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Research Article / *Araştırma Makalesi*

THE EFFECTS OF AGRICULTURAL SUBSIDIES AND AGRICULTURAL EMPLOYMENT ON ECONOMIC GROWTH: A TIME SERIES ANALYSIS

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ABSTRACT

The purpose of this study is to examine the effects of agricultural subsidies and agricultural employment on economic growth in Türkiye by utilizing annual data for the period 2000-2022. Benefiting from empirical analysis, the variables in the study were primarily tested with the unit root test. The differences of the variables for which unit roots were determined were purified from unit roots as the Augmented Dickey-Fuller (ADF) test suggests. Appropriate lag test was applied to the series and then the causality relationship between economic growth, agricultural employment rate and agricultural support amount was analyzed according to the results of cointegration, error-corrected VAR estimation, and Granger causality test. Based on the results of the analysis, agricultural subsidies do not have a significant effect on economic growth or economic growth on agricultural subsidies, whereas agricultural employment has a bidirectional and positive effect on economic growth. Causality findings indicate no causality between agricultural subsidies and economic growth. A bidirectional and positive economic growth as a result of agricultural employment was determined, and the existence of a causality relationship between the two variables has been demonstrated. In conclusion, it has been found that agricultural subsidies provided for economic growth in Türkiye have not yielded effective results, whereas agricultural employment provided positive reflections. Therefore, taking measures for a controlled transition from the agricultural sector to non-agricultural sectors over time, thus increasing the quality and adaptability of the workforce in the sector, and recording employment through incentives will make a great contribution to the solution of the problem.

Keywords: *Agricultural Subsidies, Agricultural Employment, Economic Growth*

JEL Classification: *Q10, Q18, Q11, D10*

TARIMSAL DESTEKLEMELERİN VE TARIMSAL İSTİHDAMIN EKONOMİK BÜYÜME ÜZERİNE ETKİLERİ: BİR ZAMAN SERİSİ ANALİZİ

ÖZET

Bu çalışmanın amacı Türkiye'de 2000-2022 dönemine ait yıllık verilerle tarımsal desteklemelerin ve tarımsal istihdamın ekonomik büyüme üzerine olan etkilerini incelemektir. Ampirik analizin kullanıldığı bu çalışmada öncelikle değişkenler birim kök testiyle sınanmıştır. Birim kök tespit edilen değişkenlerin farkları Augmented Dickey Fuller (ADF) testine göre birim kökten arındırılmıştır. Serilere uygun gecikme testi uygulanmış ve ardından ekonomik büyüme, tarımsal istihdam oranı ve tarımsal destek miktarı arasındaki nedensellik ilişkisi eş bütünleşme, hata düzeltmeli VAR tahmini ve Granger nedensellik testi sonuçlarına

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göre analiz edilmiştir. Elde edilen analiz sonuçlarına göre, tarımsal desteklemelerin ekonomik büyüme üzerinde ya da ekonomik büyümenin tarımsal desteklemeler üzerinde anlamlı bir etkiye sahip olmadığı tespit edilmiştir. Nedensellik bulguları ise tarımsal destekler ve ekonomik büyüme arasında nedenselliğin olmadığına işaret etmektedir. Tarımsal istihdamın ise ekonomik büyümeyi çift yönlü ve pozitif bir şekilde etkilediği tespit edilmiş, iki değişken arasında bir nedensellik ilişkisinin varlığı ortaya konulmuştur. Sonuç olarak; Türkiye'de ekonomik büyümeye yönelik verilen tarımsal desteklerin etkili olmadığı buna karşılık tarımsal istihdamın olumlu yansımalarının olduğu bulgusuna ulaşılmıştır. Dolayısıyla tarım sektöründen tarım dışı sektörlere zamana yayılan kontrollü bir geçiş için önlemler alınması ve bu şekilde sektördeki işgücünün niteliği ve uyum yeteneğinin artırılması, teşvikler yoluyla istihdamın kayıt altına alınması gibi tedbirler sorunun çözümünde büyük katkı sunacaktır.

Anahtar Kelimeler: *Tarımsal Destekler, Tarımsal İstihdam, Ekonomik Büyüme*

JEL Sınıflandırması: *Q10, Q18, Q11, D10*

1. Introduction

The increasing population's nutritional needs and the obligation of people to meet this basic need have become an urgent issue for agricultural production and humanity. The agricultural sector has shifted towards different practices to solve this issue, and significant changes in agricultural policies have come to the agenda for the continuity of the agricultural sector, which is mostly dependent on climatic conditions (Arslan & Solak, 2019).

The agricultural sector is subsidized in national economies for various reasons. The agricultural sector is the most significant source of export-oriented income for emerging economies such as Türkiye. The sector also provides benefits out of foreign trade that would otherwise be spent on importing foodstuffs and opens up employment opportunities. For these reasons, the agricultural sector is of vital importance and is recognized as an economic sector (Kılıçkap et al., 2001:147).

The rapid and continuous development of agriculture affects economic growth. Achieving the desired development in agriculture relies on total capital investments and agricultural subsidies. Although agricultural activities remain strong in developed countries, agricultural subsidies continue to expand. Due to the strategic importance of agriculture in almost every country, it is supported by policies suitable for the national economic structures. These policies are aimed at the efficient use of resources and the creation of a sustainable agricultural sector. Long-term and structural changes in subsidy policies for the agricultural sector were realized (Bayraktutan & Arslan, 2008).

The success of developed and industrialized countries depends on their ability to use science and technology effectively. Since the rate of use of new technologies and the power to create new technologies are fast in developed countries, economic growth and employment increase are easily achieved. In developing countries, on the contrary, people with relatively low levels of income live in rural areas and about a quarter of the value added created in the respective economies is obtained mainly from the agricultural sector. Since the rate of technology utilization is relatively slow in developing countries, the contribution of the agricultural sector to *economic development*, the market, and production is also limited. Since the level of technology cannot be increased at once, developing countries should prefer the path of development

through agriculture. As the level of technology cannot be improved all at once, developing countries should prefer to develop through agriculture (Çelik, 2009: 92-93).

Türkiye has remained under the influence of external dynamics in agricultural subsidy policies, and the country's circumstances and the needs of the society have been determinant in many changes from the past to the present (Yavuz, 2005). The World Trade Organization, International Monetary Fund, European Union membership status, agricultural problems, climate changes and environmental issues are effective in determining these subsidy policies (Ataseven et al., 2020). Today, the range of agricultural subsidies has expanded to include area-based agricultural subsidy payments, agricultural insurance services, livestock subsidy payments, compensatory payments, differential payment subsidies, other agricultural subsidy payments, and rural development payments. (Sağdıç & Cakmak, 2021).

Türkiye's agricultural sector has great potential despite the unfavorable conditions. However, the policies put forward for agricultural activities remain far from utilizing this potential (Erdoğan, 2020). The decrease in employment in agriculture is also closely related to economic developments in other sectors. The contraction in employment opportunities during periods of economic crisis causes an increase in employment in the agricultural sector. The expansion of job opportunities for agricultural workers leads to a trend away from agriculture towards other sectors.

It is possible to summarize the agricultural policies of states under three main headings as price, structural and social policy. Support policies, especially within the scope of price policy, are of critical importance in promoting the agricultural sector. However, it remains unclear whether support policies are effective on agricultural production in Türkiye. As a matter of fact, empirical literature points to different results supporting this view. Moreover, the undesirable effects of the recent Russia-Ukraine war, the effects of which were felt all over the world, including Türkiye, on the agricultural sector and the national/international agenda that the most important strategic sector in the future will be agriculture reveal the nature of the issue (Akça & Altuntaş, 2022).

In light of such developments, in a study conducted to evaluate the effects of agricultural supports and agricultural employment on economic growth for Türkiye, the conceptual framework was first discussed and the concepts of agricultural supports and agricultural employment in Türkiye were touched upon. Then, the relationship between agricultural subsidies and employment and economic growth is analyzed. Afterwards, the practical part of the study is presented, and an evaluation is made according to time series analysis. Finally, some suggestions were made based on the findings obtained from the analysis.

In this study, it was tried to determine the effect of agricultural supports and agricultural employment on economic growth. For this purpose, the factors that cause the decrease in agricultural employment in Turkey and solution suggestions for these are put forward. It has also been investigated why agricultural supports have a negative effect on economic growth. The main purpose of writing this study is to draw attention to the economic loss experienced in the agricultural sector, to empirically test the effectiveness of agricultural supports and employment on economic growth, and to contribute to the gap in the literature. Thus, it is aimed to determine the success of existing policies and to guide policymakers.

While determining the econometric model in the study, the stationarity of the series must be analyzed in order to reach accurate results about the relationships between variables in the time series and to provide econometric hypothesis tests. While the short-term behavior of the series can be easily analyzed, the long relationship can be ignored. Many econometricians have developed many testing strategies to analyze the relationship between series containing trends. The control of assumptions consisting of stationarity of series, cointegration, stationarity of all series together, multicollinearity, heteroskedasticity tests and necessary corrections were revealed by VAR estimation and Granger causality analysis.

2. Conceptual Overview of Agricultural Subsidies

Agricultural subsidies were first applied in Türkiye in the 1930s and were used in the form of market price subsidy (Bayraktar & Bulut, 2016). Policies implemented until the planned period were mainly supportive, protective, and interventionist. During this period, subsidy policies became a tool for the populist policies of election periods and were considered as the cause of economic crises. Subsidy practices increased over the years; while 11 products were covered by subsidy in 1963, this number increased to 30 in the 1970s (Köse & Meral, 2021).

From the beginning of the planned period in Türkiye until the 2000s, subsidy practices were generally realized in the form of input, product subsidies, and low-interest loans. After 2000, drastic reforms were implemented, and a number of subsidies and rural development plans were put on the agenda. The current subsidies are mainly diesel oil, fertilizer, agricultural consultancy, soil analysis subsidies, biological control subsidies in crop production, and policies aimed at protecting gene resources and generating alternative sources of income in animal production. Besides these policies, rural development policies with 50% grant subsidies, land consolidation, and agricultural insurance subsidies are other important agricultural subsidies (Tan et al., 2015). Agricultural sector disbursements by years are shown in Table 1. The subsidy amount at current prices increased from 1,669 millions TL in 2000 to 16,972 millions TL in 2022, an approximately 15-fold increase. The general trend is towards an increase, despite a couple of years of decrease (Table 1).

The distribution of agricultural subsidies by areas shows that area-based subsidies decreased due to the implementation of direct income support to farmers at decreasing rates and its complete abolition in 2008. In contrast to this negative trend, livestock support, differential payment support and compensatory payments steadily increased. The Agricultural Reform Implementation Project (ARIP), included in rural development subsidies, increased since 2006. By 2006, the Agricultural Insurance Pool (TARSİM) law was enacted and subsidies for agricultural insurance were increased. One-off drought subsidies were provided in 2007-2008 during the global climate crisis and frost subsidies were provided in 2010 (Tan et al., 2015).

Table 1: Subsidies Provided to Agriculture Sector by Years

Years	At Current Prices Amount of Subsidy
2000	1,669,100,000
2001	1,006,300,000
2002	1,868,856,000
2003	2,669,484,000
2004	3,049,376,000
2005	3,681,976,000
2006	4,743,709,000
2007	5,541,993,000
2008	5,850,504,000
2009	4,530,945,000
2010	5,881,069,000
2011	7,084,727,000
2012	7,676,371,000
2013	9,229,491,000
2014	10,091,185,000
2015	10,719,257,000
2016	12,424,661,000
2017	12,859,241,000
2018	15,042,538,000
2019	17,087,320,000
2020	21,949,267,000
2021	22,129,432,000
2022	25,853,447,000

Source: Republic of Türkiye Ministry of Agriculture and Forestry (2022), compiled by the author

In 2009, the "Türkiye Agricultural Basins Production and Subsidy Model" was put into practice under the leadership of the Ministry of Agriculture and Forestry. (Doğan & Gurler, 2015). According to this model, it was decided which products would be produced efficiently in which basin and which products would be subsidized only in the designated basin (Olhan, 2012). Initiated in 2017, the National Agriculture Project aimed to achieve a more competitive global environment, increase the welfare of farmers, guarantee sustainable agricultural production and food security, and leave a more livable country for future generations. The National Agriculture Project is organized under two main headings: the Basin-Based Subsidy Model and the Model for Subsidizing Domestic Production in Livestock (GTHB, 2022). Based on the Basin-Based Subsidizing Model, agricultural basins were increased to 945 in 2020 and the product patterns to be subsidized were expanded (SBB, 2022).

A comparison of agricultural subsidies between Türkiye and the USA, EU, and OECD countries is presented in Table 2. The agricultural subsidy rate, which was 32.4% in 2000, decreased to 13.5% in 2019. This shows a similar pattern with the USA. The subsidy rate of 22.7% in 2000 decreased to 12.1% in 2019. Although there was a decline in agricultural subsidies in the EU and OECD countries over the years, this rate was lower when compared to the USA and Türkiye (Table 2).

Table 2: Producer Subsidy Estimates Worldwide

Years	Countries (%)			
	TR	USA	EU	OECD
2000	32.4	22.7	33.2	32.2
2001	16.9	21.4	30.7	28.8
2002	26.0	17.9	34.3	30.5
2003	30.9	14.8	34.2	29.1
2004	30.3	16.0	33.3	29.0
2005	29.0	15.1	31.1	27.5
2006	30.9	11.1	29.5	25.5
2007	24.6	9.7	23.2	20.7
2008	28.0	8.6	22.9	20.4
2009	27.2	10.1	23.7	21.6
2010	29.7	8.6	20.1	19.8
2011	24.2	8.0	18.3	18.5
2012	21.3	8.5	19.5	19.0
2013	21.4	6.9	20.2	17.9
2014	25.1	9.3	17.7	17.2
2015	25.7	9.5	19.0	17.7
2016	27.7	9.6	20.8	19.0
2017	22.9	9.9	18.3	17.8
2018	15.0	11.4	19.5	19.2
2019	13.5	12.1	19.0	19.8
2020	12.4	12.5	19.5	19.1
2021	11.6	12.8	19.0	18.8
2022	10.9	13.6	18.7	18.4

Source: OECD, 2022

3. A Conceptual Overview of Agricultural Employment

Since its foundation, the Republic of Türkiye is an agriculture-based country. The Republic of Türkiye adopted this agricultural model from the Ottoman Empire. During the foun-

dation period, a significant portion of the population earned a living from agricultural activities and the limited manufacturing industry was largely dependent on agriculture. The agricultural structure expanded steadily and rapidly with the subsidies provided to agriculture until the mid-1950s.

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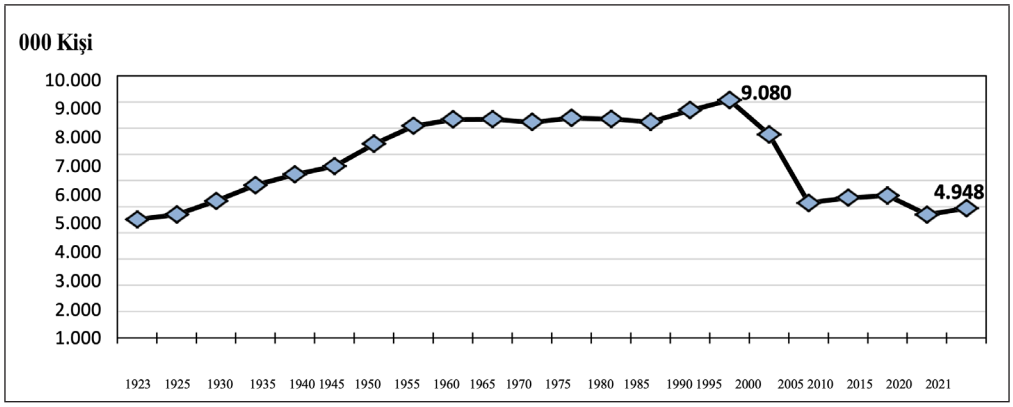
In the early years of the Republic, the number of people employed in Türkiye was 5 million, of which 4.5 million (90%) were employed in agriculture. This percentage was maintained for decades, reaching 87.5% in 1930, 85.4% in 1945 and 77.2% in 1955. The number of people employed in agriculture remained in certain ranges from the 1960s onwards until 1985 and exceeded 9 million in 1995. In 1996, the employment in agriculture reached 9.259 million, the highest level in the history of the republic (44%). After 1995, the employment in agriculture declined sharply, reaching 7.7 million in 2000 and 5.1 million in 2005. The reason for this decline could be attributed to the decline in agricultural activities and the fact that certain areas were transformed into neighborhoods and excluded from the rural population as some provinces gained the status of metropolitan cities. (Sertkaya & Şahin, 2020).

As a result of the agricultural policies implemented, a limited increase in agricultural employment was observed from 2005 to 2015 (5.3%). In 2020, the employment in agriculture dropped to 4.7 million due to the impact of Covid-19 pandemic, and increased in 2021 to approximately 5 million (Figure 1). The 47.8% agricultural employment rate in 2000 declined to 17.7% in 2020 and to 17.2% in 2021. Based on these findings, not even 1 out of every 5 people employed in Türkiye is in the agricultural sector.

Figure 1: Change in the Number of Persons Employed in Agriculture in the Republic Period



Source: TÜİK, 2022a

Despite the importance of the agricultural sector for both economy and employment, the share of the agricultural sector in GNP has been continuously decreasing over the years. The development of industrialization also has a negative impact on agricultural employment. The decline in agricultural employment leads to an increase in the development gap between rural and urban areas in Türkiye, inequality in income distribution and irregular migration (Gülçubuk, 2005: 68). It is considered that the decrease in agricultural employment is attributed to the decrease in cultivable agricultural areas, the increase in labor supply in the industry and service sectors, the high level of informal employment and the spread of mechanization in agriculture (Hatunoglu & Eldeniz, 2012: 32; Dinler, 2014: 30-32). The elimination of this negativity depends on expanding education policies in rural areas and directing capital to the agricultural sector (Turhan & Erdal, 2022).

4. Literature

Studies on the effects of agricultural subsidies and agricultural employment on economic growth using economic methods are available in the literature, albeit to a lesser extent. The studies related to the literature are given in Table 3.

Table 3: Studies on the Effects of Agricultural Subsidies and Agricultural Employment on Economic Growth

Author(s)	Period/ Country(s)	Variables	Method	Conclusion
Bondonio & Greenbaum (2006)	1989-2006 EU	Agricultural supports, economic growth	Objective econometric modeling	In investment incentives They concluded that an increase in employment increases employment.
Bondonio &Greenbaum (2007)	1982-1992 USA	Fiscal incentives, employment volume and economic growth	Probit Regression Method	It has been determined that financial incentives have a positive effect on employment volume and growth.
Spittler, Ross &Block (2011).	USA	Agricultural subsidies, economy	Government Policies and Situation Assessment	Government subsidies to the food industry have made fast food, red meat, sodas and other fat-laden products much more affordable.
Safdar, Maqsood &Ullah (2012)	1972-2011 Pakistan	Agricultural employment, economic growth	ARCH model	Agricultural employment positively affects growth It was concluded that it affected.
Khan, et al., (2012)	1981-2005 Pakistan	Agriculture sector, economic growth	Time Series Analysis	It is accepted that there is a strong relationship between economic growth and the agricultural sector has been made.

Table 3 continue

Terin, et al., (2013)	1990-2012 Türkiye	Agricultural subsidies, agricultural employment and economic growth	Unit Root and Cointegration Test, Regression Analysis	Agricultural subsidies and the share of agriculture in GDP have a positive effect on agricultural growth, on the other hand, employment in agriculture has a negative effect on agricultural growth.
Xie & Awokuse (2014)	1980-2011 9 developing countries	Agricultural sector and economic growth	ARDL, GAD Tests	The agricultural sector is a part of economic growth It has been proven that there is a dynamic
Sasmaz & Ozel (2019)	1980-2016 Türkiye	Agricultural subsidies and economic growth	Cointegration test based on ARDL approach and Toda and Yamamoto causality test	It is determined that economic incentives do not have a significant effect on the development of the agricultural sector in the long run, whereas economic growth has a positive effect on the development of the agricultural sector.
Guth, et al., (2020)	2005-2015 EU	Agricultural subsidies and economic growth	Granger Causality Test	Subsidies provided under the Common Agricultural Policy have been found to greatly increase the average income in national economies.
Guo, et al., (2021)	2001-2018 China	Agricultural Support Policies and Agricultural Economic Growth	Nonlinear MS(M)-AR(p) model	Despite Agricultural Support Policies, growth rates remain low in the long term.
Kopuk & Mecik (2021)	1998-2020 Türkiye	Agricultural subsidies and economic growth	Johansen cointegration test and Granger causality test	It is concluded that investments in agricultural sectors are a factor of growth.
Sagdic & Cakmak (2021)	2006-2019 Türkiye	Agricultural subsidies and economic growth	Hacker ve Hatemi-J Bootstrap Causality Test and Hatemi-J Asymmetric Causality Test	It is determined that subsidy payments to the agricultural sector have a long-run effect on the level of agricultural production.
Kose & Meral (2021)	1986-2016 Türkiye	Economic growth, agricultural subsidies and food production index	ARDL limit test, Toda-Yamamoto causality test	In Türkiye, a positive bidirectional relationship was found between food security and economic growth, while no relationship was found between agricultural subsidies and economic growth.

Table 3 continue

Beser & Kadanali (2021)	1995-2018 Türkiye	Economic Growth and Employment	Var Analysis, Granger Causality test	There is a bidirectional relationship between economic growth and employment.
Uslu & Apaydın (2021)	2002-2020 Türkiye	Agricultural Support and Agricultural Production	Panel Data Analysis	It has been determined that area-based supports negatively affect agricultural production and agricultural areas.
Akcan &Azizi (2022)	2005-2020 Türkiye	Employment and economic growth	Granger Causality Test	Non-employment generating growth is found to be applicable across sectors.
Turhan & Erdal (2022)	1990-2019 Türkiye	Agricultural employment and economic growth	Stationarity Analysis, Granger Causality Test	It has been determined that there is a unidirectional causality relationship between agricultural GDP and agricultural employment and a unidirectional causality relationship between agricultural employment and total employment
Ucler (2022)	1992-2020 Türkiye	Agricultural employment and economic growth	Augmented Dickey Fuller Unit Root Test, Granger Causality Test	No causality relationship was found between economic growth and agricultural employment. Unemployment growth in the agricultural sector was found to be applicable.
Merdan (2023)	2000-2022 Türkiye	Agricultural supports, agricultural employment, economic growth	Regression Analysis	It has been determined that agricultural supports affect growth positively, while agricultural employment affects agricultural growth negatively.

In all studies conducted, cointegration and causality methods have generally been used in the empirical literature investigating the effect of various agricultural supports or specific supports on employment and economic growth. An overall evaluation yields a positive outcome regarding the effect of agricultural support programs on economic growth. Some studies reported that agricultural supports affect economic growth positively whereas some suggested otherwise. In studies examining the relationship between another variable, that is, agricultural employment and agricultural growth, it has been found that there is generally no causality relationship and that growth without employment is valid in the agricultural sector. However, in some studies, no statistically significant relationship was found. Therefore, it is thought that empirically investigating the economic impact of agricultural supports and employment will make an important contribution to testing the existing view in the literature.

5. The Relationship Between Agricultural Subsidies and Economic Growth

Agricultural subsidies in Türkiye initiated in 1935 with Agricultural Credit Cooperatives and Agricultural Sales Cooperatives. In 1937, under the leadership of Ziraat Bank, loan

facilities were provided to farmers. Today, the use of these loans continues for crop and animal production, certified seeds, aquaculture products and agricultural equipment. In order to see the positive impact of the loans on agriculture, it is necessary to know the areas to which the loans are allocated and to monitor which needs they meet (Gürbüz, 2005).

Among the policies implemented to protect producers in Türkiye is the floor price practice. The primary purpose of floor prices is to protect producers of goods and services and to shape the functioning of the market. While for instance, the minimum wage payment protects low-income earners, subsidy measures protect farmers. In developed countries, financial aid policy is implemented as part of agricultural policies. This policy protects not only producers but also consumers. In the financial aid policy, the state does not buy products from the market, whereas in the floor price policy, it purchases products. The difference between the floor price policy and the financial aid policy is the price paid by the consumer. Since the subsidy policy can be applied to certain products, it imposes an unacceptable financial burden on less developed countries (Cevik, 1995).

Another instrument that subsidizes agricultural producers is direct income support payments. Direct income support covers transfer expenditures for the income levels of agricultural producers. Direct income support is realized in the form of transfers to producers, bonus system or differential payments (Babacan, 1999). Direct income support for Turkish agriculture was introduced in 2001 and was abandoned with the introduction of area-based subsidies in 2006-2007 (Gürler, 2016).

According to the 2023 Presidential Annual Program, the agricultural subsidy budget for 2023 was increased by 35.6% compared to 2022, from 39.8 billion TRY to 54 billion TRY. During this period, subsidy payments consist of area-based subsidies, differential payments, rural development subsidies, agricultural insurance subsidies, and other agricultural subsidies. The largest share of subsidies was area-based subsidies, totaling 19 billion 32 million TRY. 6.307 billion TRY was allocated for rural development subsidy payments, 6.2 billion TRY for differential payments, 5.2 billion TRY for agricultural insurance support services, 4.3 billion TRY for other agricultural subsidies, and 847 million TRY for compensatory payments. The largest increase in agricultural subsidy payments during this period was observed in agricultural subsidies for rural development, with a 223.9% increase. Looking at the subheadings of subsidized items, the largest increase was observed in diesel fuel. For 2023, 11.964 billion TRY of diesel subsidy payments were planned, with a calculated increase rate of 281.6%. According to this plan, the fertilizer subsidy increased by 149.5% and the tea subsidy by 128.9%. To mitigate the negative impact of rising input costs on agricultural production, significant increases were implemented in diesel, fertilizer, and certified seed subsidies. In order to enhance the effectiveness of agricultural subsidies, it is crucial to differentiate subsidies based on basin, product, and water constraints. Managing and controlling these subsidies on an area-specific basis and ensuring synergy between various subsidization programs implemented by different institutions should be prioritized (Anadolu Agency, 2022).

The agricultural sector's contribution to economic growth is only possible through rapid and sustained progress in agriculture. The desired agricultural development depends on agricultural subsidies and capital investments in this sector. On the global axis, this issue is addressed through its economic, political, sociocultural, geographical and technological dimensions. In

this regard, it is known that agriculture is at the desired level in developed countries and agricultural subsidies continue, while in developing countries, agricultural policies are adopted in accordance with the economic structures of the countries and supported to the extent possible (Abay et al., 2005).

Studies in the literature show that agricultural subsidies have a positive impact on agricultural growth (Terin et al., 2013). Another study supporting this result was conducted by Kopuk and Mecik (2021). Contrary to these results, it was reported that economic growth positively affects the development of the agricultural sector (Saşmaz & Özel, 2019).

6. The Relationship Between Employment and Economic Growth

Economic growth is realized by countries utilizing economic resources effectively or by adding new resources to the existing resources (Kaynak, 2005). As a natural consequence of economic growth, employment is also expected to expand. Demand for goods and services is effective in increasing employment. If employment is analyzed from the point of demand, it should be evaluated on the axis of GDP. When GDP increases, employment also increases. Factors affecting employment include capacity utilization rates, technology, labor costs, foreign purchases and exports (Akyıldız, 2006). Whether production is labor intensive or capital intensive also affects the relationship between employment and economic growth. Furthermore, the fact that economic growth is oriented towards the domestic or foreign market, its place in the sector and how it is realized are also determinant factors. Ensuring economic growth depends on the effective and efficient use of production factors. The efficient use of factors of production keeps the labor market alive and fluid, which in turn maximizes employment. The rise in production improves the welfare of the country along with economic growth. The improvement in the country's welfare is considered as an indicator of economic development. A high level of national welfare makes the direction and degree of the relationship between economic growth and unemployment stronger (Kanca, 2012).

One of the most important indicators of a country's increase in its economic and social welfare is the phenomenon of economic growth. In underdeveloped or developing countries, the concept of economic development rather than economic growth comes to the fore. Although the concept of economic development is multidimensional, it mostly concerns countries that are striving for development. Economic development examines the social, political, cultural, social welfare, and quality of life of countries (Saşmaz, 2018). Inadequate economic development in a country lowers people's living standards, which may lead countries to seek new opportunities. These pursuits may take the form of either a change of government or new initiatives to stimulate production, investments in science and technology, tax cuts, and grant programs. At this point, it is known that the unemployment issue is the biggest obstacle for developing countries to achieve their economic development goals.

An analysis of global markets reveals that the positive impact of economic growth is not reflected in employment at the same rate. Table 4 shows that capital-intensive investments and changes in management upon technological developments have a positive effect on economic growth, but not on employment in the same way. The relationship between economic growth and employment is disproportionate, and in some years this relationship weakens. This could be attributable to the population growth rate, the length of working hours, and economic growth due to non-labor factors. (Ok, 2008).

Table 4: Economic Growth and Agricultural Employment Rates in Türkiye by Years

Years	Economic Growth (%)	Agricultural Employment (%)
2000	6.6	-1.9
2001	-6	-0.7
2002	6.4	-3.0
2003	5.6	-3.3
2004	9.6	0.7
2005	9	0.4
2006	7.1	-0.6
2007	5	0.5
2008	0.8	-0.1
2009	-4.7	0.2
2010	8.9	0.9
2011	9.2	-3.8
2012	2.2	0.4
2013	4	0.5
2014	2.9	-0.4
2015	4	0.5
2016	2.9	0.3
2017	7.4	1.3
2018	2.8	-0.6
2019	0.5	-0.7
2020	1.8	-2.9
2021	11	-0.6
2022	5	0.4

Source: Presidency of the Republic of Türkiye (2022), compiled by the author

Although it is known that agricultural employment has been the driving force of employment in Türkiye for many years, employment has taken an active role in the service sector in the last two decades. Moreover, developments in the service sector have further reduced the share of agricultural employment in total employment. An analysis of the last twenty years of data from TUIK shows that the share of agricultural employment in total employment has decreased from 36% to 16%.

In light of the data obtained from TUIK for 2022, the rate of people employed in the agricultural sector in Türkiye was recorded as 17.2%, 21.3% in the industrial sector and 55.3% in the service sector. The number of people employed in all sectors in Türkiye increased in parallel with the population growth from 2000 to 2022, from 21,581 thousand in 2000 to 30,752 thousand in 2022. The number of employments increased by approximately 2 million in 2022

compared to 2021. Agricultural employment, on the other hand, fluctuated but continuously decreased from 2000 to 2022. Agricultural employment, which was 7,769 thousand in 2000, decreased to 4,833 thousand in 2022. Non-agricultural employment figures, on the other hand, increased continuously from 2000 to 2022. Non-agricultural employment increased from 13,812 in 2000 to 25,919 in 2022 (Table 5). Based on these findings, losses in agricultural employment were found to be compensated by the service and industrial sectors, and the service sector became the sector that provides the most employment.

Table 5: Employment, Agricultural Employment and Non-Agricultural Employment Rates in Türkiye by Years

Years	Employment	Agricultural employment	%	Non-Agricultural Employment	%
2000	21,581	7,769	36.00	13,812	64.00
2001	21,524	8,089	37.58	13,435	62.41
2002	21,354	7,458	34.93	13,896	65.07
2003	21,147	7,165	33.88	13,982	66.11
2004	19,632	5,713	29.10	13,919	70.90
2005	19,660	5,015	25.51	14,645	74.50
2006	20,353	4,907	24.11	15,446	75.90
2007	20,230	4,867	24.06	15,363	75.94
2008	20,451	5,016	24.53	15,435	75.47
2009	21,413	5,254	23.53	16,159	75.46
2010	22,631	5,683	25.11	16,948	74.89
2011	23,492	5,325	22.67	18,167	77.33
2012	24,486	5,349	21.85	19,137	78.15
2013	24,877	5,051	20.30	19,826	79.70
2014	25,933	5,424	20.92	20,509	79.08
2015	26,621	5,483	20.60	21,138	79.40
2016	27,205	5,305	19.50	21,900	80.49
2017	28,189	5,464	19.38	22,725	80.62
2018	28,738	5,297	18.43	23,441	81.57
2019	27,157	4,618	17.01	22,539	83.00
2020	27,266	4,725	17.33	22,541	82.67
2021	28,797	4,948	17.18	23,849	82.82
2022	30,752	4,833	15.72	25,919	84.28

Source: TÜİK, 2022b

The attractiveness of the business and social opportunities of cities accelerated the migration movement from rural areas to urban areas. This has led to rapid urbanization. Moreover, the development of industry due to technological developments and the high average age

of agricultural employment jeopardized the future of agricultural employment. In addition, the high rate of unregistered employment and unpaid family workers are also included among these negative factors (Turhan & Erdal, 2022). These issues can be solved by directing capital to the agricultural sector and expanding education policies in rural areas.

There are several studies in the literature on the relationship between economic growth and employment. In these studies, it was found that there was a bidirectional relationship between economic growth and employment (Beşer & Kadanali, 2021), while another study found that there was no relationship (Üçler, 2022). In some studies, it was found that growth without employment is applicable (Akcan & Azizi 2022; Üçler, 2022).

7. Materials and Methods

The data were generated through the data distribution system of the Turkish Statistical Institute and the Central Bank of the Republic of Türkiye. Microsoft Excel, Eviews 9 and SPSS 21.0 software packages were used to analyze the data for the period 2000-2022. While trending time series are analyzed, stationarization is performed in order to provide econometric hypothesis tests. Thus, while the short-term behavior of the series can be easily analyzed, the long relationship can be ignored. Many econometricians state that the relationship between trend-containing series can be estimated with appropriate methods. In other words, a stationary linear relationship can also be found between non-stationary series. It is said that there is "cointegration" between the series in which such a situation exists. Co-integration, VAR estimation with error correction, and Granger causality analysis were used to analyze the relationship between economic growth (GDP), the ratio of agricultural employment to total employment (ORAN), and the amount of agricultural support at current prices (CFTDM). In the VAR estimation and Granger causality analyses, the assumptions of stationarity of the series, cointegration, costationarity of all series, multicollinearity and cointegration tests were checked and necessary corrections were made.

During the application phase of the data, all series to be included in the model must be stationary. Before the analysis to determine the relationship between variables, the direction, degree and causality of the relationship, the stationarity of each series was examined with ADF and Extended Dickey-Fuller (ADF) tests, taking into account Philip Perron or Zivot Andrews tests. The stationarity of the series was ensured using the unit root test. After determining the stationarity of the series, the Johansen cointegration test was put into effect. Since the series were stationary at the first difference, the Johansen cointegration test was applied. The Johansen cointegration test was performed by establishing the VAR Model. VAR Model was constructed by determining the appropriate lag. To determine the appropriate one, lags where the Akaike (AIC) and Schwarz (SIC) criteria are minimum were selected. Following the selection of appropriate data, Vector Error Corrected VAR estimation and Granger causality analysis were carried out. Finally, CUSUM and CUSUMQ tests suggested by Brown, Durbin, and Evans (1975) were used to measure the stability of the coefficients of the long-term model. The stability of the estimated coefficients in the model is possible if the error terms are within the desired confidence range.

8. Findings

8. 1. Descriptive Statistics

The series, and Jarque Bera test statistics of the variables of the study are shown in Table 6.

Table 6: Descriptive Statistics

Year	GDP	ORAN	CFTDM
2000	6.6	36.00	1,669,100,000
2001	-6	37.58	1,006,300,000
2002	6.4	34.93	1,868,856,000
2003	5.6	33.88	2,669,484,000
2004	9.6	29.10	3,049,376,000
2005	9	25.51	3,681,976,000
2006	7.1	24.11	4,743,709,000
2007	5	24.06	5,541,993,000
2008	0.8	24.53	5,850,504,000
2009	-4.7	23.53	4,530,945,000
2010	8.5	25.11	5,881,069,000
2011	11.1	22.67	7,084,727,000
2012	4.8	21.85	7,676,371,000
2013	8.5	20.30	9,229,491,000
2014	5.2	20.92	10,091,185,000
2015	6.1	20.60	10,719,257,000
2016	3.2	19.50	12,424,661,000
2017	7.4	19.38	12,859,241,000
2018	2.8	18.43	15,042,538,000
2019	0.5	17.01	17,087,320,000
2020	1.8	17.33	21,949,267,000
2021	11	17.18	22,129,432,000
2022	5	15.72	25,853,447,000
	LNGSYIH	**LNORAN**	**LNCFTDM**
JB(p)	3.394 (0.183)	1.412 (0.493)	0.887 (0.641)

ORAN: Ratio of Agricultural Employment to Total Employment, **GDP**: Gross Domestic Product, **CFTDM**: the Amount of Agricultural Subsidy at Current Prices

Jarque-Bera is a goodness-of-fit measure used to measure separation from a normal distribution and is obtained from the transformation of kurtosis and skewness measures. According to Table 6, since the logarithmic transformations of the series, which are the variables of

the research, were found to be normally distributed (p>0.05), the logarithmic transformations of the series were used in the analyzes. Since the logarithm of negative values in GDP values cannot be taken, the largest positive number in the series must first be found. Then, all values in the series are subtracted from a fixed number that is 1 more than the largest number, and thus the resulting new series will not contain any negative numbers. In addition, the correlation coefficient between the new series obtained and the previous series is found to be -1. When the series is multiplied by -1 the correlation becomes +1. Since there are no negative numbers in the new series, its logarithm can be taken. The new series whose logarithm is taken is multiplied by -1 and the logarithmic transformation of the first series is made.

8.2. Stationarity and Unit Root Tests

Prior to the analyses to determine the relationship between the variables, the direction and degree of the relationship and causality, stationarity for each of the series was examined with ADF and Advanced Dickey Fuller (ADF) tests. A time series is a sequence of observations made at periodic time intervals. One of the most important issues in time series is stationarity. Almost all statistical inferences are made under the assumption of stationarity of the series. If the series is non-stationary, the series is stabilized in some way before proceeding to inferences (Çinar & Sevüktekin, 2017). Table 7 presents the stationarity test results of the series.

Table 7: Unit Root Test Results

Serie	Level	1.Difference
LNGSYIH	-1.291	-6.467**(1)
LNORAN	-0.908	-4.701**(1)
LNCFTDM	-0.646	-8.240**(1)

** p<0.01, *p<0.05, (L): Optimal lag length

According to the unit root test results, it has been determined that the ratio of agricultural employment in the total employment variable (LNORAN) and the amount of agricultural subsidy at current prices variable (LNCFTDM), which will be included in the economic growth variable (LNGSYIH) and economic growth model, are stationary at the level of variables.

8.3. Johansen Co-integration Analysis

Cointegration is a method developed to examine the correlation between two non-stationary time series. Two or more time series are said to be cointegrated if a linear combination of them is stationary while they are non-stationary themselves.

The cointegration method was developed by Clive Granger (1980). Many economists analyzed non-stationary time series; however, Granger and Robert Engle proved that this type of analysis results in misleading regression. The reason for misleading regression is that non-stationary series contain stochastic trend effects. When regression analysis is performed without taking into account the stochastic trend, it can be shown that the relationship that appears to exist between two variables is in fact based on a randomly developing trend. To analyze non-stationary time series, first or higher-order differences are usually taken. If a time series becomes stationary when its first difference is taken, this series is considered to be inte-

grated of the first order and this series is denoted as I(1) (Pierre, 1989). The Johansen cointegration test is a model developed by Søren Johansen and Katarina Juselius in 1988 and 1990 to test the concept of cointegration, which states that at least two series that are non-stationary at the test levels are a stationary combination. In order to implement these methods, all variables in the model must be non-stationary at level (non-stationary at I(0)) and become stationary when first differences are taken. In order to perform the Johansen cointegration test, the series must be stationary at first difference. This model cannot be applied at different stationarity levels. Johansen cointegration test is performed by constructing a VAR Model. VAR Model is constructed by determining the appropriate lag. To determine the appropriate lag, the lags for which the Akaike (AIC) and Schwarz (SIC) criteria are minimum are selected. When selecting lags, lags suitable for monthly/annual/seasonal data sets should be selected (Philips & Vogelsang, 1993). The results for the appropriate lag length are shown in Table 8.

Table 8: Selection of Appropriate Lag Length According to Information Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
1	26.470	NA	**0.000***	**-1.747***	**-1.299***	-1.660*
2	30.567	5.736	0.000	-1.257	-0.361	-1.082
3	39.803	10.159	0.000	-1.280	0.064	-1.018

* Indicates the lag order selected by the relevant criterion

According to the results in Table 8, the most appropriate values of the information criteria are obtained at the first lag. In this case, the first lags of the variables will be used to determine the appropriate model in the co-integration analysis.

After selecting the appropriate lag, the most appropriate model for the study is selected from the Trend, No Trend, Linear or Quadratic models. In this selection, the cointegration vector with the minimum value of Akaike (AIC) and Schwarz criteria is determined to be appropriate (Philips & Vogelsang, 1993). Table 9 shows the significance levels of the models that can be used in the second lag length in the study.

Table 9: Determination of the Appropriate Model for Co-Integration Analysis

		Linearity	**No**	**No**	**Yes**	**Yes**	**Quadratic**
		Intersection	**No**	**Yes**	**Yes**	**Yes**	**Yes**
		Trend	**No**	**No**	**No**	**Yes**	**Yes**
Akaike criteria	**Vector sequence number**	0	0.125	0.125	-0.029	-0.029	0.010
		1	-0.307	-0.378	-0.623	-1.646	-1.430
		2	-0.394	-0.641	-0.675	**-2.113***	-1.993
		3	0.356	-0.568	-0.568	-2.024	-2.024
Schwarz	**Vector sequence number**	0	0.559	0.559	0.550	0.550	0.734
		1	0.417	0.394	0.246	-0.729	-0.416
		2	0.620	0.470	0.484	**-0.858***	-0.689
		3	1.660	0.881	0.881	-0.431	-0.431

* There is cointegration in the vector.

According to both Akaike and Schwarz criteria in Table 9, there is cointegration in both vectors when linearity, intercept and trend are included.

After the selection of the appropriate model, the Trace Statistics and Max-Eigen values are taken into consideration and the presence of statistically significant ($p<0.05$) values indicate cointegration. If there is no cointegration between the variables, the standard Granger (1969) causality test is used; if there is cointegration between the variables, causality is investigated with the vector error correction model (VECM) (Philips & Vogelsang, 1993). Johansen-Juselius co-integration test findings according to Trace and Max-Eigen statistics are shown in Table 10.

Table 10: Number of Co-integration Vectors

		Trace		Max-Eigen	
Hypotheses	**Eigen value**	**Test statistics**	**Critical value**	**Test statistics**	**Critical value**
No	0.796	65.036* *	35.010	33.454**	24.252
Maximum 1	0.675	31.582* *	18.397	23.629**	17.147
Maximum 2	0.315	7.952* *	3.841	7.952* *	3.841

H0: There is no co-integration. * at 5% significance level, ** at 1% significance level, the null hypothesis is rejected

According to the co-integration analysis results in Table 10, both Trace and Max-Eigen statistics indicate that there are at most two cointegration vectors. According to Trace and Max-Eigen statistics, there is a long-run relationship between the variables (they move together in the long run). When long-term relationships are analyzed, long-run information may be lost when series are differenced or lag lengths are used, and VAR estimation with error correction is performed. VAR estimation with Vector Error Correction and Granger causality analysis were conducted.

8.4. VAR Model and Granger Causality Analysis

The VAR (Vector Autoregressive) Model was estimated to determine the existence and direction of the causality relationship between the series. In econometric studies using VAR model, no distinction is made between endogenous and exogenous variables and variables or quantities are analyzed simultaneously. In addition, constraints and assumptions that may arise from economic theory are not allowed to distort the model definition. Thus, the model allows the relationship between variables to be established correctly. The stationarity of the estimated model depends on the eigenvalues of the coefficient matrix. If all of the eigenvalues of the coefficient matrix are within the unit circle, the system is stationary or stable; if at least one of the eigenvalues is above or outside the unit circle, the system is non-stationary or shows a gradually expanding feature (Bahar, 2006).

According to the stationarity graph in Figure 2, the positions of the inverse roots of the AR Characteristic polynomial within the unit circle indicate that the model is stationary.

CUSUM and CUSUMQ tests proposed by Brown, Durbin and Evans (1975) are used to measure the stability of the coefficients of the long-run model. The CUSUM graph of the long-run models is shown in Figure 3. As seen in Figure 3, the fact that the error terms remain within the desired confidence interval indicates that the coefficients estimated in the model are stable.

Figure 2: VAR Model Stationarity Graph.

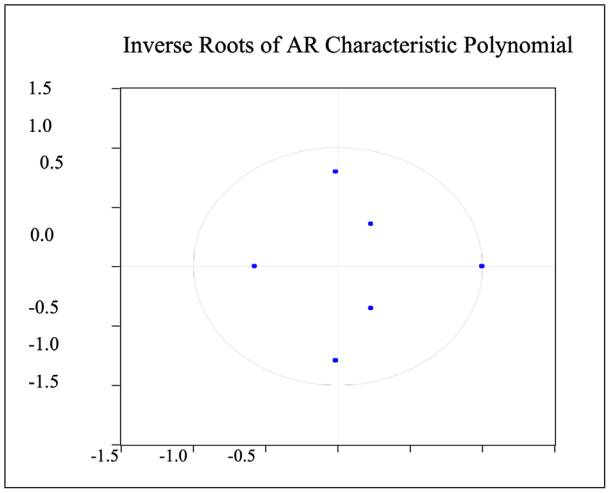
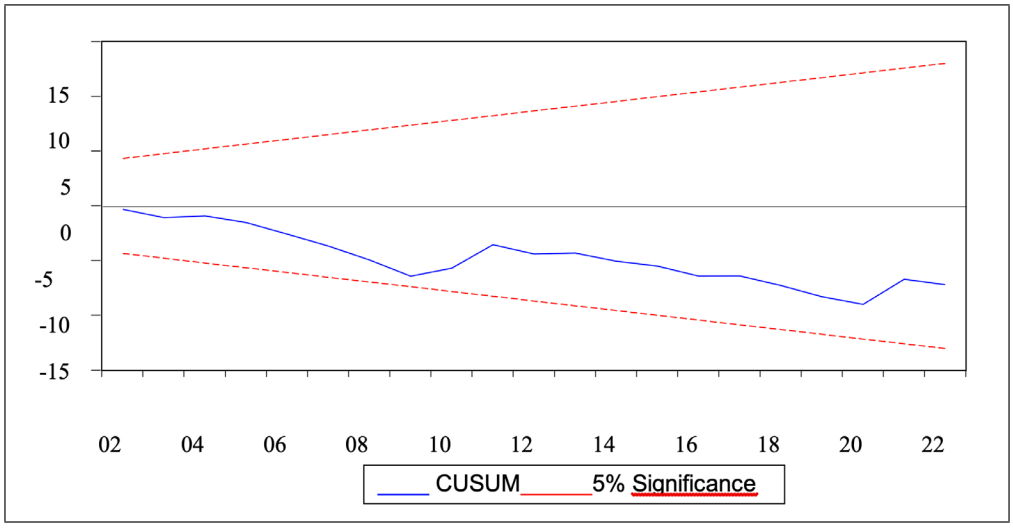


Figure 3: Structural Break Test



The White heteroscedasticity analysis for the constant (or variable) variance of the error terms in Table 11 shows that there is no problem of changing variance ($p>0.05$); there is no autocorrelation among the independent variable series (LM test $p>0.05$), in other words, all three models do not contain structural problems. The results of the error-corrected VAR Granger causality test for the causality relationship between economic growth, agricultural employment rate and agricultural support amount are shown in Table 11.

Table 11: VAR Granger Causality/Wald Externality Test

	Granger Causality/Block Externality Wald			**VECM VAR Estimation**		
Dependent variable: LNGSYIH	**X^2**	**df**	**p**	**β**	**t**	**p**
LNORAN(-1)	4.356	1	**0.036**	0.523	2.087	0.043
LNCFTDM(-1)	1.099	1	0.294	0.381	1.048	0.300
Total	4.391	2	0.111			
R^2=0.397 DR^2=0.140 Durbin Watson=1.851	White X^2=75.288 (p=0.372) LM-Stat=4.671 (p=0.861)					
Dependent variable: LNORAN	**X^2**	**df**	**p**	**β**	**t**	**p**
LNGSYIH(-1)	6.020	1	**0.014**	0.541	2.454	0.018
LNCFTDM(-1)	1.548	1	0.213	0.295	0.575	0.568
Total	8.583	2	**0.013**			
R^2=0.694 DR^2=0.564 Durbin Watson=2.116	White X^2=75.288 (p=0.372) LM-Stat=4.671 (p=0.861)					
Dependent variable: LNCFTDM	**X^2**	**df**	**p**	**β**	**t**	**p**
LNGSYIH(-1)	0.714	1	0.398	-0.111	-0.845	0.403
LNORAN(-1)	0.501	1	0.478	0.069	0.708	0.483
Total	1.385	2	0.500			
R^2=0,817 DR^2=0.738 White X^2=75.288 (p=0.372) Durbin Watson=2.157 LM-Stat = 4.671 (p=0.861)						

According to the model in Table 11, in which economic growth (GDP) is the dependent variable, the amount of agricultural subsidy at current prices (CFTDM) is not the cause of economic growth (X^2=1.099; p>0.05), whereas the ratio of agricultural employment to total employment (ORAN) is the cause of economic growth (X^2=4.356; p<0.05). The regression coefficients indicate that the amount of agricultural subsidies at current prices has no significant effect on economic growth (p>0.05), while agricultural employment has a positive and significant effect on economic growth (β=0.523; t=2.087; p<0.05).

According to the model in Table 11, in which agricultural employment rate (ORAN) is the dependent variable, it is determined that the amount of agricultural subsidies at current prices is not the cause of agricultural employment (X^2=1.548; p>0.05), whereas economic growth is the cause of agricultural employment (X^2=6.020; p<0.05). When the regression coefficients are analyzed, it is found that the amount of agricultural subsidies at current prices has no significant effect on agricultural employment (p>0.05), while economic growth has a positive and significant effect on agricultural employment (β=0.541; t=2.454; p<0.05).

According to the model in Table 11, in which the amount of agricultural subsidy at current prices (CFTDM) is the dependent variable, economic growth (X^2=0.714; p>0.05) and agricultural employment rate (X^2=0.501; p>0.05) variables are not the cause of the amount of agricultural subsidy at current prices, and similarly, when the regression coefficients are ana-

lyzed, economic growth and agricultural employment do not have a significant effect on the amount of agricultural subsidy at current prices ($p>0.05$).

Based on all these findings, according to the results obtained from the regression coefficients, the amount of agricultural support does not have a significant effect on economic growth and agricultural employment, agricultural employment affects economic growth, and economic growth affects agricultural employment positively and significantly, and economic growth and agricultural employment affect the amount of agricultural support. It was determined that it did not have a significant effect.

9. Conclusion and Discussion

In economies where the market mechanism is efficient, communication between producers and consumers is mediated through prices. Under the system, no intervention is realized in the market prices. However, the fact that prices and incomes in the agricultural sector fluctuate widely due to the characteristics of the supply and demand for agricultural products, that agricultural production is dependent on climatic conditions and that the average income of agricultural workers is below the national average compared to general employment has made it necessary to intervene in agriculture.

In an economy where agricultural subsidies are used effectively and efficiently, it is predicted that economic growth will occur, and there will be no employment issues. In some literature studies on the relationship between agricultural subsidies, employment, and economic growth, the direction of the relationship between the variables has been analyzed, and conclusions have been attempted to be reached accordingly. While some of these studies indicate a bidirectional relationship between economic growth and employment, others suggest no correlation between agricultural subsidies and economic growth. This research supports previous literature studies conducted in different time periods in Türkiye. In this study, we examine the relationship between agricultural subsidies and employment as well as economic growth. Agricultural subsidies, employment, and economic growth data for the period 2000-2022 are analyzed, and stationarity is assessed. Differences in the variables without unit roots are unit root-free according to the Augmented Dickey-Fuller test. The series was analyzed using the Granger causality test by conducting the appropriate lag test.

The Granger causality test revealed that the amount of agricultural subsidies is not the cause of economic growth, however, the ratio of agricultural employment to total employment is the cause of economic growth. The analysis of the regression coefficients reveals that the amount of agricultural subsidies at current prices has no significant effect on economic growth or economic growth has no significant effect on the amount of agricultural subsidies, while agricultural employment has a positive, bidirectional, and significant effect on economic growth.

Granger causality test revealed that the amount of agricultural subsidies is not the cause of economic growth, but rather the ratio of agricultural employment to total employment. The analysis of the regression coefficients indicates that the amount of agricultural subsidies at current prices does not have a significant impact on economic growth, or vice versa. However, agricultural employment shows a positive, bidirectional, and significant influence on economic growth.

In developing countries like Türkiye, where the share of agriculture in GDP is high, the agricultural sector holds a significant position in the economy due to the population it supports and the labor force it provides to the industry. Nevertheless, there are significant problems in the sector in terms of informality, hidden unemployment, and labor productivity. For these reasons, there is a negative relationship between the population employed in agriculture and agricultural production. At this point, the government should collaborate with regional actors to ensure the involvement of a skilled workforce in the agricultural sector. In addition, rapid population growth leads to an increase in the unskilled labor force and informal employment. The reasons for this may be that the person does not know their rights sufficiently depending on their level of education and that the person is forced to accept unregistered work during periods of unemployment. Implementing measures for a controlled transition from the agricultural sector to non-agricultural sectors over time can enhance the quality and adaptability of the labor force. This can be achieved by ensuring formal employment through incentives, and boosting direct or indirect subsidies to encourage investments in agricultural infrastructure, productivity, and production. Additionally, addressing structural issues related to seasonal, mobile, and temporary workers in agriculture, as well as preventing child labor, would significantly contribute to resolving the problem.

The number of people employed in the agricultural sector decreased between 2000 and 2022. As of 2022, 17.2% of the Turkish population works in the agricultural sector. The share of the agricultural sector in employment is significantly lower than expected. Such a situation can also be considered as an indicator that technology is being used more effectively and widely in agriculture. By modernizing the labor-intensive agricultural sector to a point where it can consistently generate adequate income, we can prevent the decline in employment and the aging of the agricultural population.

In Türkiye, the fragmentation of land and small-scale ownership of businesses remain a structural problem. Land consolidation is of great importance for the effective and efficient utilization of resources. To date, land consolidation has been carried out in approximately 4 million hectares. Land consolidation plays a vital role in improving the agricultural structure and implementing measures to increase productivity. In rural development, consolidating small, fragmented, and dispersed parcels and expanding the business scale does not yield sufficient outcomes. Such efforts need to be supported by education, health, infrastructure, and integrated rural development projects.

Solving the problems experienced in the agricultural industry in Türkiye can make significant contributions to producers' income and economic growth. The main problems experienced in the agricultural industry include the lack of integration between producers and industrialists, the inability to supply raw materials of the desired quality and in sufficient quantities, the absence of an organized producer structure, and the significant variability in raw material quantities, qualities, and prices from year to year. For Türkiye to have a significant influence in agriculture and achieve a competitive edge, it is crucial to address the persistent structural issues in agriculture, enhance agricultural production and trade policies, elevate producer education and welfare standards, maintain agricultural support programs aligned with their objectives, integrate rural development policies into agricultural strategies, tackle producer organization challenges, ensure food safety, address the comprehensive issues of agricultural workers

in social security and labor laws, and utilize agricultural consultancy services effectively. By solving all these problems, the agricultural sector would be able to continue as a significant contributor to economic growth rather than a burden on the economy.

This study is limited to variables related to agricultural support, agricultural employment, and economic growth. The scope of the study can be expanded by including variables such as agricultural production, fixed capital investments, and agricultural product exports in the model.

Contribution Rate Declaration

The author contributes 100% at all stages of the research.

Conflict of Interest Declaration

There is no conflict of interest.

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