan dengan metode kuantitatif berdasarkan model makroekonomi menggunakan Error Correction Model (ECM) untuk menjawab pertanyaan yang diajukan dan mencapai tujuan. Variabel yang menentukan model adalah PDB riil, PDB sektor agraria, pengeluaran publik untuk infrastruktur, tingkat bunga riil, tingkat inflasi,

dan lahan subur; dengan sampel data periode 2003-2017. Hasil penelitian menunjukkan bahwa sektor agraria dipengaruhi oleh kekayaan yang dihasilkan dari rekayasa (infrastruktur). Artinya, pengembangan sektor tersebut dapat berimplikasi politis melalui terbangunnya relasi antara petani kecil dan investor, yang dapat diterjemahkan menjadi daya beli produk pangan; dan akibatnya, pengentasan kemiskinan, stabilitas kebijakan moneter dan fiskal, dan penggunaan eksklusif tanah untuk investor.

Kata Kunci: *Determinan, Investasi, Investasi Swasta, Sektor Pertanian, Ekonomi*

INTRODUCTION

During the late 70's and early 80's, many African countries have faced periods of slowdown in economic growth with the real GDP per capita declined in most of them, from an average annual growth of 0.4% between 1973 and 1980 to a negative growth of 1.2% between 1980-1989. This is justified in part by the oil crisis of the 70, the unsustainability of the foreign debt and the inflation distress runaway that characterized that period (Oshikoya, 1994; Mlambo & Oshikoya, 2001).

It was in that context of the economic contraction scenario that in developing countries in general and Africa in particular, has emerged a broad understanding from the governments side, the importance of investment in Africa and the need to promote private sector development and increase its share in total investment (public and private) to ensure a sustainable economic growth in the long run. The contribution of private investment to the development of a country is very broad, because it mobilizes savings, increases tax revenues, improves management and technology, as well as increases the jobs creation (Borensztein et al., 1998).

In this term, the evolution of investment in Mozambique has distinct phases. In the post-independence period, Mozambique's economy was characterized by the predominance of public investment on private investment up sharply in 1986. During this period, the state sector was seen as the main economic agent, centralizing much of available resources. However, since 1987 Mozambique began a new era of implementation of the Economic Recovery Program (ERP) with support from the International Monetary Fund (IMF) and World Bank (WB), marking a new phase in the evolution of its economy. This phase was characterized by a set of economic reforms translated into privatization of all state-owned enterprises and in the reorientation of public investment in favor of private investment, seen as the most efficient and productive (UTRE, 1997). During this very same process, the Government of Mozambique created the Investment Promotion Centre (CPI) in 1993, an institution responsible for the dissemination of investment opportunities that Mozambique offers.

Additionally, in order to ensure a great availability of credit to the private sector and thereby stimulate productive investment, Mozambique began a financial system liberalization process (IFC, 2021). The process was marked by financial sector reforms, implemented gradually, and to highlight the liberalization of interest rates in 1992 and 1994, and the creation of interbank foreign exchange and money markets in 1996 and 1997 respectively (IMF, 2010). Alongside these actions and according to the World Bank (2009, 2019a), Mutondo et al (2019) and AfDB (2021), the position of Mozambique in relation to access to credit conditions have been observing improvements in recent years, and the range Index of Access to credit information is above the average in sub-Saharan Africa (Alfazema, 2021), and below the average of the Organization for Economic Cooperation and Development –OECD (Auerbach & Gorodnichenko, 2013).

Bearing in mind that the Mozambican economy is mainly agrarian and the agriculture is predominantly of subsistence, characterized by low levels of production and productivity, arises the need to create an enabling environment for the private sector to invest in the production, processing, marketing and commercialization. The role of investment in the economy has received attention in the literature on agricultural growth, particularly in developing countries, where the shortage of capital coupled with institutional constraints is the main challenges of investment in this sector (World Bank, 2019b, EDSFM, 2016). The investment is one of the main components of aggregate demand and long-term economic growth source. Its fluctuations significantly affect the overall functioning of an

economy and the agriculture in particular. The discussions on these issues are generally not macroeconomic which involve good governance, the quality of institutions, the business capacity of the private sector, among others (Cunguara & Moder, 2011).

The debate on the private sector role in promoting investment as of utmost importance started in 1987 with the implementation of the Economic Recovery Programme (PRE), which focus on the promotion of private investment as key element to economic growth. Despite the fact that the country recorded an average annual growth of 7% between 1994 and 2010, this growth declined to 6.7%, 6.1% and 6.3% in three consecutive years (2008 to 2010), as a result of the rising price of food and oil (World Bank, 2016). This was a sign of the importance of investment in the behavior of the aggregate demand (Mather, 2009). According to the National Statistics Institute-INE (2017), the national accounting balance indicates that the contribution of the agricultural sector to GDP has been growing.

Although the investment is a galvanizing factor of economy and of the agriculture in particular, there is limited knowledge about the factors that determine the levels of investment in agriculture of Mozambique. So, the role of investment in the economy of Mozambique has raised attention in the literature on agriculture (Thurlow, 2008; Bank of Mozambique, 2019), where capital scarcity combined with institutional constraints represents the main challenges for investment (USAID, 2016) to the sector from 2003 to 2017. It is from this scope that arose the interest in this research study which seeks to identify the determinants and the constraints to private investment in agriculture of Mozambique, to measure the impact of the determinants of private investment in the agricultural sector in Mozambique, and to analyze the factors affecting private investment in the agricultural sector in Mozambique.

The behavior of private investment in the agricultural sector stems from the fact that it is a typical endogenous variable and considering that the implementation of economic reforms targeting the market will lead to increased relative importance of this type of investment in total investment of an economy. The study on the macroeconomic factors affecting private investment in agriculture is a fairly new subject in Mozambique. Much of the discussion on this topic looks at the trend of private investment in time and for some factors known as deterministic for this trend. Although macroeconomic investment models can be derived by applying the representative firm's approach, there are criticisms of this form of modeling (Bertola & Caballero, 1990; Matsumoto, 2003; Claessens and Kose, 2018). The results of this study are particularly important today, in a context where the Mozambique government has been implementing its Action Plan for Poverty Reduction (PARP), whose objective is based on the creation of employment and the reduction of extreme poverty. According to Akanbi (2010a, 2013b), a general reduction of poverty can be achieved through a sustained increase in domestic investment.

Furthermore, in line with the Action Plan for Poverty Reduction (PARP), a medium-term plan, the government is engaged in other long-term strategies. The strategies include the Agenda 2025 and the Sustainable Development Goals (SDG) whose pillars are based primarily on wealth creation and acceleration of economic growth and development while achieving the overall well-being of people. In order to achieve these goals, the public or private investment in areas generating capacity and capable of creating positive synergies with the rest of the economy is seen as one of the pillars.

On the other hand, despite the temporary nature of the international financial crisis (Vojinovic et al., 2012; AfDB, 2018) started in mid-2008 and now with the Covid19 pandemic (AfDB, 2021), the impact of same on the developing economies are increasingly noticeable. It is particularly with regard to the risks associated with the reduction of foreign aid flow and foreign direct investment (FDI), an important component of private investment. Thus, an interest in this study arose to analyze the determining factors of private investment in the agrarian sector.

The empirical literature on the determinants of private investment in the agricultural sector is very broad and diverse. Despite having different foundations or methodologies and be applied to different realities, various studies developed converge in general, as the main determinants of private investment in the agricultural sector, although the impact of each variable may differ from study to

study. Among these studies, this research will be unfolding some. For Rocha & Teixeira (1996) and Blanchard & Leigh (2013), Borges & Parré (2022), the variation of GDP in one percentage point, leads to an increase of 2.13 percentage points in private investment. However in the analysis of Melo et al. (2010), the impact of rural credit on agricultural GDP between 1995 and 2009, based on the construction of a VAR model, the authors find a causal relationship between changes in credit for agriculture as a proportion of total GDP and growth in agricultural GDP, of which, a 1.9% increase in rural credit has an impact in the agricultural GDP by 0.79% .

From the panel data model to analyze the determinants of investment in the agricultural sector in the province of Bangkulu in Indonesia, Tatiana et al. (2015) stated that the increase in GDP also meant an increase in people's purchasing power. The result showed that the GDP coefficient had a positive sign, that is, the higher the GDP, the greater the private investment in the agricultural sector. For the purposes of this analysis in the Mozambican context, it will be based on the results of Tatiana et al. (2015), who state that GDP has a positive effect on the private investment in the agrarian sector. Tatiana et al. (2015), also refers to the contribution of agriculture to GDP, having concluded that it has a negative and significant effect on private investment in the agrarian sector. A large contribution of agriculture to GDP can lead to a reduction in private investment in the agrarian sector, due to the fact that investment in the agrarian sector is dominated by the planting of food crops such as: rice, corn, cassava, peanuts, and horticultures, among others.

Sundararajan and Thakur (1980) developed a dynamic model that uses the firm's approach, and the results indicate that an increase in public investment by 1 billion (rupees) initially reduces the resources available to the private sector and causes a decline in private investment by 0.6 billion (rupees) in the subsequent period. However, the additional resources generated by public investment stimulate the private sector, and consequently the investment, hence, the positive effect in the following periods is verified be small compared to the initial negative effect. Thus, the increase in public investment serves to increase overall investment. So this a dynamic model that uses the firm's approach obtained results that suit the reality of Mozambican economy.

Aschauer (1989), using the parsimonious empirical model for the study of the American economy, concludes that expansions in government spending on public investment would have a positive impact in stimulating private investment to production than if the expansion were to government spending on consumption (Eden & Kraay. 2014). Meanwhile, from the IMF working paper of Berg et al (2015), was emphasizing the Greene and Villanueva (1991) which observed the complementarity between government spending with public investment and private sector investment, although the estimated coefficient is of small magnitude (Khan & Reinhart, 1990).

Still on government spending, Rocha and Teixeira (1996), incorporate the analysis of co-integration in the study of an econometric estimation, and the results of the vector error correction model indicate the existence of a certain degree of substitution between government investments and private investment. Then Tadeu & Silva (2013) and Neduziak & Correia (2017), attributed to competition for physical resources between the public and private sectors.

For the purposes of the analysis of government spending (Garry & Valdivia, 2017; Mauro et al, 2015), the results of Sundararajan and Thakur (1980), are adapted to the Mozambican reality. Insofar as, the expression adopted for the desired stock of capital from the private agricultural sector, shows that the increase in the stock of capital in the public sector reduces capital in the private sector (Byiers & Rosengren, 2012). This is explained by the fact that government investment provides resources that the private sector would own, otherwise would have to supply itself. Raising the cost of capital / wage cost ratio reduces the desired capital stock with substitution of capital for labor.(Building Markets, 2016).

Greene and Villanueva (1991) sought to emphasize the impacts of macroeconomic instability and foreign exchange restrictions on private investment in 23 developing countries. In addition to considering the variables suggested by neoclassical theory, the authors concluded that there is a negative relationship between private investment in relation to interest rate, inflation rate and external debt stock and its services. (Blejer & Khan, 1984; Khan & Khan, 2007; Costamagna, 2015). In the same context, Rocha and Teixeira (1996), using the vector error correction model, also concluded

that the variables, interest rate and inflation rate, have a negative effect on private investments. This was also emphasized by Haque (2013) who observed that in Bangladesh, the public and private investment have a direct impact on economic development on the long-run. Haque used the error correction model (ECM) to evaluate the short run, where the factors of productivity and capital formation do not make sense in the private sector. As for public investment, complementarity was observed in relation to private sector investment, although the estimated coefficient is small in magnitude. (Nguyen & Trinh, 2018; IMF, 2015) However, the estimation performed by Greene and Villanueva (1991) is subject to the problem of spurious regression, because also here not investigated the stationarity of the variables.

Following different approaches, Pyndick & Solimano (1991), Servén & Solimano (1992) and Servén (2002) concluded that the stability of interest rates, the general level of prices and the exchange rate are the main indicators of economic instability in Africa and interfere largely on decisions investment. The two authors' ideas were put emphasis by Bekoe & Adom (2013) on the role of uncertainty and risk in investment decisions. This analysis considered the negative impact of interest rates on private investment in the agrarian sector.

Likewise, Kastratovic and Vasiljevic (2007), using the OLS model, to analyze the determinants of foreign direct investment in the agricultural sector in the Danube region, concluded that the possessed land has a positive effect, which means that, it is a determining factor in attracting private investment. The same time as Nijhoff et al. (2014) state that the land ownership regime in place in Mozambique has discouraged private investment in the agrarian sector.

METHODS

For the analysis of private investment in the agrarian sector, annual frequency data was used. The sample considered in the survey is for the period 2003-2017 and the choice of that period is associated, among several factors, with the consistency and availability of data on the variables included in the model.

Looking at the objectives, the present study is an explanatory research, as it allows access to literary studies and the cases analysis (Karlsson, 2016), in order to understand which factors are determinant in the private investment in the agricultural sector (UNCTAD, 2012). The determinants of investment include: real GDP; GDP of the agrarian sector; public investment (government spending on infrastructure, electricity, water, among others); real interest rate; inflation rate (variable that captures the effects of uncertainty resulting from macroeconomic instability on the level of investments) and arable land. (Ahumada, 2021; Wethal, 2018, Erdem & Yamak, 2016; Gan, 2014)

In this study, the research sought to identify the constraints for private investment (Belchior, 2016) and describe the private investment in the agricultural sector in Mozambique. Therefore, to describe private investment in the agrarian sector in Mozambique, some case studies were used, as defined by Njie & Asimiran (2014) and Yin (2005), it is the investigation of a phenomenon within its context.

The secondary data were obtained from bibliographic research in journals and electronic addresses for the composition of the theoretical framework of the study and a better understanding of the sector in question. Historical data series on private investment in the agrarian sector for the period under review (2003-2017) were consulted at the Investment Promotion Center (CPI). Reports of the agrarian sector in Mozambique, with the Ministries of Agriculture and Rural Development, industry and Commerce and other institutions. The data on real interest rates were obtained from the Bank of Mozambique website (2018); data on real GDP, GDP in the agrarian sector, inflation rate were obtained from the archives of the National Statistics Institute.

In terms of approach, quantitative research was carried out, given that, we sought to find the results and / or impacts of the determining factors of private investment in the agrarian sector of Mozambique, through statistical and econometric models which are presented below.

Specification of the Econometric Model

For the analysis of the determinants of private investment flows in the agricultural sector, a model was formulated based on the theoretical and practical framework of other empirical studies mentioned in the literature review. So the relevance of the determinants (Albaladejo et al, 2015) in the specific case of the Mozambican agricultural sector was taken into account considering the availability of data. The equation considered in the present research has as reference some of the theoretical models, with macroeconomic foundation, namely the neoclassical model, the flexible accelerator model and the options model. Therefore the equation considered parameters like real GDP and real interest rate, inflation and real exchange rate. The model that would be better estimate the outcomes of this study for our time series data from 2003 to 2017 is the Error Correction Model (ECM) and ARDL as per Iqbal (2011) and Shrestha, & Bhatta (2018).

The unit of analysis in this research is defined individually as a countries for reasons of the relevant information availability in the databases of foreign direct investment inflows (Dellis et al, 2017; Koçak & Barış-Tüzemen, 2022). Thus, to analyze the factors affecting private investment in the agricultural sector in Mozambique, the following regression of private investment in the agricultural sector was estimated:

$$LIP_t = \beta_0 + \beta_1LY_t + \beta_2LYA_t + \beta_3LG_t + \beta_4R_t + \beta_5P_t + \beta_6LT_t + \varepsilon_t \quad (\text{Equation 1})$$

where L is the natural logarithm, IP is the private investment in the agricultural sector, Y is the gross domestic product (GP), YA denotes the GDP generated by agriculture, G is public investment (infrastructure), R is the real interest rate (a picture of the effects of uncertainty from macroeconomic instability on the level of investments), P is the inflation rate and T arable land, t is the yearly time dimension in quarters, the β , are the estimated parameters and ε is the error term.

The variables included in the model are in the form of natural logarithm, except the real interest rate. This logarithmic propriety for naming these variables allows that the coefficients are interpreted as elasticities. Notwithstanding the general model specified above is according to the theoretical models of investment and incorporate other variables relevant to the analysis of private investment in agriculture in developing countries. It should be noted that any problem related to the above equation can interfere with the quality of the regression results.

Estimation procedure

Before proceeding with the regression estimation, tests were carried out to determine the properties of the time series of the variables included in the model. Stata was the econometric package used for estimation purposes.

Unit root test

The use of regression models involving non-stationary time series can lead to the problem that is conventionally called spurious regression. In these cases, the estimators obtained through ordinary least squares lose their properties and the t-statistics obtained are not credible. (Gujarati, 2006).

There are several tests, the commonly most used are the following; Augmented Dickey-Fuller – ADF by Dickey & Fuller (1979) and Philips- Perron- PP (1988). However, for the present research study, the ADF unit root test will be used to test whether each of the variables included in the model are stationary or not. The test will be performed based on the estimation of the following regression:

$$\Delta Y = \beta_1 + \beta_2t + \delta Y_{t-1} + \sum_{i=1}^n \alpha_i \Delta Y_{t-1} + \varepsilon_t \quad (\text{Equation 2})$$

Where Y_t is the variable of interest, Δ is the difference operator, t is the trend, ε is a white noise, n is the order lag test, $\delta = (\rho - 1)$ is the null hypothesis of non-stationarity (it implies that $\delta = 0$).

Cointegration test

The co-integration tests are of paramount importance for those working with time series in economics, as they allow study and analyze structural relationships between economic variables. More specifically, these tests for determining whether or not the variables have a relationship (balance) in the long term even though they may deviate from the equilibrium in the short run (Engle & Granger, 1987). Before that, it is needed to check the order of integration of each variable individually. In this case will be used the unit root test of ADF.

Error Correction Model

The error correction (ECM) allows to estimate both the long-term relationship between the variables and the short-term dynamics. This technique helps to correct potential errors for the estimation of the models coefficients with differences that do not take into account relationships of co-integration. Thus, one of the advantages the co-integration analysis is that from the error correction, you can examine the dynamic co-movements between variables and the adjustment process to the long-term equilibrium as well as the use of ARDL as per Hamuda et al (2013)

Step 1 - in the long-term (ECM): $y_t = \bar{\alpha} + \beta x_t + \varepsilon_t$ (Equation 3)

Step 2 - in the short-term (dynamic model): $\Delta y_t = \alpha_1 \Delta x_t + \alpha_2 \varepsilon_{t-1} + \mu_t (\alpha < 0)$ (Equation 4)

The estimation of the parameter α gives an indication of the speed of y_t adjustment to its equilibrium level, ie how the y_t variable varies when there is an imbalance.

Regression Diagnostic Testing

This test is used to assess the robustness of the variables included in the model and ensure non-violation to the assumptions of the Classical Linear Regression model (CLRM) by performing the multicollinearity tests, normality, autocorrelation and heteroscedasticity. In summary, the method selection for our time series data has followed the below scheme.

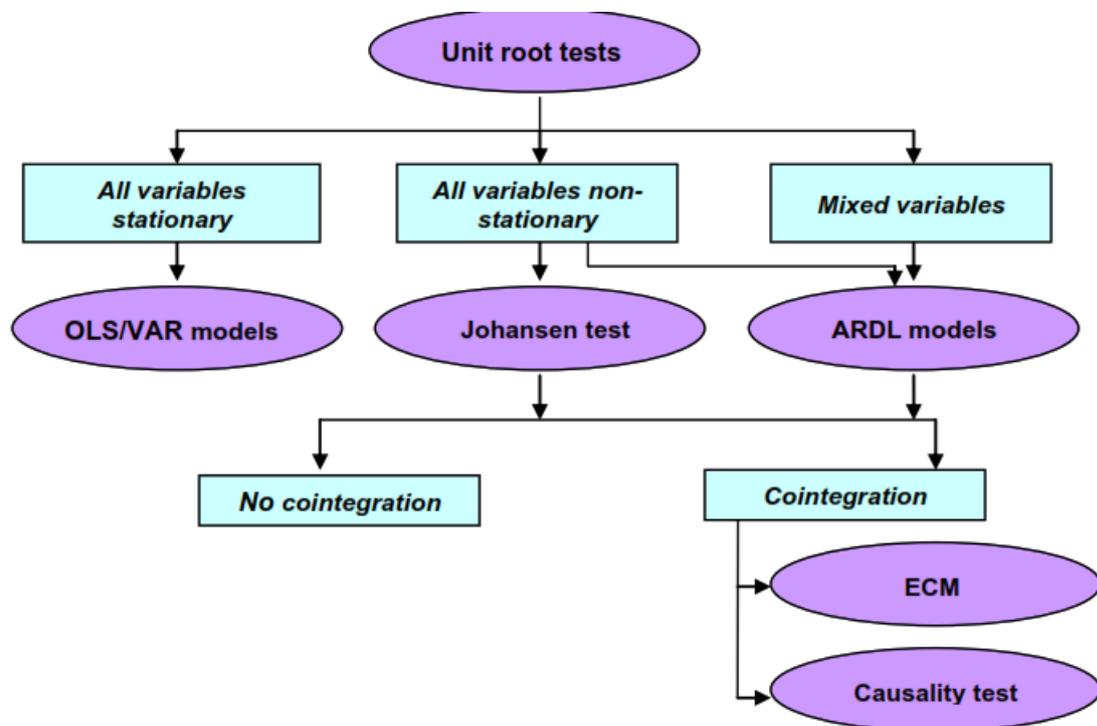


Figure 1. Time Series Data Method Selection Scheme

Hence, since the study mixed variables, we used the techniques of Cointegration test where one variable drags the other over the period and hence, both of them share the same movement; OLS: Ordinary least squares used to determine the relationship between the given variables; ARDL: Autoregressive distributed lags an ordinary least square (OLS) based model which is applicable for both non-stationary time series as well as for times series with mixed order of integration; ECM: Error correction models, here the coefficients describe how deviations from that long-run relationship affect the changes on them in next period.

RESULTS AND DISCUSSIONS

Unit root test

One of the basic conditions of the classic linear regression model (CLRM) is that all variables must be stationary, and the violation of this condition makes the results of the regression unreliable (Phillips & Perron, 1988). To avoid this error, the unit root test was carried out to find out whether the variables are stationary or not stationary. It is important to mention that to avoid the problem of multicollinearity in the model, the variable private investment in the agricultural sector, GDP, GDP generated by agriculture, public investment and arable land, were transformed into a logarithm. For this, the “ADF” method was used, as shown in Table 1.

Table 1. Unit Root Test for the level and first difference

Variables	Level	ADF test statistics	Critical value		
			1%	5%	10%
LIP	I (0)	-1.51	-3.75	-3.00	-2.63
	I(1)	-3.92	-3.75	-3.00	-2.63
LY	I (0)	-1.40	-3.75	-3.00	-2.63
	I(1)	-2.68	-3.75	-3.00	-2.63
LYA	I (0)	-2.01	-3.75	-3.00	-2.63
	I(1)	-3.31	-3.75	-3.00	-2.63
LG	I (0)	-1.56	-3.75	-3.00	-2.63
	I(1)	-3.63	-3.75	-3.00	-2.63
R	I (0)	-1.25	-3.75	-3.00	-2.63
	I(1)	-3.54	-3.75	-3.00	-2.63
P	I (0)	-1.11	-3.75	-3.00	-2.63
	I(1)	-4.25	-3.75	-3.00	-2.63
LT	I (0)	-1.42	-3.75	-3.00	-2.63
	I(1)	-3.66	-3.75	-3.00	-2.63

Source: Authors own calculations with Stata 13, 2021

The results of the analysis confirm the existence of the unit root, which indicates that, on average, the series statistics for each variable under analysis are non-stationary. The possible explanation for this fact is precisely the heterogeneity of the series. The fact that the data have different quantitative and qualitative nature, making the average of the statistics provide results that suggest the existence of an individual unit root.

In this case, the fact that the variables are non-stationary, means that the results of the analysis cannot be validated. For the results to be valid, the variables must be stationary, that is, the outputs should not have a unit root, so all variables were converted into the first difference {I (1)}. Thus, after converting the seven variables to I (1), they all became stationary (co-integrated).

Error Correction Model (ECM)

The error-correction coefficient in the ECM must be negative. This negative sign of the white noise ($\hat{u} = -5.46$) and significant, reveals that there is a long-term relationship between the variables: private investment, gross domestic product, GDP generated in agriculture, public investment in infrastructure

to support production, real interest rate, inflation and arable land. The magic and intuition of the ECM is if our IP (the private investment in the agricultural sector) is above its long-run equilibrium with other variables, this coefficient with negative sign can pull it back down. In the contrary, it will cancel the dynamics and become positive pulling the IP back up.

Table 2. OLS Regression Results of The Estimation of ECM with Private Investment In The Agricultural Sector As Dependent Variable

	coeff	std error	t	Prob
ip_LY	23.260	9.128	3.822	0.020
ip_LYA	-7.995	3.416	-2.762	0.152
ip_LG	2.148	1.152	1.172	0.250
ip_R	-24.921	7.862	-2.748	0.001
iP_P	-33.001	7.861	-3.692	0.010
ip_LT	-3.357	4.102	-0.905	0.069
disequilibrium	0.321	0.058	2.841	0.004
constant	0.694	0.146	0.252	0.372
	χ^2			13.49
	Prob(χ^2)			0.501
	Skew			0.406
	Kurtosis			3.880

Source: Authors own calculations with Eviews9, 2022

The results in the table above show that the total GDP, starting from the one generated by agriculture, public investment allocated to infrastructure, interest rate, including the inflation and arable land, affect private investment in the agricultural sector of Mozambique. However, the total GDP, from the generated by the agricultural sector, the real interest rate and the inflation rate were the variables that negatively (or significantly) affected private investment in the agriculture.

The GDP has significantly affected private investment in the agricultural sector, simply because any investor who decides to invest in this specific area does so considering that this same sector has always been a potential contributor and a demand for GDP indicators as a whole and specifically the per capita. The last is reflected in the level of the population's purchasing power. According to INE, from their data in the years 2003 to 2017, there is an increase in GDP (Bank of Mozambique, 2019), which translated into an increase in per capita incomes and, as a consequence, an increase in people's purchasing power. This is shown by the positive sign in the GDP coefficient, meaning that the more and the better the people's purchasing power, the greater investment is allocated in the agricultural sector. A clear message that any change in GDP can have a real meaningful influence on private agricultural investment. That is, increasing or decreasing people's purchasing power would increase or decrease the demand for agricultural products. Therefore, an increase in demand for agricultural products would encourage an increase in investments allocated to this sector.

In addition to the total wealth of the country, public funds allocated to infrastructure were one of the factors that dictated private agrarian investment. The level of improvements in infrastructure affects the functioning as well as any financing of economic activities and including operationalization (Wethal, 2017). Based on this, the funds allocated to infrastructures classified as access to water, agricultural resources, roads and electricity in this study, only infrastructures linked to access roads (road) significantly influence private investment in the agricultural sector. Meaning that road infrastructure has been a priority in all public investment plans, as it plays an important role in the development of agriculture. The quality of the roads reduces the costs of agrarian inputs.

From the results, it can be seen that the coefficient linked to infrastructure shows a positive sign. This means that improving the quality of access road infrastructures (road), encourage investment in the agricultural sector. Therefore, changes in the quality of access roads (road infrastructure) will always have a significant effect on private investment in the agrarian sector.

The results also show that private investment in the agricultural sector is negatively affected by interest rates and inflation. *Ceteris paribus*, these results indicate that private agricultural investment has not been geared towards boosting the national economy and creating wealth, because, if it were so, there would be agrarian development and thus there would be no dependence on imports of agricultural products and thus improve the balance of current transactions (balance of payments). On the other hand, agrarian development implies the total non-dependence on private investment, that is, the terms of financing and production would be governed according to the interests of the producer, as well, there could be a local institution that would provide cheap (fundamental) inputs for production, which could attract private investors.

As for the GDP generated by agriculture, its effect on private investment in the agricultural sector was negative and significant, meaning that a variation of one percentage point in the GDP generated by agriculture reduces private investment by 8.11 percentage points. The opposite is true when investment in the agrarian sector is dominated by planting crops and industrial or export (soy, jatropha, cotton, tea, eucalyptus, palm oil and rubber for example). However, in Mozambique the demand has been more dominated by food crops. And when so, increasing the planting area decreases the area for growing food products such as vegetables, peanuts, corn, potatoes, cassava, and rice between others. So, the investment in the agricultural sector has not only been of benefit to the food or manufacturing side, but it has also created jobs. More investments can generate many jobs (seasonal or seasonal) from local farming families. And this makes us to state that the different conditions of investment in agriculture, may not have an influence on investment when the sector is very oriented towards primary products.

Regarding the arable land factor, also considered as a determinant of investment flows in the agrarian sector, it had a negative impact. This result is due to the fact that the land in Mozambique is state owned, the investors are not owners of the land, but have the right to use and benefit from it through a lease that protects them during the period of the contract. However, uncertainty prevails among investors as to whether a change in government policy will occur and reallocate part or all of the land they hold.

Diagnostic Tests

The table 3 presents the Normality Test which was performed for our study.

Table 3. The normality test results

Variables	Pr(Skewness)	Pr(Kurtosis)	χ^2	Prob (χ^2)
DLIP	0.89	0.84	1.38	0.97
DLY	0.24	0.49	1.85	0.40
DLYA	0.26	0.98	1.29	0.52
DLG	0.39	0.54	1.10	0.58
DR	0.64	0.25	1.55	0.46
DP	0.15	0.09	4.93	0.08
DLT	0.27	0.69	1.39	0.50

Source: Authors own calculations with Stata 13, 2021

The results from the normality test shows that the waste is normally distributed and as for heteroscedasticity, the residues are homoscedastic.

CONCLUSIONS

The research aimed to investigate some of the most important determinants influencing the investment flows in the Mozambican agricultural sector. From the results obtained, it was noted that only public investment in infrastructure, GDP, had significant effects in leveraging private investment in the agricultural sector. It has been clear that the development of this sector has been practically influenced by the wealth produced in the country and invested in infrastructure. However, the largest

share of agricultural income that contributes to GDP is dominated by export crops, industries or plantations than by food crops, as these are less attractive to agricultural investment. This is due to the fact that investors are more oriented to plantation crops for export, thus reducing the production of the main food crops. In addition, the rising level of GDP, which supports the income that people have during the study period in question, should translate into their interest in the form of purchasing power in food products, to attract more and more investment in the sector. .

It is interesting to note that the results of GDP generated by agriculture, interest rates, inflation rates and arable land, had negative (opposite) effects on private investment in the agrarian sector (Morina et al, 2020). These cases can be explained by the risks on capital (Hassan, 2022) and other risks associated with this sector (the fact that agriculture is losing its importance on Mozambican economic growth), which means that some general investment models can be theoretically validated, but they are not necessarily feasible, true and / or individually applicable in specific sectorial economic contexts. Thus, it raises the importance of modeling and more empirical researches at the sectorial level, which may be essential to better understand or explain this phenomenon.

The estimated results may have important political utility and implications for the agrarian economy and agriculture sector of Mozambique in general. Despite the current macroeconomic scenario (political and economic instability), it is necessary for the government to continue to influence GDP growth and therefore GDP per capita, through the establishment of relations between small farmers and investors, which will be translated into greater purchasing power in food products and consequently in the alleviation of poverty. Interest rates and inflation have also been used to explain investment flows in the agrarian sector. In the case of Mozambique, these have a negative effect, hence, it is necessary for the government to guarantee the stability of these variables through effective monetary and fiscal policies. Due to its potential in agro-ecological zones and the size of distribution in arable land, Mozambique can be considered a favorable country for investments in the agricultural area, however, the government must guarantee the exclusive use and benefit of the land in contract period to investors.

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