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RESEARCH PAPER

The Effect of Agricultural Support Policies on Economic Development and Growth

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Abstract

Agricultural support policies form the basis of sustainable development plans to ensure economic sustainability within the framework of global development goals. In the analysis, the total production of 10 agricultural products (cotton, sunflower, soybean, wheat, corn, rye, oat, paddy, and safflower), which are important in terms of agricultural production in Turkey, was used for the years between 1980 and 2020. Analyzes were performed using the EViews-9 package program. The intervention analysis method was used in the study. First, the appropriate ARIMA model was determined, and then a dummy variable was added to the model for 2006, the year the support applications started, and the said effects were revealed. According to the analysis results, agricultural support policy and price difference payment support, which is one of the agricultural support instruments, has a positive effect of approximately 47% on the total agricultural production in the selected products group.

Key words: Economic Devolopment, Growth, Agricultural Support Policy.

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INTRODUCTION

In addition to being the oldest production activity in human history, agricultural activities have strategic importance as they provide the production of basic needs such as nutrition and clothing. With the changing technology and globalization, the agricultural sector has also started to develop and change. Especially after the Second World War, steps were taken to diversify agricultural production and increase productivity by using modern agricultural methods worldwide. However, irrigation possibilities have been expanded, and many changes have occurred in soil cultivation methods. After these developments, significant increases have occurred in agricultural production and productivity.

Due to its disadvantageous characteristics, agriculture is one of the sectors protected by supportive policies in all countries, especially in developed countries. Again, subsidies are provided due to low price and income elasticity of demand for agricultural products, high risk and uncertainty in production. As in other countries, the agricultural policies implemented in Turkey; It has various aims, such as increasing the income and welfare level of producers, ensuring price stability, increasing consumer welfare with cheap food supply, providing self-sufficiency, rural development, and foreign exchange savings.

It is considered critical to establish and implement effective agricultural policies to realize the agricultural sector's potential, increase its economic value and win both the producer and the consumer. In this sense, the state's intervention in agriculture through support policies is necessary not only for the producer and the consumer but also for protecting the environment and biological diversity and the sustainability of agriculture.

The rest of the study is structured as follows. Section 2 provides insights into expansionary and contractionary fiscal policies, while the attendant literature is covered in Section 3. The methodology and data are discussed in Section 4, whereas Section 5 discloses the empirical results. Section 6 concludes with implications are future research directions.

AGRICULTURAL SUPPORT POLICIES IN THE TURKISH ECONOMY

Agricultural support policies include determining appropriate and necessary procedures and making arrangements for developing the agricultural sector and rural areas in line with development plans and strategies. According to the OECD, agricultural support is defined as support purchases, carried out mainly on price policy, and support through agricultural loans (OECD, 2020: 172).

Agricultural support policies aim to create stability in agricultural product prices and balance between products, to ensure stability and fair income distribution in producer incomes, to develop suitable business structures with structural developments in agriculture, to enable agricultural producers to compete with other countries in the world in terms of technology, cost and price and also to contribute to the offering of agricultural products at the desired time, place and amount to the consumers at affordable prices. (Çavuş, 2009:6-7) The primary purpose of agricultural support policies is to prevent producers and consumers from losing income against price fluctuations and provide a fairer income distribution. Thus, stability in agricultural product prices will be ensured, and inter-regional changes will be prevented. The state needs support to develop agriculture within the country and solve existing problems (Kamacı, 2006:21).

At the same time, all kinds of expenditures made for the agricultural sector are within the scope of the support policy, and these include expenses made for all types of support that protect agriculture, develop the agricultural industry, encourage agriculture, provide agricultural infrastructure, observes agricultural products, and ensures agricultural productivity (Ataseven, 2016:2).

Agricultural supports can be applied in different ways in each country. The state aims to revitalize agricultural life and protect producers and consumers against all kinds of price fluctuations with its interventions in agriculture. The state intervenes in the market to protect producers and consumers and tries to prevent loss of income against price fluctuations (Kamacı, 2006:21). These interventions must

have a common goal. These goals are to protect the country's food security by ensuring the continuity of agricultural production, increasing the living standards of agricultural producers and consumers, contributing to the national economy of the sector's production, and achieving a competitive advantage in foreign trade (Sergeant, 2009:6).

Agricultural supports applied today can be classified as crop production, animal production supports for structural improvements in agriculture, and supports for rural development and environmental purposes. Various biological control supports, diesel, fertilizer, soil analysis supports, agricultural consultancy, and farm accounting data network system registration supports are within the scope of supports that will strengthen the agricultural infrastructure. In addition, the rural development investments support program (KKYDP) and the environmental protection agricultural land protection (ÇATAK) project are the policies implemented within the scope of rural development and the environment of the ministry (Durak and Karadağ, 2017:113-114).

The "pay the difference" system, which expresses the difference between the producer price and the market price, is a support type with the features to replace the price support system with the most negligible loss. The price difference payment system facilitates the adaptation to world market prices by ensuring that agricultural prices are formed under market conditions and contributes to the increase in welfare by providing products at low prices to the consumer. Applicability of the different payment systems; A strong public finance that develops with tax revenues, a detailed and consistent registration system in agriculture, a conscious producer organization, the positive perspective of the producers on technology, the competitive nature of the input markets, the necessary structural, institutional, and legal, such as commodity exchanges and futures markets. possible with conditions (Habalı, 2010:87).

In our country, until the 2000s, agricultural support was carried out through support purchases, input, product and credit subsidies and other subsidies for the agricultural sector. While the number of herbal products included in the price difference payment support was around 20 in the 1970s, it gradually decreased to 10 in the 1980s with the effect of market economic policies. Still, it increased to over 20 again in the 1990s. The fact that these support policies, which are essential in the form of input subsidies and price support, both failed to lead the agricultural sector to success at the desired level and brought heavy burdens to the budget led to the transition to new support policies, especially Direct Income Support (DIS), with the support of international organizations. Agricultural Reform Implementation Project (ARIP) played the leading role in this change (Yavuz et al., 2016:23).

In ARIP, three main policy elements have been established: direct income support, phasing out price and input supports and reducing government intervention in processing and marketing agricultural products by privatizing state enterprises in agriculture. In this sense, price supports were removed, direct income support was substituted for these supports, and the Agricultural Sales Cooperatives Unions were restructured. As a result of the mid-term review of the project in 2004, new components were added to the project. In addition, it was decided to extend it until the end of 2006 (Yavuz et al., 2016:23).

The fact that the agricultural sector dominates the Turkish economy has made agricultural policies one of the essential policies since its establishment. Agricultural policies have also changed depending on the cyclical changes in the Turkish economy. This change became more evident in 2001 and later. The "Agricultural Strategy Document (2006-2010)" was prepared in 2004 to facilitate the decision-making of the segments related to the agricultural sector and to ensure that the industry is developed in line with the development goals and strategies, taking into account the compatibility with the EU, before the 'Agricultural Law' No. forms the basis of agricultural support policies implemented. Agricultural price support policies continue within the scope of this law until today.

This support model, a premium (price support) system in practice, called price difference payment supports in Turkey, is a support method in the agricultural sector, where the supporter undertakes to make a payment per production unit for products where there is mainly demand pressure (Yavuz et al., 2016:24). Like other support systems, the price difference payment system is effective on both producer

and consumer welfare. For the producer, an increase in income may occur due to the increase in differential payment, as well as an additional income increase due to the rise in agricultural production encouraged by the increase in payment. From the consumer's point of view, it can be said that the different payment systems can lead to an increase in welfare, based on the assumption that the prices formed in competition conditions are at the lowest level. Minimizing the possibility of excessive gains or losses for the producer and consumer depends on the effective determination and operation of the difference between the market price and the target price. In the difference payment system, the government undertakes to make a compensatory payment to the producers when the producers' production costs are above the market price, without affecting the prices the consumers pay. The compensatory payment consists of the difference between the target price (producer price) set by the government and the market price. As a criterion in determining the target price, the formula can be used to add the difference between current cash costs and the average cash costs of the past five years to the average price of the past five years (Teoman, 2012:6).

Four positive aspects of the different payment systems can be mentioned economically. First, due to the system's operation, consumers and industries that process agricultural products have the opportunity to purchase the product at the market price. Thus, since there is no artificial price fixation, the possibility of distorting effects in resource allocation that such pricing would bring with it is eliminated. This situation can provide a competitive advantage for industrialists who use agricultural products for export as inputs, just like in the premium system. Second, the system ensures that manufacturers producing the supported product are registered, provided the system is implemented under a contract. Thirdly, it is possible to get rid of the costs of storage and disposal of the supported product, thanks to the operation of the different payment systems. Finally, the fourth positive aspect is that since the taxpayers will undertake the financing of the different payments in terms of financing the support instead of the consumers, the opportunity to show agricultural support as a separate item in the budget is created (Yavuz et al., 2016: 32).

LITERATURE REVIEW

The effect of agriculture on economic growth has been among the topics discussed in the literature for a long time. The study, handled by Johnston and Mellor (1961) and created as a qualitative research article, aimed to investigate the role of agriculture on development. Within the scope of the study based on the related purpose, The supports provided by both the government and the public, which are influential in the development of agriculture, have been examined, and the necessity of maintaining a balance between the agricultural sector and other sectors has been expressed. It is seen within the scope of the study that the importance of rural development is great at the country's growth point. However, it cannot be deduced that agricultural development is more important than industrial expansion in the relevant study. At this point, keeping a balance is necessary to ensure both agricultural and industrial development.

The article "The Production Effects of Agricultural Income Support Policies under Uncertainty", published by Hennessy in 1998, aims to research how agricultural support policies affect production under uncertainty. Although the related study was prepared with the empirical modelling method, the Von Neumann-Morgenstern utility function was used. As a result of the study, it is seen that; Insurance effects on support policies positively affect the input level. From this point of view, the impact of insurance and wealth should also be considered in addition to both trade and domestic policy reforms for development.

Another study was published by Günsoy, B. and Günsoy, B. (2000) under the title "Ineffectiveness of Agricultural Support Policies in Turkey". Although the related article is a research article created in the light of statistical data, OECD data between 1980-1998 is used as the basis of the study. The agreement, which emerged from the necessity of updating agricultural policies within the scope of agricultural reform in Turkey, expressed the ineffectiveness of policies by expressing the increasing costs and

burden on the consumer due to agricultural support. In order to minimize the relevant inefficiency, the income status of the society should be taken into account when creating a policy.

C. Petter Timmer (2002) aims to investigate the potential impact of agriculture on the economy in his study of agriculture and economic development. The study named "Agriculture and Economic Development", which aims to examine the impact of policies supporting rural development on the economy, was created as an empirical study using the panel data analysis method. It is seen in the related research that; Policies carried out based on agriculture to provide efficiency at the point of minimizing poverty will lead to growth-encouraging results.

Although Acar and Bulut carried out one of the critical studies that researched the subject in 2010, the related study was named "Agricultural Support Policies in Turkey in the Light of EU Common Agricultural Policy Reforms: A Critical Approach". The corresponding article was carried out as a review research article. As a result of the study aiming to evaluate the positive and negative aspects of the effects that will occur after the implementation of agricultural policies, which are thought to be effective at the exit point from the global crisis, it has been revealed that Turkey's policy implementation needs not to get results in the short term, but to get effective results in a long time.

The study carried out by Civan (2016); was written as "Agricultural Support Policies in Turkey", and the Becker model was used as a model. The related study examines the distribution of support between agricultural sub-sectors and production branches in agricultural support. In the study, producer support data between 1985 and 2004 was used. The "Becker Test" was applied for the empirical research carried out in 12 production branches in Turkey, and it was concluded that the relationship was not linear because of the application. In addition to the relevant result, it was supposed that the increase in support for the policies was positively related to the country's income and the time left to the elections.

Another study carried out in 2011 was published in the Journal of Economic Sciences by Kandemir (2011), with the title "The Effect of Agricultural Support Policies on Rural Development". The related study was created as a research article to examine agricultural policies' positive and negative aspects. As a result of the relevant compilation research article, which was created by considering the data of TURKSTAT and the ministry, the economic impact of the policies was negative at the point of production, and the import of agricultural products showed an increasing feature.

Another study investigating the impact of agricultural policies on development was carried out by Köse (2012) in the European Union and Turkey under "Agricultural Policy Reforms and their Implications on Rural Development: Turkey and the EU". The reform movements of the European Union and Turkey have been comprehensively discussed, and the impact of the relevant policies on development has been examined.

In addition, Yanıkkaya and Koral (2015) empirically examine the effects of agricultural support on the export of 18 products to 72 countries, using the period of 1965-2010 as a sample in their article titled "Impacts of Agricultural Supports on Exports of International Agricultural Products in Turkey". In particular,

PSE and NRA were used as agricultural support indicators, and the related study was conducted with gravity model analysis. During the related examination, the effect of the real exchange rate and volatility on the export of Turkish agricultural products was also examined within the scope of the study. Although the relationship seemed positive, the exchange rate-based coefficient results showed different results at the end of the study.

Aktaş, Altıok and Songur (2015) investigate the economic impact of agricultural support policies, which is the main subject of the study. While the increase in Turkey's foreign dependency brings about the necessity of the relevant research, Turkey's position at the point of agricultural support necessitated the determination of the cause of the wrong orientations in the policies, and Turkey's agricultural support was shown as the basis for the relevant requirement. From this point of view, in the study named "Comparative Analysis of the Effects of Agricultural Support Policies in Different Countries on

Agricultural Production", a comparative analysis of the countries that play a leading role in agricultural policies was carried out. The study, which is based on 1995-2010, was created using panel data analysis. As a result of the research, it is seen that; The changes in inputs and prices because of the support affect the agricultural output positively. At this point, it is necessary to increase the appropriateness of the relevant policies to increase their effectiveness.

When the development of agricultural support policies, which is the main subject of the study, is examined within the literature, the analyses of Yüceer, Tan and Semerci (2020) draw attention. In the study, which was created in the light of the information obtained from the Ministry of Agriculture and Forestry, TUIK, OECD, EU and USA databases, the 2008-2018 time series were used. The policies from 2000 until today were examined, and the data created by using secondary sources were used as the basis for the analysis. As a result of the research, it was seen that; 13% of Turkey's Gross Production in 2019 occurred as a positive effect of agricultural policies. However, although it cannot be said that the negative impact on agriculture has been eliminated, new policies should be implemented to remove the effect of the relevant situation.

In their article titled "Causality Relationship Between Agricultural Support Payments and Agricultural Production Level: The Case of Turkey", Sağdıç and Çakmak (2021) aimed to empirically examine the effect of payments provided to farmers by related policies on a production level. The Hacker and Hatemi-J Bootstrap Causality Test (2006) and the Hatemi-J (2012) Asymmetric Causality Test were used for the causality relationship. As a result of the related study, it is seen that; It can be said that it is necessary to focus on policymaking at this point, while agricultural supports in Turkey affect production positively in the long run, while the shocks that occur also affect the relevant values.

Another study on the impact of Agricultural support was carried out by Tandoğan (2022). The related study named "Impact of Agricultural Supports on the Agricultural Export" has an empirical feature and investigated how agricultural supports affect Turkey's agricultural exports. Within the scope of the relevant research, the data for the period between 1986-2019 (annual) was chosen as a sample for the study. ARDL boundary test and structural break test were used in the related research. As a result of the related study, it is observed that while agricultural exports have a positive relationship with agricultural support and GDP per capita, it has a negative relationship with the real exchange rate. In addition, it is stated that the support policies created as a result of deep studies within the scope of the study will affect the productivity positively; in addition, it is among the positive effects that efficiency will be increased by informing the farmers at the production point, and it is stated that the relevant situation will affect foreign trade positively.

DATA AND METHODOLOGY

In the analysis, the total production of 10 agricultural products (cotton, sunflower, soybean, wheat, corn, rye, oat, paddy, and safflower), which are important in terms of agricultural production in Turkey, was used for the years between 1980 and 2020. The data used in the study was taken from the official Republic of Turkey Ministry of Agriculture and Forestry database annually for Turkey. Analyzes were performed using the EViews-9 package program.

Variables are assumed to be stationary in models studied with time series econometrics. The fact that these variables do not meet the stationarity condition indicates the existence of a trended series. According to Granger and Newbold (1974), spurious regression problems may arise when working with time series that do not satisfy the stationarity condition. In this case, the result of the regression analysis can reflect the actual relationship only if there is a cointegration relationship between these series (Gujarati, 2001:726).

If the time series is not stationary, these series contain a trend. This trend can be stochastic or deterministic. However, the existence of a deterministic trend in the long-term in the series and the trends that appear over time in non-regular models and disappear after a while are different from each other. First of all, stationarity should be determined.

Stationarity in time series is determined in two ways: visually and with the help of statistical tests. The most commonly used test methods for the determination of stationarity properties of time series are Extended Dickey-Fuller (ADF) introduced by Dickey and Fuller (1979), Phillips Perron (PP) and Kwiatkowski, Phillips, Schmidt, found in Phillips Perron (1988). They are unit root tests (KPSS) developed by Shin (1992).

One of the methods used in the analysis is the ARIMA Model. The method used by the ARIMA Model developed by Box and Jenkins (1970) with the Time Series Analysis book is also known as the Box-Jenkins (BJ) method (Chatfield, 2000:43).

The ARIMA model is an adapted version of the ARMA model, formed by the combination of Autoregressive (AR) and Moving Average (MA) Models, used in non-stationary situations. While the past values of the dependent variable are considered the explanatory variable in AR Models, the weighted sum of the lagged and current error terms in MA Models is considered. (Yaffee and Mcgee, 2000:108).

The method that reveals the final stage of our analysis is called Intervention Analysis. Intervention analysis was first introduced by Box and Tiao (1975) in the article "Intervention Analysis with Applications to Economic and Environmental Problems".

The intervention method analyzes any effect on the time series. It reveals the impact of a different intervention or an interruption in this process (Cauley and Im, 1988: 28). This analysis examines serial reactions to another event or intervention input. These events and interventions are usually unusual or one-off events and interventions. Intervention input can be a scandal, war, crisis, embargo, strike or price change (Yaffee and McGee, 2000: 265). The effects of the intervention differ depending on whether the intervention is sudden (pulse) or gradual (step).

The time series function is as follows;

$$Y_t = f(I_t) + N_t \qquad (1)$$

In equation (1), I_t is the political dummy added to the model and takes the value of zero in the period before the intervention and 1 in the period after the intervention. $f(I_t)$ represents the intervention function in the period, N_t represents the ARIMA pre-intervention model. The political influence in the t period is shown as follows;

$$Y_t^* = Y_t - N_t = f(I_t) \qquad (2)$$

In equation (2), Y_t^* refers to the ARIMA notation for the time series after the intervention, Y_t refers to the ARIMA representation for the time series before the intervention, and $f(I_t)$ the transfer function.

The total agricultural production data used in the analysis is expressed as "agriculture" in tables and figures. Before proceeding to the analysis, the data must be made suitable for analysis by passing some tests. After this is achieved, the appropriate model will be determined with the help of ARIMA models, and the intervention analysis and interpretation of the results will be started.

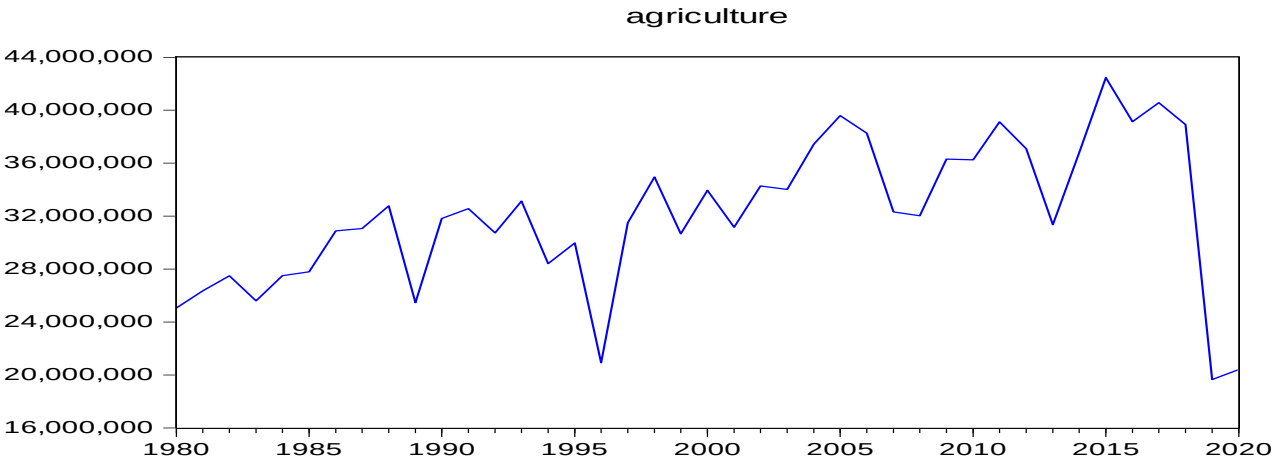


Figure 1. The Course of Agriculture Series

Figure 1 shows the course of agriculture series. When the graph is examined, it is seen that the series contains a trend. For this reason, the logarithm of the series was taken to eliminate small fluctuations and make it linear.

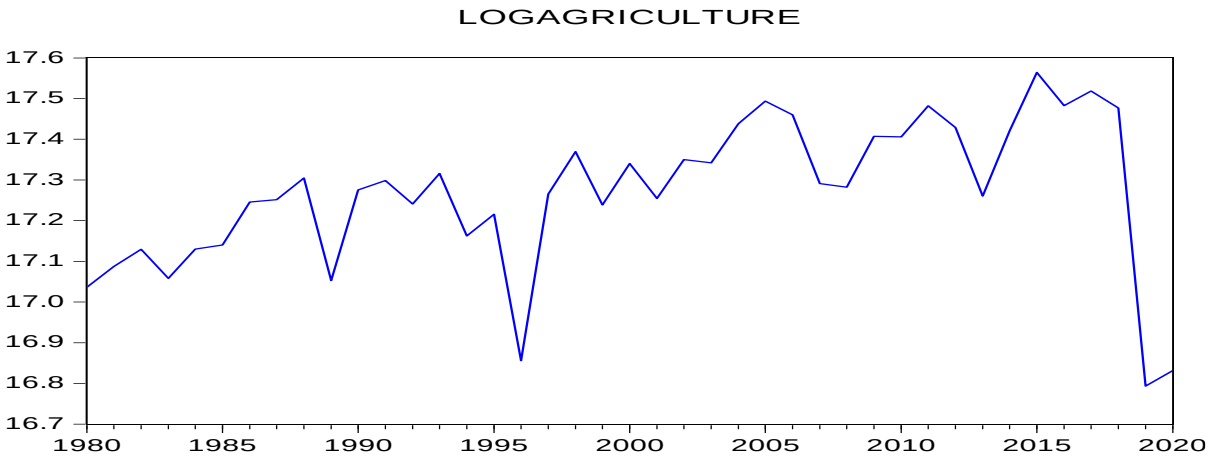
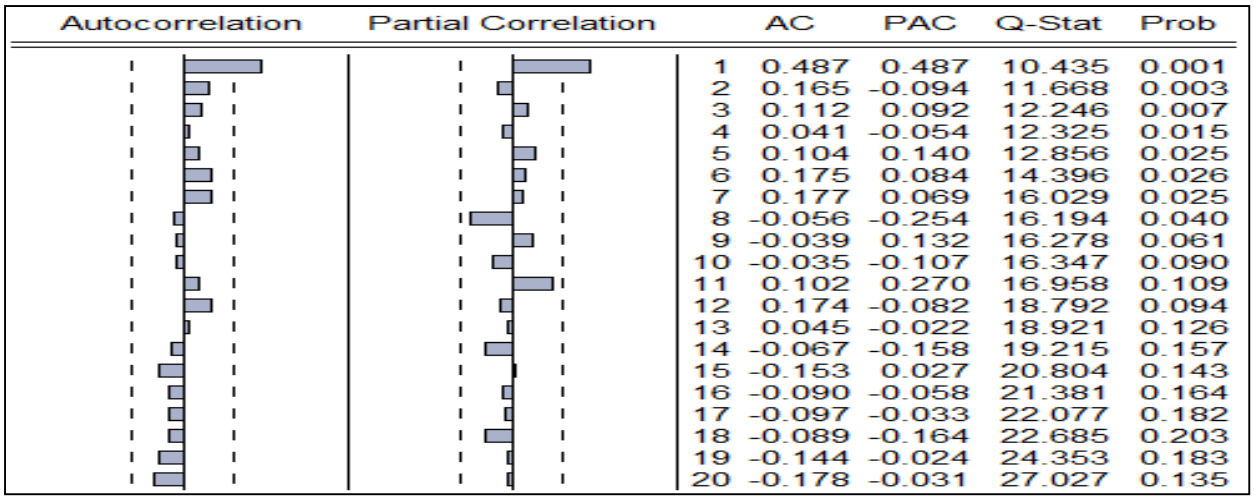


Figure 2. The Course of Logarthm Agriculture Series (Logagriculture)

The graph of the course of logarthm agriculture series is shown in Figure 2. A similar situation to the trendy structure in the Agriculture series also manifests itself in the logagriculture series.



	AC	PAC	Q-Stat	Prob
1	0.487	0.487	10.435	0.001
2	0.165	-0.094	11.668	0.003
3	0.112	0.092	12.246	0.007
4	0.041	-0.054	12.325	0.015
5	0.104	0.140	12.856	0.025
6	0.175	0.084	14.396	0.026
7	0.177	0.069	16.029	0.025
8	-0.056	-0.254	16.194	0.040
9	-0.039	0.132	16.278	0.061
10	-0.035	-0.107	16.347	0.090
11	0.102	0.270	16.958	0.109
12	0.174	-0.082	18.792	0.094
13	0.045	-0.022	18.921	0.126
14	-0.067	-0.158	19.215	0.157
15	-0.153	0.027	20.804	0.143
16	-0.090	-0.058	21.381	0.164
17	-0.097	-0.033	22.077	0.182
18	-0.089	-0.164	22.685	0.203
19	-0.144	-0.024	24.353	0.183
20	-0.178	-0.031	27.027	0.135

Figure 3. Correlogram of Logagriculture

In Figure 3, the Correlogram of Logagriculture series is given. When the correlogram expressing the autocorrelation is examined, it is seen that there is autocorrelation in the series. This creates a belief that the series contains a unit root. In this respect, it is appropriate to conduct unit root tests for the variable first.

In our analysis, using Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root tests, it will be tested whether there is a unit root in the new series whose logarithm is taken ADF, PP and KPSS unit root tests used to test whether the series is stationary or not are reported together in Table 1.

Table 1. ADF, PP and KPSS Unit Root Tests on Logagriculture

	ADF Test Statistic	Mac Kinnon Critical values			Probability Value
ADF	-2.749530	% 1	% 5	% 10	0.2235
		-4.205004	-3.526609	-3.194611	
	ADF Test Statistic	Mac Kinnon Critical values			Probability Value
ADF (-1)	-7.716982	% 1	% 5	% 10	0.0000
		-3.610453	-2.938987	-2.607932	
	PP Test Statistic	Mac Kinnon Critical Values			Probability Value
PP	-2.817662	% 1	% 5	% 10	0.1997
		-4.205004	-3.526609	-3.194611	
	PP Test Statistic	Mac Kinnon Critical Values			Probability Value
PP (-1)	-7.870545	% 1	% 5	% 10	0.0000
		-3.610453	-2.938987	-2.607932	
		LM Stat.			
KPSS	KPSS Test Statistic	% 1	% 5	% 10	
	0.170463	0.216000	0.146000	0.119000	
		LM Stat.			
KPSS (-1)	KPSS Test Statistic	% 1	% 5	% 10	
	0.264991	0.739000	0.463000	0.347000	

As the ADF test statistic first shown in Table 1, (-2.749530) value was lower than the MacKinnon critical values at 1%, 5% and 10% significance levels, and the probability value (0.2235) was greater than the 0.05 critical value, the Ho hypothesis could not be rejected. It has been decided that there is a unit root problem in the series. Then, the series was made stationary by taking the first difference.

The null and alternative hypotheses of the PP test, which is another unit root test used in unit root tests, also overlap with the ADF unit root test. According to the results of this test statistic (-2.817662) value was lower than the MacKinnon critical values at 1%, 5% and 10% significance levels, and the probability value (0.1997) was greater than the 0.05 critical value, the Ho hypothesis could not be rejected. It has been decided that the series is not stationary. At this stage, the first difference of the series has been taken and this problem has been resolved.

Another test used in unit root testing is Kwiatkowski, Phillips, Schmidt, Shin (KPSS). However, unlike the ADF and PP tests, the hypotheses established in the KPSS test are;

H0: Logagriculture is stationary

H1: Logagriculture is not stationary

According to Table 1, KPSS test results indicate that there is a unit root in the series at 5% and 10% values. For this reason, as in other unit root tests, the first difference of the series was taken and the unit root problem was resolved.

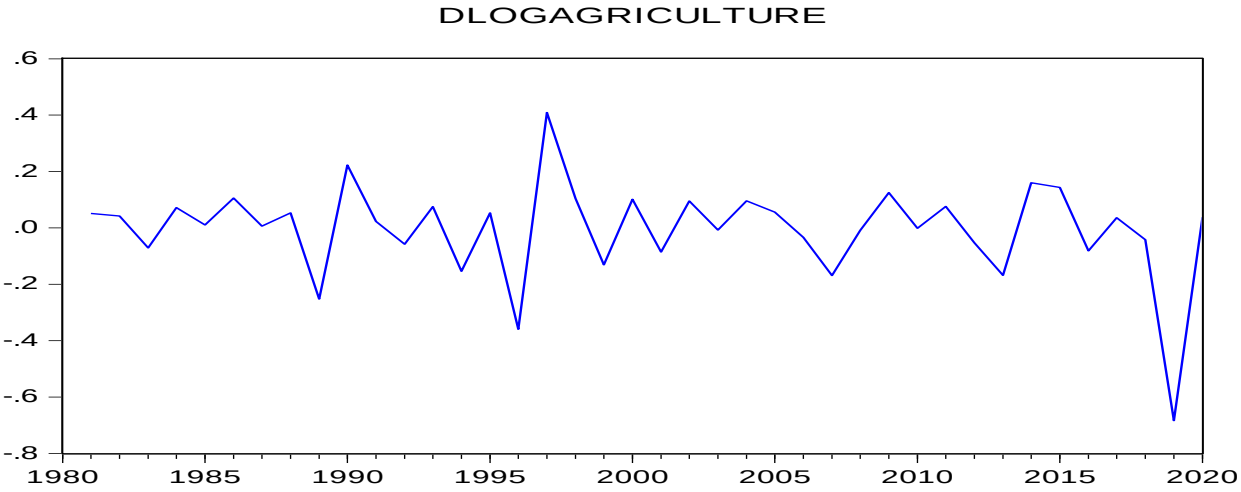
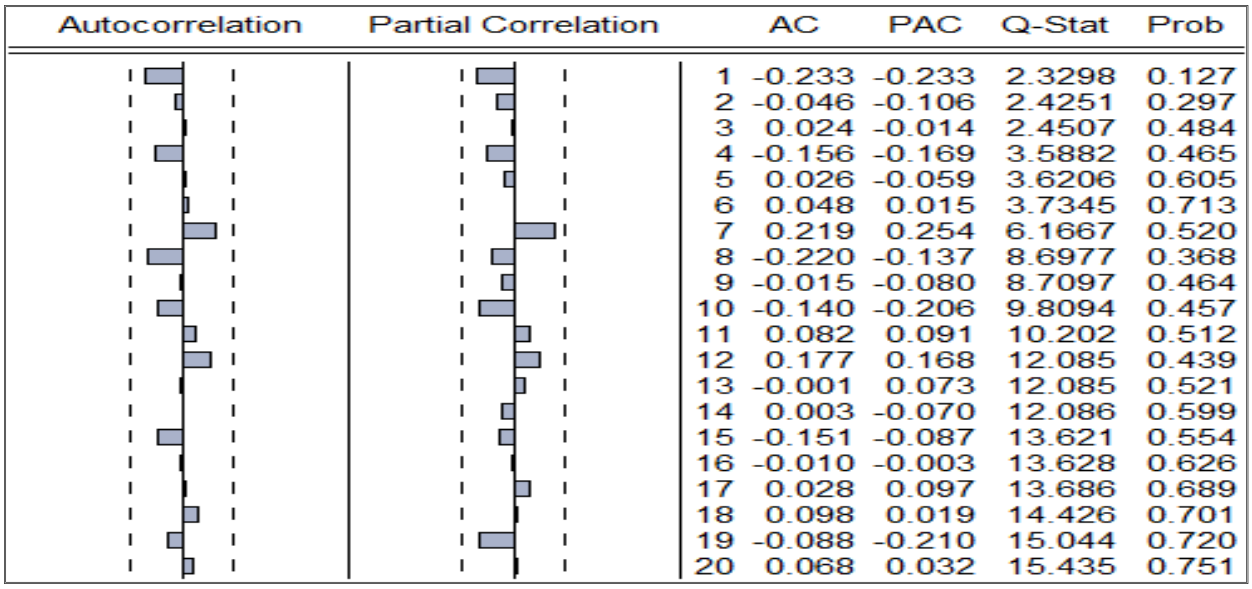


Figure 4. The Course of (dlogagriculture) Series

Figure 4 shows the 1st difference and logarithm taken agriculture series growth rate. In other words, it shows the changes over time.



	AC	PAC	Q-Stat	Prob
1	-0.233	-0.233	2.3298	0.127
2	-0.046	-0.106	2.4251	0.297
3	0.024	-0.014	2.4507	0.484
4	-0.156	-0.169	3.5882	0.465
5	0.026	-0.059	3.6206	0.605
6	0.048	0.015	3.7345	0.713
7	0.219	0.254	6.1667	0.520
8	-0.220	-0.137	8.6977	0.368
9	-0.015	-0.080	8.7097	0.464
10	-0.140	-0.206	9.8094	0.457
11	0.082	0.091	10.202	0.512
12	0.177	0.168	12.085	0.439
13	-0.001	0.073	12.085	0.521
14	0.003	-0.070	12.086	0.599
15	-0.151	-0.087	13.621	0.554
16	-0.010	-0.003	13.628	0.626
17	0.028	0.097	13.686	0.689
18	0.098	0.019	14.426	0.701
19	-0.088	-0.210	15.044	0.720
20	0.068	0.032	15.435	0.751

Figure 5. Correlogram of dlogagriculture

In Figure 5, correlogram of dlogagriculture series (agriculture series with first degree difference and logarithm) is shown. Statistics in the graph show that the series is between the limits. After this point, the autocorrelations and partial autocorrelations of the agriculture series with the first-degree difference of which the stability is achieved will be evaluated and the appropriate ARIMA model will be determined.

Table 2. ARIMA Model Resorts of the Series

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.24884	0.071696	240.5821	0.0000
AR(1)	0.552570	0.320761	1.722686	0.0933
MA(1)	0.035379	0.343744	0.102924	0.9186

According to Table 2, our appropriate ARIMA model was determined as AR(1) and MA(1), that is, ARIMA (1,1,1). Accordingly, there is one AR and MA root in our model. In order to determine the accuracy of this model, it was checked whether the roots are within the unit circle and whether the modulus numbers are less than 1.

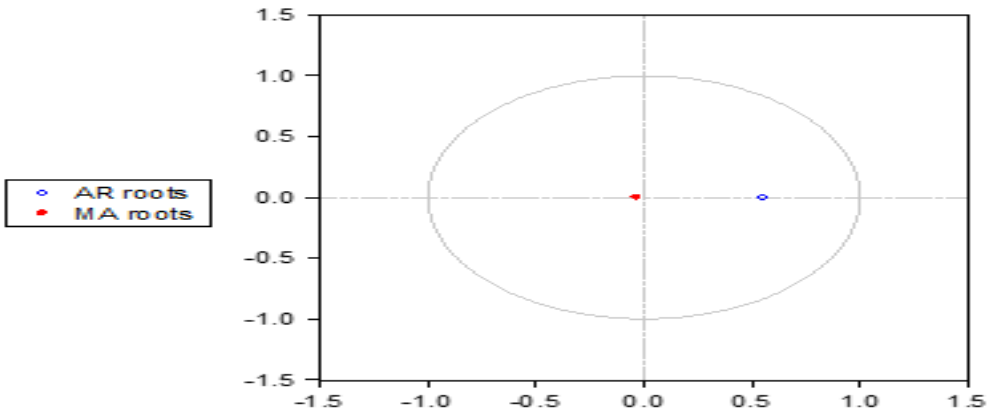
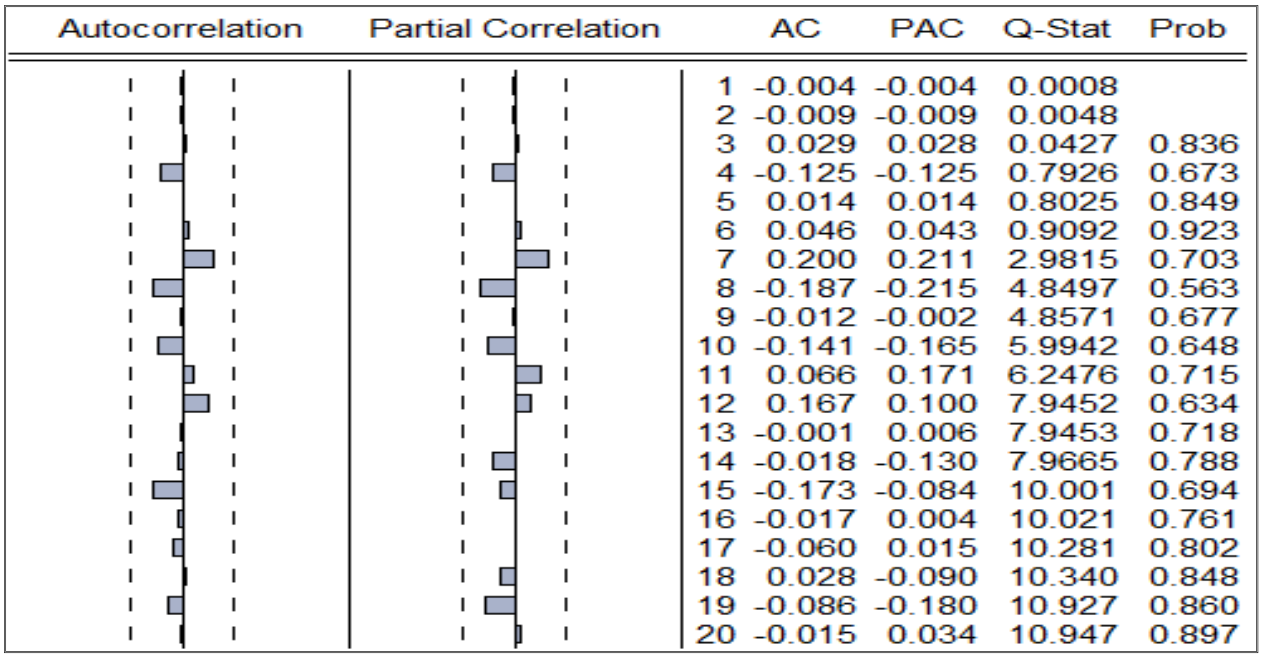


Figure 6. Inverse Roots of AR/MA Polynomial(s)

Table 3. Table of Inverse Roots of AR/MA Polynomial(s)

AR Root(s)	**Modulus**
0.552570	0.552570
MA Root(s)	**Modulus**
-0.035379	0.035379

According to the results in Figure 6 and Table 3, no root lies outside the unit circle. Modulus numbers for AR and MA roots take values less than 1. ARMA model is invertible.



	AC	PAC	Q-Stat	Prob
1	-0.004	-0.004	0.0008	
2	-0.009	-0.009	0.0048	
3	0.029	0.028	0.0427	0.836
4	-0.125	-0.125	0.7926	0.673
5	0.014	0.014	0.8025	0.849
6	0.046	0.043	0.9092	0.923
7	0.200	0.211	2.9815	0.703
8	-0.187	-0.215	4.8497	0.563
9	-0.012	-0.002	4.8571	0.677
10	-0.141	-0.165	5.9942	0.648
11	0.066	0.171	6.2476	0.715
12	0.167	0.100	7.9452	0.634
13	-0.001	0.006	7.9453	0.718
14	-0.018	-0.130	7.9665	0.788
15	-0.173	-0.084	10.001	0.694
16	-0.017	0.004	10.021	0.761
17	-0.060	0.015	10.281	0.802
18	0.028	-0.090	10.340	0.848
19	-0.086	-0.180	10.927	0.860
20	-0.015	0.034	10.947	0.897

Figure 7. Correlogram Q Statistics of ARIMA (1,1,1) Model

In Figure 7, the autocorrelation and partial autocorrelations of the model are checked and there is no value that goes out of the confidence interval. The model seems pretty consistent. After this stage, our work continues with the Intervention Analysis section.

In the ARIMA (1,1,1) model specified above, a dummy was created for 2006, when agricultural support policies and especially price difference payment support from agricultural support instruments were started to be implemented. This dummy variable, included in the analysis as D2006s, shows how agricultural subsidies have had an impact on the agriculture series. It is thought that whether the effects arising from the dummies will occur suddenly (pulse) in the series or not, it will continue to have some effect (step). This explanation is included with the letter s added next to the dummy variables in the analysis. The test results of the analysis are reported in Table 4.

Table 4. Statistical Results of the Final Model with Added Effect of Intervention

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.22039	0.023300	739.0705	0.0000
D2006S	0.436305	0.127917	3.410847	0.0017
T1	-0.029898	0.014050	-2.127906	0.0407
AR(1)	1.308164	0.301248	4.342485	0.0001
AR(2)	-0.565607	0.259797	-2.177112	0.0365
MA(1)	-1.000000	5375.239	-0.000186	0.9999

The equation of the final model is formed as follows:

$$Logy_t = 17.22 + 0.44D2006S_t - 0.03T_t + 1.137308\, log\, y_{t-1} - 0.56\, log\, y_{t-2} + \varepsilon_t - 1.000\varepsilon_{t-1} \quad (1)$$

When the results in Table 4 and equation 1 are examined, it is seen that the agricultural support policies added to the model with the D2006S dummy and especially the price difference payment support from agricultural support tools have a positive effect of approximately 47% on total agricultural production.

In other words, agricultural support policies increase the average agricultural production amount by approximately 47%. This effect was also found to be statistically significant. (Prob=0.0.0017). It has been determined that the effect of agricultural support policies on the growth rate of total agricultural production figures is -2%. This result shows that support practices suppress growth rates, albeit slightly. This effect is also statistically significant (Probe=0.04).

Finally, the Breusch-Pagan-Godfrey Test was conducted to test whether there is autocorrelation in the model. The null and alternative hypotheses of this test are as follows:

H0: There is no quadratic autocorrelation.

H1: There is quadratic autocorrelation.

Table 5. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-ist	**Prob. F(2,38)**
2.457741	0.0991
Obs*R-squared	**Prob. Ki-Kare (2)**
4.696086	0.0956

The results of this test are given in Table 5. According to the test results, the null hypothesis cannot be rejected, and it is concluded that there is no quadratic autocorrelation in the model.

CONCLUSION AND EVALUATION

This study analyzes the impact of agricultural support policies on total agricultural production from 1980-2020. The intervention analysis method was used in the study. First, the appropriate ARIMA model was determined, and then a dummy variable was added to the model for 2006, the year the support applications started, and the said effects were revealed. According to the analysis results, agricultural support policy and price difference payment support, which is one of the agricultural support instruments, has a positive effect of approximately 47% on the total agricultural production in the selected products group. At the end of the study, it was seen that the agricultural support policies implemented effectively and efficiently contribute to food security, poverty reduction, green growth, and rural development. According to the analysis results, agricultural support policies in developing economies show effectiveness as a result of medium and long-term applications. Global climate crises, hot wars and pandemic conditions have shown that the agricultural sector continues to maintain its importance. Recent developments in the world economy, increasing population, and the signals of the agriculture/food crisis have once again revealed the necessity of effective and sustainable agricultural policies.

For agricultural support policies to reach the desired targets in developing economies;

1. Agricultural support policies should be in harmony in a way to ensure integrity in the relationship between purpose and means,

2. Institutionalization of agricultural support policies,

3. Selecting policies that define and even compelling rules that increase the output in agricultural support policies,

4. Selecting policies that will be implemented and sustained in the long term with consistency, stability, and determination,

5. Implementation of agricultural policies in which the main problems of the agricultural sector are determined, and the agricultural sector is included in policy selection and implementation,

6. Determining the agricultural product group by considering the agricultural output and export potential of the relevant country,

7. Agricultural support policies should be revised according to domestic and foreign cyclical developments, considering the international competition,

8. Agricultural production should be done by considering domestic and foreign demand.

9. Agricultural support policies should be in harmony in a way to ensure integrity in the relationship between purpose and means,

10. Institutionalization of agricultural support policies,

11. Choosing policies that define and even compelling rules to increase output in agricultural support policies,

12. Choosing policies that will be implemented and sustained consistently, consistently, and decisively in the long term,

13. Implementation of agricultural policies in which the main problems of the agricultural sector are identified, and the agricultural sector is included in policy selection and implementation,

14. Determining the agricultural product group by considering the agricultural output and export potential of the relevant country,

15. Agricultural support policies should be revised according to domestic and foreign cyclical developments, considering the international competition,

16. Agricultural production should be done by considering domestic and foreign demand.

Thus, the continuity of policies in developing and developed economies will prevent the agricultural and food crisis in the world economy. In addition, the self-sufficiency of the agricultural sector will be ensured.

Beyan

Makalenin tüm yazarlarının makale sürecine verdikleri katkı eşittir. Yazarların bildirmesi gereken herhangi bir çıkar çatışması yoktur.

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