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Abstract:

According to the World Bank (2021), agriculture is the main source of income for 80% of the world's poor. This sector therefore plays a key role in reducing poverty, increasing incomes, and improving food security. The aim of this paper is to study the impact of agricultural investment on economic growth in France. To attempt our goal, annual data was collected during the period 1978 – 2020 and was estimated by ARDL model. Empirical results indicate that in the long run and in the short run agricultural investment has a positive impact on France's economic growth. These results argue that investments in the agricultural sector are an essential determinant of economic growth in France and motivate the need to adopt sound policies to further strengthen this sector.

Keywords: Agricultural Investment, Economic Growth, Cointegration, ARDL Model, France.

JEL Classification : O47, O55, Q10, Q18.

1. Introduction

Healthy, sustainable, and inclusive food systems are essential to achieving global development goals. The development of agriculture is one of the most powerful levers on which to act to put an end to extreme poverty, to strengthen the sharing of prosperity and to feed the 9.7 billion people who will be on the planet in 2050. By compared to other sectors, the growth of agriculture is two to four times more effective in increasing the income of the poorest populations. According to a study published in 2016, 65% of the working poor depend on agriculture for a living. Agriculture is also a key driver of economic growth: in 2018, it accounted for 4% of global gross domestic product (GDP) and, in some least developed developing countries, its share can exceed 25% of GDP. However, several factors risk jeopardizing the ability of agriculture to drive growth and reduce poverty, as well as food security. From disruptions linked to the COVID-19 pandemic and extreme weather events, to locust invasions and conflicts, food systems are exposed to multiple shocks that lead to higher food prices and worsening hunger. Accelerating climate change could cut agricultural production, especially in regions of the world that are already suffering from food insecurity. In addition, agricultural activity, the exploitation of forests and land use change also contribute to climate change since they are the source of approximately 25% of global greenhouse gas (GHG) emissions.). Therefore, mitigating GHG emissions in the agricultural sector will help stem climate change. Current food systems endanger the health of people and the planet and cause unsustainable levels of pollution and waste. A third of the food produced in the world is lost or wasted. Tackling this issue is key to improving food and nutrition security, as well as achieving climate goals and reducing pressures on the environment. Malnutrition is one of the leading risk factors for death worldwide. Millions of people eat badly or insufficiently, and this "double burden" of malnutrition is the cause of diseases and health crises. According to a 2021 report, between 720 and 811 million people suffered from hunger in 2020, more than 10% of the world's population. Food insecurity has the effect of deteriorating the quality of the diet and increasing the risk of various forms of malnutrition: undernutrition, but also overweight and obesity. It is estimated that 3 billion people in the world cannot afford healthy food. The impact of the war in Ukraine creates additional food security risks, and food prices are likely to remain high in the months ahead.

Agriculture in France benefits from a large useful agricultural area (about 1/2 hectare per inhabitant) and a favorable geographical and climatic situation, straddling the 45th parallel. Together with the aid provided by the common agricultural policy (CAP), these factors explain why France has become the leading agricultural country in the European Union with 18% of European agricultural and agri-food products. In addition, France was, in 2011, the world's third largest exporter of agri-food products tied with Brazil. Agriculture occupies 53.2% of the surface of metropolitan France, and up to around 75% in regions such as Nord-Pas-de-Calais. In 2018, it employed 410,000 people, or 1.5% of the total working population. It has been modernized within the framework of the common agricultural policy, constantly reducing the quantity of labor employed. In 2003, the sum of the agriculture, forestry, agri-food and wood industry sectors represented more than 1,800,000 people employed or employers, generating 4.5% of French GDP, i.e., a just over 72 billion euros. Agriculture benefits from a large part of European aid, but the average agricultural income remains very low locally and averages 18,300 euros in 2016.

According to the ONUAA (2018 data), France is the 8th world producer of apricots, the 8th world producer of artichokes, the 5th world producer of wheat, the 2nd world producer of mixed cereals, the 6th world producer of whole cereals , the 8th world producer of mushrooms and truffles, the 1st world producer of hemp, the 8th world producer of hemp fibers, the 9th world producer of cauliflowers and broccoli, the 4th world producer of rapeseed, the 7th world producer of spinach, the world's 7th producer of dry broad beans, the world's 7th stone fruit producer, the world's 8th producer of flax seeds, the world's 9th producer of sunflower seeds, the world's 2nd producer of green beans, the world's 8th producer of kiwis, the 1st world producer of flax fiber and tow, the 8th world producer of fresh corn, the 9th world producer of mustard, the 10th world producer of blueberries, the 8th world producer of hazelnuts, the 9th producer m world of walnuts, the 4th world producer of cornflowers, the 2nd world producer of barley, the 5th world producer of leeks, the 3rd world producer of fresh peas, the 7th world producer of dry peas, the 9th world producer of apples, the 8th largest producer of potatoes, the 2nd largest producer of chicory roots, the 5th largest producer of grapes, the 3rd largest producer of buckwheat, the 2nd largest producer of sugar beets and the 3rd largest producer of triticale.

Indeed, as part of a research investigation that has never dealt with the context of the French economy, the objective of this work is to examine the impact of agricultural investments on economic growth in France. To achieve this goal, we will present in the following section a review of the literature related to our problem. In the third section, we will explain our empirical methodology. In the fourth section, we present our empirical results. And finally, in the last section, we will provide the conclusions and the recommendations adopted.

2. Literature survey

We will present a brief review of the literature, the aim of which is to try to inspire our empirical research methodology to detect the impact of agricultural investments on economic growth in France. For this reason, this section is divided into three paragraphs. In the first paragraph, we will present the works that examine the link between investments and economic growth. In the second paragraph, we will study recent works that have examined the impact of diversification on economic growth. Finally, in the third section, we will present the works that have examined the relationship between the agricultural sector in general and economic growth. We begin with the presentation of works that have investigated the link between domestic investment and economic growth.

2.1.Investment and economic growth

According to the work of several economists such as Romer (1986), Lucas (1988), Barro (1991) and others, investments occupy a very important place in the economies of countries thanks to their ability to stimulate economic growth and improve sustainable development. In this small part, we will present the various works that have examined the link between these two variables. For the case of Pakistan, Ghazali (2010) confirmed that domestic investments cause long-term and short-term economic growth during the period 1981 - 2008. During the period 1970 - 2009 and for the case of Malaysia, Tan and Tang (2011) examined the causal link between domestic investment in the private sector and economic growth. They found that investments in the private sector cause economic growth. In the case of China, Tang et al. (2008) used quarterly time series data from 1988 to 2003 to study the causal links between domestic investment and economic growth. The empirical results indicate a bidirectional causality between domestic investment and economic growth. Ullah et al., (2014) examined the interaction between domestic investment and economic growth in Pakistan from 1976 to 2010. The empirical results confirmed unidirectional causality running from domestic investment to economic growth. Using a three-variable model in Malaysia from 1970 to 2009, Lean and Tan (2011) investigated the links between domestic investment and economic growth. They found that domestic investment has no effect on economic growth. For the case of Sudan, Bakari (2017a) proved that there is no relationship between domestic investment and economic growth in the short and long terms during the period 1976 – 2015. In his analyses, he applied cointegration analysis and error correction model. For the case of Japan, and over the period 1970 – 2015, Bakari (2017b) found that domestic investment affects positively economic growth. In the other hand, Bouchoucha and Bakari (2019) found that domestic investment affects negatively economic growth in the long run for the case of Tunisia. In their analysis they applied cointegration analysis and ARDL model over the period 1976 – 2017. These results were also confirmed by Bakari (2017c) in the case of Tunisia.

In the case of panel data from North Africa, and for the period 1982 - 2016, Bakari and

Mabrouki (2018) found that domestic investments have a favorable effect on economic growth based on an estimate analyzed by the static gravity model. However, in the case of Brazil, Bakari et al (2019) examined the link between domestic investment and economic growth during the period 1970 – 2017. In their empirical analysis, they used cointegration analysis, VECM Model and Wald tests. Empirical results proved that in the long run and in the short run domestic investment have a positive effect on economic growth.

Bakari (2018) searched the incidence of domestic investment on economic growth in the case Algeria for the period between 1969 – 2015. To attempt his goal, Bakari (2018) applied empirical methodology based on cointegration analysis, Vector Error Correction Model (VECM) and Granger Causality Tests. Empirical analysis indicated that domestic investment has a negative incidence on economic growth in the long run. However, results suggested that domestic investment causes economic growth in the short run. Bakari (2021) searched the impact of domestic investment and economic growth in the case of Spain for the period 1970 – 2017. He applied stylized facts and vector error correction model. Empirical results indicate that domestic investments, thus, are seen as the source of economic growth in Spain which should pay attention to the nexus between domestic investments and growth by formulating new policies that enhance the role of exports in stimulating domestic investment and improving economic growth. In the case of Germany and for the period 1972 - 2016, Bakari et al (2020) used cointegration analysis and vector error correction model to detect the nexus between domestic investment and economic growth in the long run and in the short run. Empirical results indicated that there is a cointegration relationship between domestic investment and economic growth. Also, they found that domestic investment has a strong positive impact on economic growth in the long run and in the short run.

For the case of USA, Bakari and Tiba (2019) found that domestic investment has a positive impact on economic growth in the long run. They applied vector error correction model and data during the period 1970 – 2016. Aslan and Buket (2021) studied the link between gross capital formation and economic growth in developing countries of the European, Asian, African, and American continents. He adopted the panel vector autoregression (PVAR) approach to test this relationship for the period from 1980 to 2018. The results suggest that gross capital formation has a positive impact on economic growth in European, Asian countries and Americans. In another studied, Bakari and El Weriemmi (2022) searched the nexus between domestic investment and economic growth in the case of Arab Countries. They found for the period 1990 – 2020 that there is no relationship between domestic investment and economic growth in the long run. In the short run, results indicated that there is a bidirectional causality relationship between economic growth and domestic investment.

2.2.Diversification and economic growth

According to Brenton et al (2019), economic diversification stands as an essential factor in economic growth and economic development in which countries develop towards a more diversified structure of production and trade. Insufficient economic diversification is often associated with heightened vulnerability to external shocks that can undermine long-term economic growth prospects and forecasts. This invents challenges in terms of illustrating sector-specific shocks, such as weather-related events in agriculture or sudden mineral price shocks.

In the case of South African countries, Matthee et al (2016) proved that export specialization has no effect on economic growth. Similarly, McIntyre et al. (2018) found that export diversification in 34 small countries has no effect on economic growth. For a group of 84 low-income countries, Lee and Zhang (2019) confirmed that export diversification has no effect on economic growth. In the Case of Thailand, Reungsri (2010) searched the nexus between investment in infrastructure. During the period 1993 - 2006, he found that there is a negative relationship between economic growth and infrastructure investment. In the case of Nigeria, Babatunde and al (2012) found that investment in infrastructure has a positive effect on economic growth with a bi- directional causal link during the period 1970 - 2010. Also, in the case of Pakistan, Younis (2014) found that there is a negative effect between infrastructure investment and economic growth in the long run using VECM Model. In the case of Botswana, Mbulawa (2017) searched the nexus between investment on infrastructure and economic growth using VECM model and annual data for the period 1985 - 2015. In their analysis, they found that infrastructure investment influence positively economic growth. Bakari et al (2018) searched the impact of industrial investment on economic growth in the case of Tunisia for the period 1969 – 2015. In their analysis, they applied cointegration analysis and Vector Error Correction Model. Empirical analysis indicate that industrial investment has a negative effect on economic growth in the long run. Similarly, Bakari et al (2018b) examined the relationship between industrial exports and economic growth in Tunisia during 1969 and 2015. They used vector error correction model and Granger causality tests. According to the result of the analysis, it was determined that there is a negative relationship between industrial exports and long-term economic growth.

2.3.Agricultural investment and economic growth

Based on our findings, we concluded that there is a lack of work that has examined the link between agricultural investments and economic growth. In fact, most studies have focused on the link between the agricultural sector and economic growth on the one hand and on the other hand on the link between agricultural trade and economic growth. For example, in the case of Tanzania, Msuya (2007) concluded that agriculture has a much greater economic and social impact than in other sectors. In the case of 11 countries in Latin America and East Asia, Zhang (2001) found a strong causal Granger relationship between FDI in the agricultural sector and economic growth. On a sample of 62 developing countries during the period 1960 - 1990, Golin et al. (2002) observed that the improvement of agricultural investments would make it possible to transmit resources for other non-agricultural activities (Industry and service), which will promote economic growth. In the case of 15 developing economies, Awokuse (2015) found strong evidence that agricultural investment is an engine of economic growth. For the case of 85 countries, Tiffin and Irz (2006) found that the agricultural sector causes economic growth using the Granger causality test. On the other hand, for a panel of 52 developing countries, Gardner (2005) found that agricultural investments had no effect on economic growth. Awunyovitor and Sackey (2018) examined the association between FDI in Ghana's agricultural sector and economic performance over the period 1975 to 2017. The results showed a positive and significant association between FDI in the agricultural sector and economic performance. Gubak and Samuel (2015) examined the effects of Chinese investment in Nigeria's agricultural sector. The conclusion reveals that Chinese investment in Nigeria's agricultural sector is quite low and has not paid much attention to the development of the sector in Nigeria. Ullah et al. (2012) studied the role of FDI in the agricultural sector on the growth of the Pakistani economy for the period 1979-2009. They pointed out that FDI in the agricultural sector has a significant negative influence on agricultural production. Chandio et al (2019) examined the impact of FDI in the agricultural sector on economic growth in the case of Pakistan during the period 1991 – 2013. Using an estimation based on the ARDL model, they found a two-way causality of Granger between economic growth and agricultural FDI in the short and long term. For the period 2002 - 2012, Badibanga and Ulimwengu (2020) proved that in agricultural investment stimulate economic growth in agricultural sector in the case of the Democratic Republic of Congo. Bakari and Abdelhafidh (2018) studied the impact of the structure of agricultural investments on Tunisian economic growth during the period 1990 - 2016. To achieve their goal, they used an estimate based on the ARDL model. They found that investments in fruit trees, investments in livestock, investments in agricultural irrigation and investments in studies, extension and research in the agricultural sector have a positive impact on economic growth. However, investment in fishing has a negative impact on economic growth. For the case of China, Bakari and Tiba (2020) researched the impact of agricultural investment on economic growth during the period 1984 - 2008. They found that investments in the agricultural sector have a positive effect on the long-term economic growth using the ARDL model. Using the VECM model and Granger causality tests, Abdelhafidh and Bakari (2019) studied the impact of agricultural investment on economic growth in the case of Tunisia during the period 1965 - 2016. They found that domestic investment in the agricultural sector has a positive effect on long-term economic growth. On the other hand, they found that agricultural investments had no effect on short-term economic growth.

3. Data and methodology

The impact of agricultural investment on economic growth in the case of France, is analyzed under the analytical framework of Abdelhafidh and Bakari (2018), Bakari et al (2018a; 2018b). The benchmark regression model is set as follows:

$$Y_t = f(AI_t, OI_t, L_t, CF_t, X_t, M_t) \quad (1)$$

The explanatory variables in the model include gross fixed capital formation in agricultural investment, gross fixed capital formation in other sector, Labor force, Finale consumption, Exports of goods and services, and imports of goods and services. The endogenous variable is economic growth (Y_t). Considering that all variables were lagging in time, in this work, an ARDL model was selected to examine the impact of agricultural investment on economic growth in the case of France. The ARDL model was calculated by two steps:

Step 1: The co-integration test of ARDL model, which was used to test whether there was a long-term causal relationship between the variables. The following model was established:

$$\begin{aligned}\Delta lnY_t = {} & \beta_0 + \beta_1 lnY_{t-1} + \beta_2 lnAI_{t-1} + \beta_3 lnOI_{t-1} + \beta_4 lnL_{t-1} + \beta_5 lnCF_{t-1} + \beta_6 LnX_{t-1} \\ & + \beta_7 LnM_{t-1} + \sum_{i=1}^{a} \beta_{5,i}\, \Delta lnY_{t-i} + \sum_{i=0}^{b} \beta_{6,i}\, \Delta lnAI_{t-i} + \sum_{i=0}^{c} \beta_{7,i}\, \Delta lnOI_{t-i} \\ & + \sum_{i=0}^{d} \beta_{8,i}\, \Delta lnL_{t-i} + \sum_{i=1}^{e} \beta_{9,i}\, \Delta lnCF_{t-i} + \sum_{i=0}^{f} \beta_{10,i}\, \Delta lnX_{t-i} \\ & + \sum_{i=0}^{g} \beta_{11,i}\, \Delta lnM_{t-i} + \mu_t \qquad (2)\end{aligned}$$

Where was the first-order differential operator, t u was the white noise, a, b, c, d, e, f et g were the maximum lag orders, determined by AIC or BIC. Whether there was a long-term equilibrium relationship between horizontal variables can be tested using F-statistic, and the null hypothesis was that there was no long-term equilibrium relationship.

Step 2: The estimation ARDL model, which was used to analyze the long- and short-term relationships between the variables. The long-term relationship can be estimated using the ARDL (P_1, P_2, P_3, P_4, P_5, P_6 et P_7) model:

$$\Delta lnY_t = \gamma_0 + \sum_{i=1}^{P_1} \gamma_1 \Delta lnY_{t-i} + \sum_{i=0}^{P_2} \gamma_2 \Delta lnAI_{t-i} + \sum_{i=0}^{P_3} \gamma_3 \Delta lnOI_{t-i} + \sum_{i=0}^{P_4} \gamma_4 \Delta lnL_{t-i} + \sum_{i=0}^{P_5} \gamma_5 \Delta lnCF_{t-i} + \sum_{i=0}^{P_6} \gamma_6 \Delta lnX_{t-i} + \sum_{i=0}^{P_7} \gamma_7 \Delta lnM_{t-i} + \mu_t \quad (3)$$

We use annual data for the period 1990 – 2020 for the empirical analysis. The data are obtained from the National Institute of Statistics and Economic Studies (INSEE, 2021). The variables used in this study include gross domestic product (Constant price) as a proxy of economic growth (Y), gross fixed capital formation in agricultural sector (constant price) as a proxy of agricultural investment (AI), gross fixed capital formation in other sector (Constant price) as a proxy of other investments (OI), Labor force (million person) as a proxy of labor, Finale consumption (Constant price) as a proxy of finale consumption (CF), Exports of goods and services (Constant price) as a proxy of exports (X), and imports of goods and services (Constant price) as a proxy of imports (M). To ensure the stability of the data, we use the logarithmic form for the analysis.

To empirically seek the impact of agricultural investment on economic growth in France, we will apply the most popular model, which is the autoregressive distributed lag model (ARDL model). In fact, the latter is favored over other cointegration techniques for various reasons: (i) According to Pesaran et al. (2001), this approach is better suited to small samples. ; (ii) This methodology can be applied if the variables used; are stationary all I(1), are stationary are all I(0), or are mixed; (iii) The ARDL model allows the study of causality between long-term and short-term variables.

4. Empirical results

As mentioned previously, we will use the ARDL model to detect the impact of agricultural investments on economic growth in France. In fact, the approach of our methodology consists of the one hand in examining the stationarity of the variables, and on the other hand in analyzing the cointegration between the variables. Indeed, if the variables are stationary and if there is a cointegration relationship between the variables, this means that the ARDL model will be retained. We start with analyzes of the stationarity of the variables.

4.1.Unit Root Tests

In this step, we will examine the stationarity of the variables included in our model. To achieve this goal, we will apply the ADF and PP unit root tests whose purpose is to determine the order of integration of each variable. In fact, the economic objective of stationarity analysis is to verify the variation of variables over time.

Table 1: Results of Unit Root Tests

PP Test								
At Level								
		LOG(Y)	***LOG(AI)***	***LOG(OI)***	***LOG(L)***	***LOG(CF)***	***LOG(X)***	***LOG(M)***
Constant	t-Statistic	-2.4194	-2.5853	-1.0813	-1.7998	-3.3600**	-1.8068	-1.4745
Constant & Trend	t-Statistic	1.0452	-2.5373	-1.8980	-0.8036	1.1965	0.0520	-0.7243
At First Difference								
		d(LOG(Y))	***d(LOG(AI))***	***d(LOG(OI))***	***d(LOG(L))***	***d(LOG(CF))***	***d(LOG(X))***	***d(LOG(M))***
Constant	t-Statistic	-2.7476***	-4.7331***	-3.3196**	-4.0629***	-1.5190	-4.0013***	-4.4697***
Constant & Trend	t-Statistic	-2.8161	-4.6046***	-3.2773*	-4.3388***	-2.9223	-4.2262***	-4.5673***
ADF Test								
At Level								
		LOG(Y)	***LOG(AI)***	***LOG(OI)***	***LOG(L)***	***LOG(CF)***	***LOG(X)***	***LOG(M)***
Constant	t-Statistic	-2.4740	-3.9795***	-1.2916	-1.0983	-3.4587**	-1.8068	-1.4745
Constant & Trend	t-Statistic	0.5239	-4.0561**	-2.5269	-1.0664	1.2690	0.1836	-0.5028
At First Difference								
		d(LOG(Y))	***d(LOG(AI))***	***d(LOG(OI))***	***d(LOG(L))***	***d(LOG(CF))***	***d(LOG(X))***	***d(LOG(M))***
Constant	t-Statistic	-2.7100***	-5.6731***	-3.4891**	-1.1357	-1.7026	-4.0013***	-4.4697***
Constant & Trend	t-Statistic	-3.2818**	-5.5966***	-3.4652**	-1.2894	-2.9223	-4.2883***	-4.5673***
Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant								
****MacKinnon (1996) one-sided p-values.***								

Source: Authors' calculations using EViews 11 software

Table 1 presents the results of the stationarity of the two ADF and PP tests. We notice that all the variables {Log (Y), Log (AI), Log (OI), Log (L), Log (X) and Log (M)} are stationary in first difference. On the other hand, the variable Log (CF) is stationary in level. In conclusion, we have stationary variables in level and in first difference, which confirms the ARDL model will be retained.

4.2.Cointegration Analysis

Before applying an estimate based on the ARDL model, it is important to verify the existence of a cointegration relationship between the variables. To achieve this goal, we will apply Fisher's test called the Bounds Test. In fact, the econometric rule of this test indicates that the calculated F statistic must be greater than the critical value of the upper bound to confirm the existence of a cointegrating relationship between the variables.

Table 2: Results of ARDL Bounds Test

ARDL Bounds Test		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	11.28046	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Authors' calculations using EViews 11 software

The results of the cointegration analysis are presented in Table 2. Note that the value of the F-statistic (11.28046) is greater than the critical value of the I1 Bound at the 1% threshold. This confirms that there is a cointegrating relationship between the variables. So the ARDL model will be retained.

Table 3 reports the results of the estimation of the ARDL model. In the short term, we noticed that agricultural investments {Log (AI)}, investments in other sectors {Log (OI)}, final consumption {Log (CF)} and exports have a positive effect on growth economic. In contrast, imports {Log (M)} and labor force {Log (L)} have no effect on short-term economic growth.

Table 3 : Results of ARDL Estimation

ARDL Cointegrating And Long Run Form				
Dependent Variable: DLOG(Y)				
Selected Model: ARDL (1, 0, 1, 1, 2, 1, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Short run results				
DLOG(AI)	0.035959***	0.010386	3.462137	0.0019
DLOG(OI)	0.131000***	0.033704	3.886818	0.0007
DLOG(L)	-0.169695	0.149025	-1.138699	0.2656
LOG(CF)	0.790037***	0.071115	11.109358	0.0000
DLOG(X)	0.164128***	0.016462	9.970339	0.0000
DLOG(M)	-0.044031	0.026385	-1.668780	0.1076
ECT	-1.182246***	0.141413	-8.360215	0.0000
Long run results				
DLOG(AI)	0.030416***	0.009834	3.093030	0.0048
DLOG(OI)	0.154423***	0.036368	4.246128	0.0003
DLOG(L)	-0.295652*	0.169294	-1.746378	0.0930
LOG(CF)	0.005396*	0.003105	1.737779	0.0946
DLOG(X)	0.211528***	0.021890	9.663203	0.0000
DLOG(M)	-0.144187***	0.041428	-3.480468	0.0019
******, **, and * denote statistical significance level at 1%, 5%, and 10%, respectively.***				

Source: Authors' calculations using EViews 11 software

Similarly, Table 4 shows the results of the estimation of the long-term ARDL model. We note that agricultural investments {Log (AI)}, investments in other sectors {Log (OI)}, final consumption {Log (CF)} and exports have a positive effect on long-term economic growth. On the other hand, imports {Log (M)} and labor force {Log (L)} have a negative effect on long-term economic growth. To test the robustness of our model and the credibility of our results, we perform a set of diagnostic tests. These are the Breusch-Pagan-Godfrey heterodasticity test, the Harvey heterodasticity test, the Glejser heterodasticity test, the ARCH heterodasticity test and the Breusch-Godfrey Serial Correlation LM Test.

Table 4: Results of Diagnostics Tests

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.979969	Prob. F(14,25)	0.4990
Obs*R-squared	14.17326	Prob. Chi-Square(14)	0.4369
Scaled explained SS	3.269947	Prob. Chi-Square(14)	0.9985
Heteroskedasticity Test: Harvey			
F-statistic	1.561580	Prob. F(14,25)	0.1605
Obs*R-squared	18.66080	Prob. Chi-Square(14)	0.1783
Scaled explained SS	13.03009	Prob. Chi-Square(14)	0.5242
Heteroskedasticity Test: Glejser			
F-statistic	1.170705	Prob. F(14,25)	0.3533
Obs*R-squared	15.83950	Prob. Chi-Square(14)	0.3233
Scaled explained SS	8.110049	Prob. Chi-Square(14)	0.8835
Heteroskedasticity Test: ARCH			
F-statistic	3.413678	Prob. F(1,37)	0.0727
Obs*R-squared	3.294267	Prob. Chi-Square(1)	0.0695
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.350108	Prob. F(2,23)	0.7083
Obs*R-squared	1.181789	Prob. Chi-Square(2)	0.5538

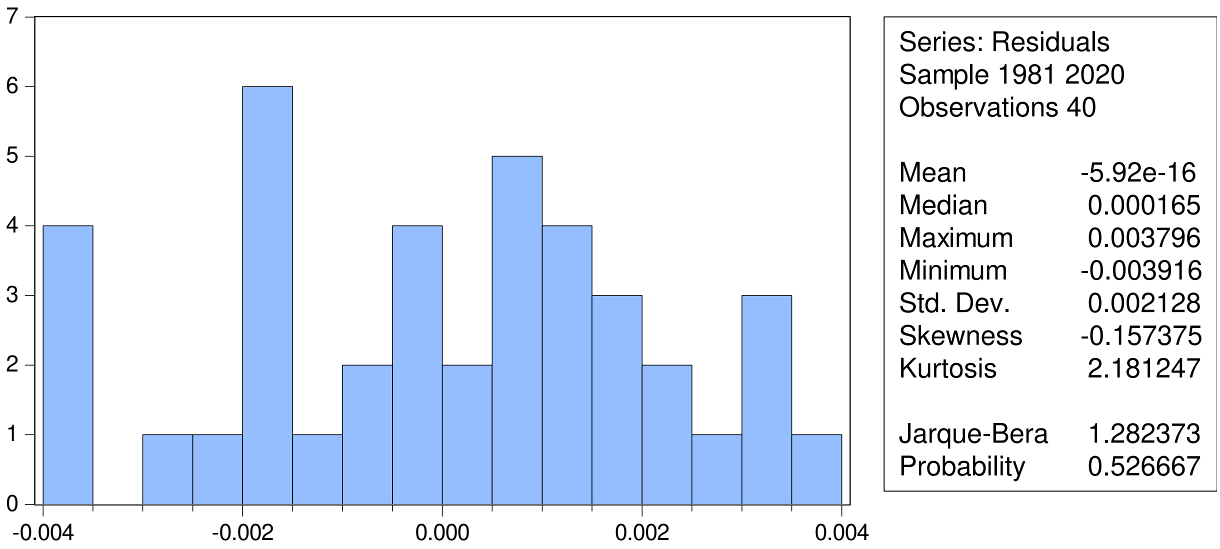
Source: Authors' calculations using EViews 11 software

The diagnostic tests show that the estimation results are acceptable because the probabilities of the heterodasticity tests and the Breusch-Godfrey Serial Correlation LM test are greater than 5%. This confirms the credibility of our results and our estimate.

4.3.Test of Normality

Another technique to check the robustness of our results and our model is the normality test. The econometric rule states that the probability of Jarque Bera including in the normality test must be greater than 5%.

Fig 1. Results of test of Normality



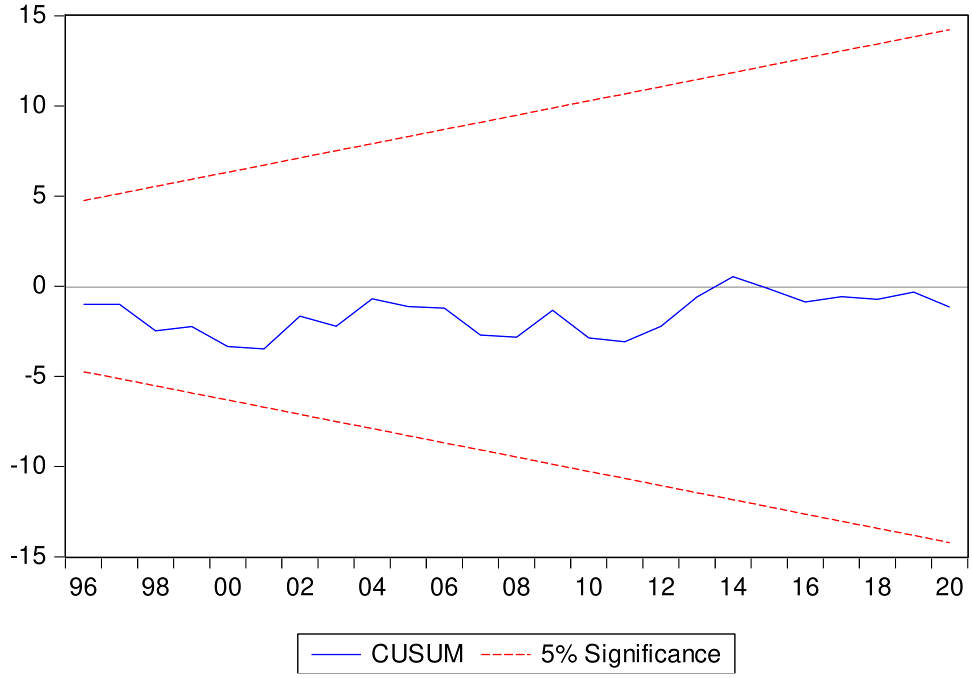
Source: Authors' calculations using EViews 11 software

Figure 1 presents the results of the Normality test. It is clear to us that the probability of Jarque-Bera is equal to 52.66%, it is greater than 5%. This result indicates and proves that the test of normality certifies that our results are credible.

4.4.Stability Tests

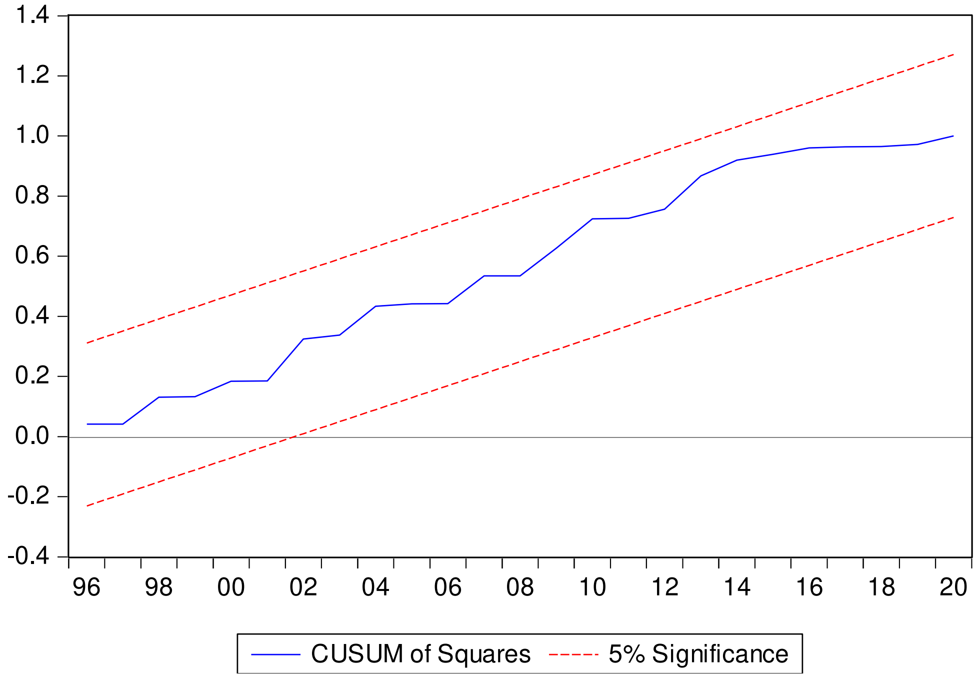
We follow Pesaran and Pesaran (1997) in using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) to check the long-term stability and short-term dynamics of the coefficients.

Fig 2. Result of CUSUM Test



Source: Authors' calculations using EViews 11 software

Fig 3. Results of CUSUM of Squares



Source: Authors' calculations using EViews 11 software

The cumulative sum of the recursive residuals (CUSUM) and the cumulative sum of the squares of the recursive residuals (CUSUM of the squares) of Figures 2 and 3 also confirm the stability of the model. The blue lines for CUSUM and CUSUMSQ are in the critical range and are significant at 5%, proving that our model estimate is very stable during sampling.

Conclusion

The aim of this paper is to search the impact of agricultural investment on economic growth in the case of France. According to our research, we conclude that there is no empirical investigation that examined before the nexus between agricultural investment and economic growth in the Case of France. Also, we conclude that there is a paucity of work that has examined the impact of agricultural investments on economic growth, most of the work related to the axis of agricultural economics has focused on the impact of agriculture on economic growth and on the impact of agricultural trade on economic growth and not on the impact of agricultural investments on economic growth, which proves the originality and importance of our work. To attempt our goal, annual data was collected during the period 1978 – 2020 and was estimated by ARDL model. Empirical results indicate that in the long run and in the short run agricultural investment has a positive impact on France's economic growth. These results argue that investments in the agricultural sector are an essential determinant of economic growth in France and motivate the need to adopt sound policies to further strengthen this sector.

In our opinion, and in view of the food crisis caused by the war between Russia and Ukraine, the French state is able to take care of its food security on the one hand and to benefit economically from the food situation that the world is experiencing at the present time by enhancing its investments and intensifying its production capacity to raise the value of food exports on the one other hand. France has considerable agricultural assets that should enable it to seize the opportunities available to it, both on the national market and on international markets.

References

Abdelhafidh, S & Bakari, S (2019). "Domestic Investment in The Agricultural Sector and Economic Growth in Tunisia," *International Journal of Food and Agricultural Economics (IJFAEC)*, Alanya Alaaddin Keykubat University, Department of Economics and Finance, vol. 7(2), April

Aslan, A., & Altinoz, B. (2021). The impact of natural resources and gross capital formation on economic growth in the context of globalization: evidence from developing countries on the continent of Europe, Asia, Africa, and America. *Environmental Science and Pollution Research*, 28(26), 33794-33805. https://doi.org/10.1007/s11356-021-12979-7

Awokuse, T. O., & Xie, R. (2015). Does agriculture really matter for economic growth in developing countries? *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 63(1), 77-99.

Awunyovitor, D. and Sackey, R.A. (2018), "Agricultural sector foreign direct investment and economic growth in Ghana", *Journal of Innovation and Entrepreneurship*, Vol. 7 No. 1, pp. 1-15

Babatunde, O. A., Afees, S.A and Olasunkanmi, O.I (2012). "Infrastructure and economic growth in Nigeria: A multivariate approach". *Research Journal of Business Management and Accounting*, Vol. 1 (3): 30 – 39.

Badibanga, T., & Ulimwengu, J. (2020). Optimal investment for agricultural growth and poverty reduction in the democratic republic of congo a two-sector economic growth model. *Applied economics*, 52(2), 135-155.

Bakari, S. (2017a). Appraisal of trade potency on economic growth in Sudan: New empirical and policy analysis. *Asian Development Policy Review*, 5(4), 213-225. https://doi.org/10.18488/journal.107.2017.54.213.225

Bakari, S (2017b). "The Nexus between Export, Import, Domestic Investment and Economic Growth in Japan," MPRA Paper 76110, University Library of Munich, Germany.

Bakari, S. (2017c). The Impact of Vegetables Exports on Economic Growth in Tunisia. Economic Research Guardian, 7(2), 72-87. http://www.ecrg-journal.com/archive2017.html

Bakari, S. (2018). The Impact of Domestic Investment on Economic Growth: New Policy Analysis from Algeria. Bulletin of Economic Theory and Analysis, 3(1), 35-51. https://doi.org/10.25229/beta.337367

Bakari, S. (2021). Are Domestic Investments in Spain a Source of Economic Growth? (No. 105526). University Library of Munich, Germany. https://mpra.ub.uni-muenchen.de/105526/

Bakari and Abdelhafidh (2018). “Structure of Agricultural Investment and Economic Growth in Tunisia: An ARDL Cointegration Approach”. The Economic Research Guardian – Vol. 8(2)2018

Bakari, S., Ahmadi, A., & Tiba, S. (2020). The Nexus among Domestic Investment, Taxation, and Economic Growth in Germany: Cointegration and Vector Error Correction Model Analysis. Journal of Smart Economic Growth, 5(1), 37-47. https://www.jseg.ro/index.php/jseg/article/view/77

Bakari, S., & El Weriemmi, M. (2022). Causality between Domestic Investment and Economic Growth in Arab Countries (No. 113077). University Library of Munich, Germany. https://mpra.ub.uni-muenchen.de/113077/

Bakari, S & Fakraoui, N & Tiba, S (2019). Domestic Investment, Export, Import and Economic Growth in Brazil: An Application of Vector Error Correction Model. MPRA Paper No. 95474, University Library of Munich, Germany. https://mpra.ub.uni-muenchen.de/95528/

Bakari, S., & Mabrouki, M. (2018). *The Impact of Agricultural Trade on Economic Growth in North Africa: Econometric Analysis by Static Gravity Model* (No. 85116). University Library of Munich, Germany. https://mpra.ub.uni-muenchen.de/85116/

Bakari, S., Mabrouki, M., & Elmakki, A. (2018a). The Impact of Domestic Investment in the Industrial Sector on Economic Growth with Partial Openness: Evidence from Tunisia. *Economics Bulletin*, 38(1), 111-128. http://www.accessecon.com/Pubs/EB/2018/Volume38/EB-18-V38-I1-P12.pdf

Bakari, S., Mabrouki, M., & Elmakki, A. (2018b). The Nexus between Industrial Exports and Economic Growth in Tunisia: Empirical Analysis. *Journal of Smart Economic Growth*, 3(2), 31-53. https://jseg.ro/index.php/jseg/article/view/44

Bakari, S., & Tiba, S. (2019). Long run and Short run Macroeconomics Determinants of Economic Growth in the USA: Cointegration and VECM Analysis. *University Library of Munich, Germany*. https://mpra.ub.uni-muenchen.de/96618/

Bakari, S & Tiba, S, (2020). "Does Agricultural Investment Still Promote Economic Growth in China? Empirical Evidence from ARDL Bounds Testing Model," *International Journal of Food and Agricultural Economics (IJFAEC)*, Alanya Alaaddin Keykubat University, Department of Economics and Finance, vol. 8(4), October.

Bouchoucha, N & Bakari, S, (2019). "The Impacts of Domestic and Foreign Direct Investments on Economic Growth: Fresh Evidence from Tunisia," *MPRA Paper 94816, University Library of Munich, Germany*. https://mpra.ub.uni-muenchen.de/94777/

Brenton, P., Gillson, I., & Sauve, P. (2019). Economic diversification: Lessons from practice. Aid for Trade at a Glance 2019: *Economic Diversification and Empowerment*, 135-160.

Chandio A.A., Mirani A.A., Shar R.U. (2019): Does agricultural sector foreign direct investment promote economic growth of Pakistan? Evidence from cointegration and causality analysis. *World Journal of Science, Technology and Sustainable Development*, 16: 196–207.

Gardner, B. L. (2005). Causes of rural economic development. *Agricultural Economics*, 32, 21-41.

Ghazali, A. (2010). Analyzing the Relationship between Foreign Direct Investment, Domestic investment and economic growth for Pakistan. *International Research Journal of Finance and Economics*, 47, 123-131.

Gollin, D., Parente, S., & Rogerson, R. (2002). The role of agriculture in development. *American economic review*, 92(2), 160-164.

Gubak, H.D. and Samuel, M. (2015), "Chinese trade and investment in Nigeria's agricultural sector: a critical analysis".

Lean, H.H., & Tan, B.W. (2011). Linkages between foreign direct investment, domestic investment and economic growth in Malaysia. *Journal of Economic Cooperation and Development*, 32(4), 75-96.

Lee, D., and H. Zhang. 2019. "Export Diversification in Low-income Countries and Small States: Do Country Size and Income Level Matter?" *IMF Working Paper* No. 19-118, May. Washington DC.

Matthee, M., E. Idsardi, and W. Krugell. 2016. "Can South Africa Sustain and Diversity Its Exports?" *South African Journal of Economic and Management Sciences* 19 (2):249–263.

McIntyre, A., M. Li, K. Wang, and H. Yun. 2018. "Economic Benefits of Export Diversification in Small States." *IMF Working Paper* No. 18/86, April. Washington DC.

Mbulawa, S. (2017). "The impact of economic infrastructure on long term economic growth in Botswana." *Journal of Smart Economic Growth*. Volume 2, Number 1, Year 2017.

Msuya, E. (2007). "The Impact of Foreign Direct Investment on agricultural productivity and poverty reduction in Tanzania," *MPRA paper 3671. Germany: University Library of Munich.*

Reungsri, T. (2010). *The impact of public infrastructure investment on economic growth in Thailand*. A Doctorate Thesis submitted to the School of Economics and Finance, Victoria University, Australia. http://eprints.vu.edu.au/15497/1/Thanapat_Reungsri.pdf

Tan, B. W., & Tang, C. F (2011). The dynamic relationship between private domestic investment, the user cost of capital and economic growth in Malaysia. *MPRA Paper No*. 27964, Posted 08 January 2011/ 02:24. Online at http://mpra.ub.unimuenchen.de/27964/

Tang, S., Selvanathan, E.A., & Selvanathan, S. (2008). Foreign direct investment, domestic investment and economic growth in China: A time series analysis (*UNU-WIDER No. 2008/19). Finland: United Nation University.*

Tiffin, R., & Irz, X. (2006). Is agriculture the engine of growth?. *Agricultural economics*, 35(1), 79-89.

Ullah, A., Khan, M.U., Ali, S. and Hussain, S.W. (2012), "Foreign direct investment and sectoral growth of Pakistan economy: evidence from agricultural and industrial sector (1979 to 2009)", *African Journal of Business Management*, Vol. 6 No. 26, pp. 7816-7822.

Ullah, I., Shah, M., & Khan, F.U. (2014). Domestic investment, foreign direct investment, and economic growth nexus: A case of Pakistan. *Economics Research International*, 2014, 1-5.

Younis, F (2014). Significance of infrastructure investment for economic growth. *MPRA Paper 72659, University Library of Munich, Germany, revised 01 Jun 2015.*

Zhang, K. H. (2001). Does foreign direct investment promote economic growth? Evidence from East Asia and Latin America. *Contemporary Economic Policy*, 19(2), 175–185.