The Impact of Economic Factors on Agricultural Production in the Case of a Developing Country

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Abstract: - This paper aims to identify the key economic factors that boost agricultural activity in a developing country such as Albania. The comprehensive literature review reveals that this study area is lacking in our country. After identifying the main factors that significantly impact the level of total farm production, a multiple regression analysis is employed as a statistical technique widely used in cases where the dependent variable is influenced by more than one independent variable. For this purpose, we develop a regression equation using secondary data regarding agricultural production, business freedom, credit, remittances, and foreign direct investments over 20 years with annual frequency retrieved from the World Bank and the National Institute of Statistics of Albania. The regression model results show that the independent variables are statistically significant in impacting the dependent variable. We conclude that business freedom and credit positively impact on agricultural production, whereas remittances and foreign direct investments have the opposite impact.

Key-Words: - Agriculture Production, Developing Country, Business Freedom, Credit, Remittance, FDI, Economy.

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1 Introduction

Agriculture plays a central role in the economic development of developing countries. The sector agricultural constitutes а necessary production process that contributes substantially to any society and economy [1] and remains an essential driver of the rural areas of the European Union [2]. The study of [3] emphasizes the role of agriculture in the economic development of a country in several important aspects such as contributing to national income, being a source of food supply, helping to reduce inequality, and improving rural welfare. The important role of agriculture in a regional economy does not only include its production but is related to other antecedents such as those of production and labor that are also required by other sectors, [4]. Agricultural development is one of the most powerful tools to end extreme poverty, foster shared prosperity, and feed the projected 9.7 billion people by 2050, [5].

In the case of developing countries, agriculture has always been a challenge for the hundreds of millions of small-scale farmers and pastoralist families who rely on the food they can produce on their own. At the same time, decades of international investments have created new agricultural and financial technologies, which, paired with effective development programs, have created opportunities for inclusive agriculture-led growth, [6].

Albania is considered a developing country with a total land area of 28,750 square kilometers, of which 24% is agricultural, 36% forest, and 15% pasture or other type of land.

Although agriculture no longer dominates the Albanian economy, its contribution to the GDP is still significant. This is evident from various databases and analyses conducted by agencies and formal institutions in the country.

The agriculture sector's contribution to GDP for 2021 was 16.8% and 16.2% for 2022. During 2020 there was an increasing trend of agricultural production, specifically in vegetables, aromatic, medicinal plants, and cooking spices, [7]. Albanian agriculture represents a driving force in the economy, employing one-third of the population and significantly contributing to the Western Balkans' economic position. Agriculture is one of the main economic pillars of Albania's economy contributing 18.36 percent of the country's GDP, according to the National Institute of Statistics in 2023. While the sector has become more resilient and efficient, the challenges remain, calling for a

collective effort to improve food safety, enhance value addition to primary production, and streamline coordination along the food value chains, [8]. Considering the importance of this sector in our country, the focus of the research is agricultural production and how the main economic factors impact its level.

The paper is organized as follows. The first section provides a brief review of previous research and findings regarding the factors that impact agricultural production. Second, a description of the methodology used in this study is given, explaining the approach, variables, hypothesis development, and data analysis. The findings, discussions, and conclusions are summarized in the last part of the study.

2 Literature Review

Agricultural production is designed by combining several socio-economic factors that influence it. Many researchers have addressed these factors in the economic reality of different countries. [9] have studied these factors by grouping them into biochemical, environmental, and technological factors. Other scholars have studied factors such as the labor force [10], climate change [11], remittances [12], trade of agricultural products [13], education [14], credit [15], foreign direct investment [16], or freedom of business [17]. However, the importance of these factors is influenced by the socio-economic characteristics of each country.

2.1 Agricultural Production and Business Freedom

Business freedom positively impacts agricultural production, increasing the capacities and improving production methods. Greater freedom of business affects the embrace of new technologies and investments, improving the yield in agriculture. Free competition gives power to the market by creating more access for farmers to the national and international markets. The increase of International Trade through globalization brings benefits to the growth of production technology, and the improvement of the food production chain for farmers aiming to fulfill the main purpose of agriculture: ensuring the production of food for the entire population, [18]. Development in these dimensions improves the quality of agricultural products by using natural resources sustainably and enhancing food security

Different authors have emphasized the importance of the variable "freedom of business" in

agricultural production. In their study, [17] verified a positive relationship between economic freedom and the efficiency of a farm, asserting that freedom of decision-making helps agricultural development. Furthermore, the decision-making process in a free economic environment. accompanied bv institutional support for farm management training, increases the chances for a successful, quality, and productive farm, [19]. The freedom of business also appears in its legal form, which was addressed by [20]. In their study, the researchers claimed that there are significant differences in the economic performance of business farms compared to cooperative ones. They found that the sophisticated management style in business farms has a direct impact on economic indicators and agricultural production. In a broader sense, an economy with a high level of business freedom is an indication of a strong relationship between companies of different natures without government intervention. Under these economic circumstances, the partnership between supplier-client or third-party companies will work effectively and productively [21], leading to an increase in agricultural production.

2.2 Agricultural Production and Credit

The level of credit in the agricultural sector has a fundamental impact on the development of all its components. Lending creates potential for the growth of farms and agribusinesses by improving the capacity to purchase more inputs [22], updating technology [23], improving infrastructure, and expanding productive land. Moreover, it supports farmers in dealing with the consequences of natural or different risks. Therefore, the financial sector or government support in the form of grants or subsidies is considered to play a facilitating and supporting role in developing the agricultural sector.

Focusing on the studies in this field, [15] proved the existence of a strong positive correlation between credit and agricultural production. Moreover, such a relationship existed between the Nigerian government's expenditure on agriculture and agricultural production. So, an increase in lending from the private or public sector increases agricultural production. This relationship was further analyzed by [24] using the nonlinear autoregressive distributed lag (NARDL) model. The study showed that (i) the relationship between credit and agricultural production is more present in the long term and (ii) the growth of agricultural production is affected by the growth of credit with a delay of four quarters. In the same context, [25] revealed the relationship in the short-term and longterm between credit in agriculture and agricultural production using the autoregressive distributed lags limit test (ARDL) In addition, the study identified also other factors such as government expenditures in agriculture, inflation, and interest rates to have a significant impact on agriculture production. The one-sided connection of credit in agriculture with agricultural production was also verified with the Granger causality test in the study of [26]. This study emphasized the facilitation of credit procedures and the increasing access to agricultural loans as leading factors that effectively improve agriculture production.

In his study [22] proved that a 10% increase in agricultural credit affects a 10.8% increase in the purchase of tractors, a 5.1% increase in pesticides, and a 1.7% increase in chemical fertilizers. The impact of credit institutions on the purchase, update, and use of technology in agriculture is positively significant, but it depends on the size of the farm and the type of inputs used [23].

2.3 Agricultural Production and Remittances

Remittances represent a source of additional income for farmers, which they can use to expand production activity or manage risks more easily. On the other hand, an increase in remittances means a more immigrated workforce, so the number of farmers in the country of origin decreases or the number of abandoned agricultural lands increases, affecting the decrease in agricultural production. Remittances are important not only at the microeconomic level but also at the macro level for the country's economy, especially for developing countries. In his study of 103 developing countries [27] revealed that remittances have a significant negative relationship with poverty. A 10% increase in remittances per capita results in a 1% decrease in number of people living in poverty. the Furthermore, developing countries are economies that rely on the agricultural sector, [28].

Their study [12] proved that farmers who receive remittances from emigrants tend to have higher agricultural productivity and this impact is greater on farms with low productivity. These researchers have continued the study in another paper by including the concept of earned and unearned remittances, [29]. In this study, the authors conclude that unearned remittances (which are not the family's main income source) have a greater impact on the increase in agricultural productivity than earned ones. His article [30] reinforces the positive relationship that remittances have in agricultural production, contradicting the opinion that remittances are mostly used for food consumption. In his study [30], he proved that remittances have alternative uses by poor families, such as investments in agricultural production.

A point of view in the opposite direction shows the study of [31]. The study suggests that while increased remittances in Nepal boost consumption, demand is shifting from traditional agricultural products to modern manufactured goods, and agricultural production is declining as labor emigration leaves more land uncultivated, thereby reducing the supply of domestic goods and increasing reliance on imports, [31]. Similarly, the study [32] proves that the increase in remittances causes a strong negative impact on the productivity of agricultural work. The study goes further by stating that a higher level of GDP and human capital causes a decrease in agricultural production, [32]. Also, the same conclusion was given in the study conducted by [33], where it is emphasized that as GDP per capita increases, people are less inclined to engage in menial jobs such as agriculture.

2.4 Agricultural Production and FDI

Foreign direct investments play an important role in different sectors of the economy, especially in developing countries, by reducing poverty, promoting economic growth, creating new jobs, and transferring new knowledge. Regarding production, the literature review suggests that the impact of FDI in the agricultural sector can be positive or negative.

The study conducted by [34] in sixteen developing countries, finds a medium- to long-term positive impact of FDI on value added in agriculture, forestry, and fishing. Moreover, there exists a two-way causality between foreign direct investments in agriculture, forestry, and fishing and value-added in these sectors. This result suggests that countries facing high foreign direct investment (FDI) transaction costs or those with a less favorable investment climate can enhance agricultural production by addressing and removing these barriers. By creating a more conducive environment for investment, these countries could potentially unlock greater agricultural productivity and development.

Using quarterly time series data for 36 years (1981-2017), [35] analyzed the impact of foreign direct investment on the agricultural sector in Nigeria, by concluding that foreign direct investment has a positive and significant impact on agricultural production. The positive role of foreign investments via their effect on agricultural productivity is also suggested by [36]. However, based on the literature review conducted by [37], several empirical studies have used aggregated FDI inflows. The sectoral approach of FDI is rarely used

and when it is, it concerns rather developed countries. The effects of the FDI at the sectoral level imply both direct and indirect influence. The direct effect is seen from agricultural FDI to agricultural production, whereas the effect is indirect from spillovers of FDI in the rest of economic sectors to agricultural production. [38] tested the effect of sectoral FDI on productivity across economic sectors in Latin America and concluded that FDI in agriculture has a positive and significant effect on agricultural productivity and a positive spillover effect from manufacturing FDI and services FDI. The explanation of the indirect effect is argued by the presence of foreign capital in agri-food industries, which requires more efficiency in agricultural production.

According to some other studies, the negative influence of FDI on agricultural value added is suggested. These researchers consider the sectoral differences in the impact of FDI and conclude that FDI is predominantly directed towards the manufacturing and services sectors. with comparatively less investment in agriculture, [39]. Early studies suggest that FDI negatively impacts the growth of host economies [40], as it can lead to monopolistic structures in certain industries, which undermines the efficient allocation and utilization of resources, [41]. In Nigeria, [42] found in their study that FDI does not have a significant impact on agricultural output. The empirical findings of [43], show that FDI has a considerable negative influence on the agricultural sector in Bangladesh in the long term. Moreover, this is also found by the study that FDI has no effect in the short run on the country's agricultural sector. The study conducted by [44] gives empirical results by showing no significant effect of FDI inflows on the agriculture value added-to-GDP ratio in Tanzania even though FDI inflows in the economy have been outstanding, particularly in the past two decades. [39] study on Ghana's agricultural sector found that FDI negatively impacted agricultural productivity in the long term (1980-2013), whereas in the short term, FDI had a positive effect on productivity.

2.5 Climate Change, Education and Gender Impact on Agricultural Production

Agriculture is a sector exposed to risks, especially natural risks. Climate changes harm agricultural production and in the future, this phenomenon is expected to worsen, [11]. On the other hand, agriculture degrades the environment, so the use of inputs in a more effective way would have a more positive impact on the environment than the application of methods such as organic farming, [14].

Using inputs effectively through technological methods requires knowledge on the part of the farmer. The level of training and years of formal education of the farmer has a significant impact on increasing the probability of a farmer entering the market and increasing the well-being of his family, [45]. So, to increase the productivity of agricultural production, it is necessary to invest in farmers, as human capital, [46].

The researchers seem to have different attitudes about the influence of gender in agricultural production. Some support the theory that women have a higher influence on agricultural production, while others oppose it. The transformation of the gender gap is expected to occur when the control of assets and resources is done by women, [47]. Another important social factor is job satisfaction. In different sectors, we find an important connection between job satisfaction and increased worker productivity. It has been noted that the satisfaction of rural families in China (76.5%) has influenced the increase in farm performance, [48].

3 Methodology

This paper aims to identify the key economic factors that boost agriculture activity in a developing country such as Albania. Based on the significant role of agriculture in the GDP of Albania, the study is highly important at the macroeconomic level and will bring important results for policymakers. The study uses secondary data for 20 years with annual frequency which is retrieved from the World Bank database and the National Institute of Statistics of Albania (INSTAT). So, a time series of 20 observations is included in the study.

To achieve the above objective, the study employs a multiple regression analysis which is a widely used statistical technique in cases where the dependent variable (Y) is influenced by more than one individual variable (X), [49], [50]. The dependent variable included in the study is the total production in agriculture. This means that we investigate the factors that have a significant impact on the overall output of agricultural activity.

The independent variables of the study are:

(i) Business Freedom - a measure of an entrepreneurial environment that expresses the level of regulatory framework development to support entrepreneurship in the country. The Business Freedom Index is composed of 10 factors derived from the Doing Business Report of the World Bank. The scoring of the index ranges from 0 to 100, where the higher the index value, the freer the business environment to encourage entrepreneurship development. This indicator is expected to have a positive impact on the dependent variable, since an increase in the overall scoring of the business environment will boost the production in all the sectors, including agriculture, [51].

H1: There is a positive relationship between Business Freedom and the production of agriculture

(ii) Credit – From the financial institutions' point of view, agriculture is considered a risky activity. As such, banks often hesitate to lend to this sector. However, bank financing is considered pivotal to support agricultural households, which are characterized by small-sized farms with low access to finance. Therefore, it is important to investigate the impact that bank crediting has on agriculture production. This indicator is measured by the monetary sector credit to the private sector as a percentage of GDP.

H2: There is a positive relationship between credit and production in agriculture

(iii) Remittances - Remittances of migrants are a significant source of income for rural families in Albania, which have agriculture as the main activity for living, [52]. Therefore, this indicator is expected to have an impact on production in agriculture. It is measured by the annual personal remittances paid (logged value).

H3: There is a positive relationship between remittances and the production of agriculture

(iv) Foreign Direct Investments – Generally FDIs in developing countries are not only a crucial source of capital, but they allow the transfer of technology, skills, knowledge, and good practices from a developed country to a developing one, [53]. Considering aggregate FDI enhances the model's comprehensiveness and accuracy. From an economic point of view, the inclusion of FDI in the model is essential as it affects factors such as employment. income distribution. and infrastructure, which in turn affect agricultural productivity. FDI in non-agricultural sectors can divert labor and resources from agriculture, potentially reducing output. Therefore, there are controversial findings in the existing literature regarding the relationship between FDIs and production in agriculture, [54]. Thus, we test if this is relevant also in the case of the agriculture sector in Albania and will determine the impact that FDIs have in increasing/decreasing the overall production in the sector. This indicator is expressed by the net FDI inflow (logged value). H4: There is a negative relationship between FDIs and the production of agriculture

The overall regression model is: PROD_t = $\beta_0 + \beta_1$ *FREE_t + β_2 *CRED_t + β_3 *REM_t + β_4 *FDI_t + ε_t Where: β_0 - regression intercept β_1 ... β_4 - regression coefficients FREE- Business Freedom CRED - Bank crediting REM - Remittances FDI - Foreign Direct Investment ε_t - error term

To check the appropriateness of the model, we use several tests after obtaining the regression output, [55], [56]. The first test is the Ramsey Reset test, which helps us to understand if the relation between the dependent and independent variables is linear. The Ho for the test which states that "The functional form of the regression is appropriate" will be rejected if the p-value is lower than 5%.

We also test for multicollinearity to check if independent variables are highly correlated with each other, which would negatively affect the regression results and give unreliable estimates. The Variance Inflation Factor (VIF) is used to detect multicollinearity. The presence of multicollinearity is accepted if VIF values are higher than 5. In cases where multicollinearity is identified in the model, several adjustments should be made to fix it.

Moreover, we check whether the residuals are normally distributed using the Jarque-Bera test. The null hypothesis states that "Regression residuals are normally distributed" and it will be accepted for p > 0.05.

Autocorrelation is another problem that could result when we use multiple regression models. We use the Breusch-Godfrey Serial Correlation LM Test to test for autocorrelation up to any order p. The null hypothesis for this test asserts that "There is no serial correlation in the model". The last residual diagnostic test is to detect heteroskedasticity using the Breusch-Pagan-Godfrey Test. To be accurate, a regression model should support the null hypothesis which states that "All variances of residuals are equal", which means that the model is homoscedastic and heteroskedasticity does not exist.

4 Discussion

The results of the regression model show that all the independent variables are individually significant,

so they all impact the dependent variable. The overall model is significant (F-statistic less than 0.05), so we can use and interpret the results and use them in forecasting production in agriculture in the future. The adjusted R^2 of the model is 82.76%, which means that the independent variables determine 82.76% of the fluctuations in the production in agriculture.

Table 1. Multiple regression output Dependent Variable: PROD Method: Least Squares

Variable	Coefficient	t Std. Error	t-Statistic	Prob.
FREE CRED	1612.293 4586.576	594.1834 1930.094	2.713460 2.376348	0.0265* 0.0448*
REM	-0.000347	0.000110 3	.157899	0.0134*
FDI C	-6.71E-05 538518.4	3.49E-05 1. 80949.18	.925359 6.652549	0.0904** 0.0002*
R-	0 885057	Mean	dependent	601400.0
Adjusted	0.885057	Var		081422.2
R-squared S.E. of	0.827586	S.D. depe Akaike	endent var info	29760.20
regression Sum squared	12357.27	criterion		21.96560
resid	1.22E+09	Schwarz Hannan-(criterion Duinn	22.18289
likelihood F-	-137.7764	criteria.	_	21.92094
statistic Prob(F-	15.39994	Durbin-V	Vatson stat	2.905321
statistic)	0.000793			

* *p* < 0.05

0.1

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Source: Authors calculations in E-views 12

Based on the regression output (Table 1), we conclude that business freedom positively impacts agricultural production. This means that the higher the business freedom, the higher the number of farmers and this increases the production in agriculture. Business freedom enhances efficiency in the agricultural sector by increasing incentives, reducing financial burdens, supporting technological development, strengthening legal systems and property rights, and optimizing resource allocation, [57]. The results of the model indicate that the relation between credit and agricultural production is also positive at a 95% significance level, which

signifies that the higher the level of credit, the higher the access of farmers to finance and their financing sources and consequently the higher production in agriculture. The study [58] shows that agricultural credit positively affects agricultural production in both the short and long term, with a confirmed unidirectional causal relationship agricultural between credit and production. Therefore, [59] recommends that credit institutions expand their lending services to rural agricultural families to increase the number of beneficiaries. In contrast to the first two variables, remittances have the opposite impact on agricultural production. This means that the increase of remittances affects the decrease of production in agriculture. This can be explained by the reason that the growth of remittances accompanies the increase of migrants, which could affect the reduction in the number of farmers. This reduction has a negative impact on the agricultural production. According to [60], as the percentage of households receiving remittances increases, there is a corresponding rise in investment in non-agricultural activities, leading to higher selfemployment in these sectors and a greater contribution of non-agricultural income to overall household earnings. Foreign direct investments are another variable included in the regression model. Results of the model indicate that the relation between FDIs and agricultural production is negative at a 90% significance level. The negative impact of FDI on agricultural production is supported by existing literature, including papers by [43], [44] and [39]. This negative relationship can be attributed to the fact that FDI is highly concentrated in non-agricultural sectors such as real estate (26%), financial intermediation (17%), hvdrocarbons (16%), energy (10%). and communications (4%) during the fourth quarter of 2023, [61]. This sectoral concentration leads to an economic shift away from agriculture, as resources (including labor and capital) are reallocated towards more lucrative and investment-heavy sectors. As a result, the agricultural sector faces diminished investment, productivity, and output. This trend is further compounded by the limited attractiveness of agriculture to foreign investors due to factors such as land fragmentation, low technology level, and insufficient infrastructure [62], which further entrenches the negative impact of FDI on agricultural production in Albania.

In terms of the acceptance/rejection of hypotheses, these conclusions are summarized in Table 2.

Hypothesis	Formulation	Accepted/rejected	
H1	There is a positive relationship between Business Freedom and production in agriculture.	Accepted	
Н2	There is a positive relationship between credit and production in agriculture.	Accepted	
Н3	There is a positive relationship between remittances and production in agriculture.	Rejected	
H4	There is a negative relationship between FDIs and the production in agriculture.	Accepted	

Table 2. Summary of hypothesis results

Source: Authors calculations in E-views 12

As stated in the methodology section, the regression model needs to satisfy several crucial assumptions, including linearity of the relationship between the independent and dependent variables, normality of distribution, absence of multicollinearity, absence of heteroscedasticity, and absence of autocorrelation, to be reliable. Based on the residual diagnosis test results (Table 3), we conclude that:

- The Ramsey Reset test indicates that the model is correctly specified with a p-value greater than 0.05, affirming the appropriateness of the model and the linearity of the relationship between the independent and dependent variables.
- The model is free of multicollinearity because all VIF values are less than 5.
- The p-value of the Jarque-Bera test is higher than 0.05, so we accept the null hypothesis and conclude that residuals are normally distributed.
- The model does not suffer from autocorrelation because the p-value of the Breusch-Godfrey Serial Correlation LM Test is higher than 0.05.
- The model is homoscedastic, and we can accept the null hypothesis of the Breusch-Pagan-Godfrey Heteroskedasticity Test (p-value > 0.05).

Upon conducting the necessary diagnostic tests, we have confirmed that the model meets the assumptions required for reliable results. These tests conclude that the model is well-specified, and its results are accurate.

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Table 7	Abultunlo	rogradion	modal	tooto
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Test name	Probability/value	Null hypothesis
Ramsey RESET Test	0.2297*	Accepted
Jarque-Bera	0.6842*	Accepted
Breusch-Godfrey Serial Correlation LM Test	0.1268*	Accepted
Heteroskedasticity Test: Breusch- Pagan-Godfrey	0.9603*	Accepted
Variance Inflation Factors	FREE – 1.3679 CRED – 2.2621 REM – 2.5719 FDI – 1.4404	Accepted

p > 0.05

Source: Authors calculations in E-views 12

5 Conclusion

By employing a multiple regression analysis, this study contributes to the existing literature by providing statistical evidence on the factors that impact the production of agriculture in a developing country such as Albania. We conclude that a good freedom level of business that supports entrepreneurial activity is positively linked to the growth of production in agriculture. Therefore, the government should work to further improve the ranking of the Business Freedom Index, focusing on the factors it takes into consideration.

The same result comes from bank crediting, which also positively impacts agriculture production. The higher the access to finance from banks, the higher the capital for direct investment from farmers, which extends the production.

In contrast, remittances and FDI have a negative relationship with agricultural production. So, an increase in remittances and FDI means that farmers choose to work abroad or in other sectors with higher development due to the support from FDI. For this reason, the government must design supporting policies and strategies to revitalize rural areas. Developing infrastructure, improving agricultural support services, encouraging foreign investors in the agricultural sector, and encouraging families that receive remittances to invest in the would agricultural sector help strengthen agricultural development.

Limitations of the study and direction for future research: The study is focused only on the case of Albania as a developing country. A valuable contribution could be expanding the analysis to other developing countries with similar economic development, for example in the Balkan region. In this case, a comparative analysis between countries of the same region could suggest other factors that can drive agricultural production. Due to rapid changes in economic development over the countries such as changes in exchange rates, the relative increase of inflation in one country compared to another, relative changes in the workforce rate between countries, etc., other variable impacts in the future can be analyzed.

Moreover, this study is based on secondary data that have a significant impact on agricultural production. A valuable suggestion could be to analyze agricultural production from the farmers' perspective by including primary data, which could lead to more appropriate results and suggestions for future intervention.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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