Original Article
Received/Accepted Dates
16.05.2022/16.08.2022
DOI 10.52096/usbd.6.26.1

International Journal of Social Sciences

Uluslararası Sosyal Bilimler Dergisi

www.sobider.net **ISSN: 2548-0685**

Analyzing The Determinants of Agricultural Value Added in EU15 Countries and Turkey by Panel Data

Özlem Eştürk[1]

Department of Economics, Faculty of Economics and Administrative Sciences

Ardahan University, 75000, Ardahan Turkey, ORCID NO: 0000-0003-4324-0912

Nilcan Mert

Department of Economics, Faculty of Economics and Administrative Sciences

Ardahan University, 75000, Ardahan Turkey, ORCID NO: 0000-0002-4065-4768

Abstract

Countries have to deal with the sustainability of food supply and demand due to factors such as rapid increase in demand for agricultural food products on a global scale and climate change. Therefore, productivity and agricultural value added products have become strategically important to ensure food security.

Developed countries provide a significant amount of value added in the agricultural sector. The aim of the study was to determine primary factors affecting the agricultural value added production in Turkey and EU15 countries and to determine how Turkey differs from these countries as a developing country. In this

[1] *Corresponding author:* ozlemesturk@ardahan.edu.tr

context, the long-term impact of government effectiveness, political stability and gross domestic product on agricultural value added has been investigated for the EU15 countries and Turkey for the period of 2002-2019.

Results indicated that Turkey had a lower agricultural value added amount than the EU15 countries. While a statistically significant and positive relationship between agricultural value added and agricultural GDP and Political Stability Index, a statistically significant and negative relationship between agricultural value added and Government Effectiveness Index were observed.

Keyword: agricultural value added, government efficiency index, political stability index, panel data analysis

JEL Classification: C23, , H50, O13, Q18

I. Introduction

High costs, climate change, developments in foreign trade and price movements in agricultural sector affect the food supply chain in Turkey and in the world. Agricultural production has also become one of the priority issues during pandemic disease period. In this context, agricultural development policies and efforts to increase agricultural value added are among the priorities of the countries.

Economic growth has an important role in achieving agricultural development. Economic growth in a country increases fixed capital investments and production capacities. Therefore, economic growth could lead to an increase in infrastructure investments in the agricultural sector resulting in an increase in agricultural value added amount due to the use of technology. Countries with high per capita income and high production could generally allocate more resources to improve education, health, service and to solve environmental problems through technological developments and contribute to an increase in welfare (Bucak, 2021). In addition to the growth rates, there are important indicators showing the development of a country such as institutional capacities, institutional functioning, effective use of resources, political and social stability of the countries.

There are numerous studies in recent years showing the relationship between economic growth and political stability and the healthy functioning of institutional mechanisms. The studies have shown that in countries where political stability is ensured, uncertainties about the future decreased, the decisions of economic units were effective, and thus in return, this situation contributes to economic growth by reflecting positively on investment decisions. On the other hand, it has been observed that the risk premia and borrowing costs of the economy increased, and investments and economic growth were negatively affected in countries where political instability was experienced (Şanlısoy, 2010; Biçen, 2020). In addition to the economic stability, the healthy functioning of institutional mechanisms is also important for the efficient use of the resources and sustainable development of a country. This situation is referred as the government effectiveness in the literature. There are various studies showing the effect of this concept on economic growth and development (Güney, 2018; Şaşmaz, 2019; Acemoglu and Robinson, 2010). In addition to fixed capital investments and technological developments, stable and effective policies are important in the development of the agricultural sector. It is possible to achieve high agricultural value added by integrating technology into the agricultural production process with effective and coordinated management.

In this study, the relationship between agricultural value added, a critical value in terms of agricultural development, and GDP, political stability and government efficiency will be examined comparatively for EU15 countries and Turkey.

2. Determinants of Agricultural Value Added

Agricultural activities, carried out to meet the needs of human beings, form the basis of a country's economy. The agricultural sector provides animal and plant foodstuffs necessary for nutrition as well as it creates value added to industry by supplying raw materials.

Value added represents the difference between the monetary value of goods and services produced and the inputs used in production. From a macro point of view, agricultural value added expresses the numerical net production reached as a result of the difference between the sum of the outputs in the agricultural sector and the inputs. According to the definition of the United States Department of Agriculture (USDA), agricultural value added means making progress in the material value of the produced agricultural products together with the physical presence (Lu and Dudensing, 2015; Erdinç and Aydınbaş, 2021).

In other words, agricultural value added is calculated as the difference between the costs incurred in agricultural production and the selling price. It is very important to determine the ratio of the inputs such as labor, seeds, fertilizers, machinery, equipment and technology produced by using national resources, which is used in the production phase of the agricultural product. This ratio is an indicator in determining the amount of the agricultural value added (Tunç, 2020).

Agricultural value added in Turkey remains relatively low when compared to EU15 countries. In Figure 1, agricultural value added per capita was compared with Turkey and EU 15 countries. The agricultural value added per farmer in Turkey was 10,628 dollars in 2002. It increased to 13,049 dollars in 2015 and 17,212 dollars in 2019. Although there was an increase in agricultural value added rates, it was far behind the EU 15 countries. Switzerland had the highest agricultural value added per farmer in 2019 with 102,938 dollars, while the Netherlands ranked second with 87,122 dollars, and Finland ranked third with 75,876 dollars.

An increase in value added in the agricultural sector is related to the development of the agricultural sector. The expected development of the agricultural sector depends on the total capital investments and agricultural supports (Terin et al., 2013).

Fixed capital investments to be made in the agricultural sector are one of the most important factors for agricultural development. This situation contributes to the increase in agricultural income by increasing agricultural productivity (Bahşi, 2005). The share of the agricultural sector in the GNP of Turkey decreased in recent years.

While agricultural income at current prices was 81.2 billion in 2009, this value reached to 188.6 billion TL in 2017 and 277.4 billion TL in 2019 (Figure 2). This value in US dollar was 52.5 billion dollars in 2009. However, it decreased to 52.11 billion dollars in 2017 and 48.8 billion dollars in 2019 (TUIK, 2020). The share of agriculture in GDP was 8.1% in 2009. It decreased to 7.8% in 2012, 6.1% in 2017 and 6.4% in 2019 (TUIK, 2020).

Ensuring economic growth in a country depends on the amount of fixed capital investments and increase in production capacities. Fixed capital investments have positive effects on the country's economy by technology transfer, capital accumulation, production and employment and income increase, economic development and welfare increase (Bayraktutan and Arslan, 2008). Therefore, the increase in value added in agriculture depends on the investments in sectoral infrastructure and the use of technology as a result of economic growth. Stable and effective policies are important in the development of the agricultural sector. It would be the most rational way to integrate technology with effective solutions into the agricultural production process.

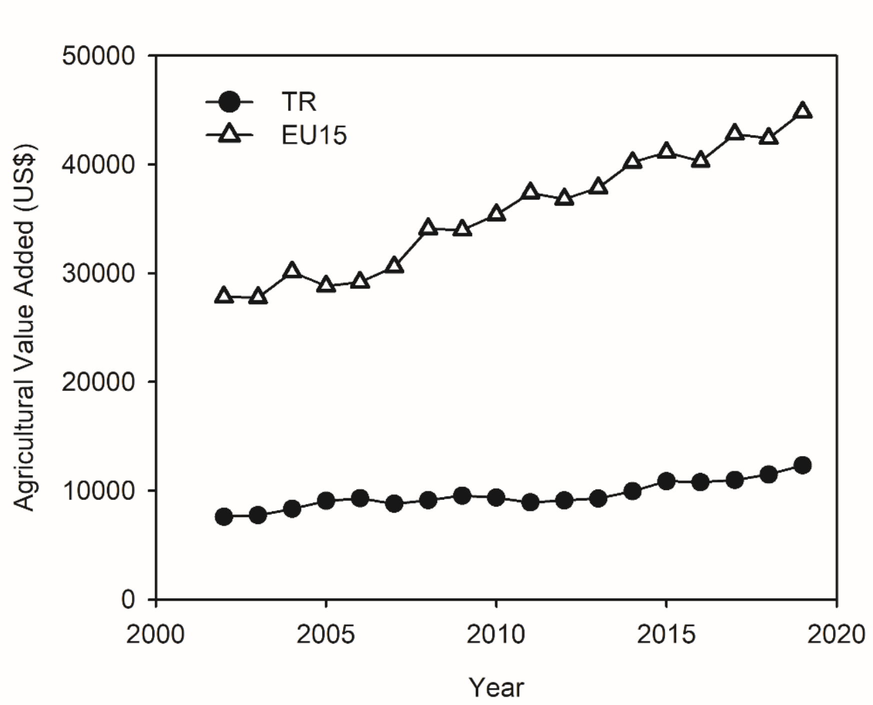

Figure 1. Agricultural value added in EU15 countries and Turkey

Government efficiency and stabilization policies and growth variables in the economy have important effects on the dynamics of the agricultural sector as well as in other sectors. The increase in agricultural productivity and agricultural value added along with the ability producer having high profits depend on the effectiveness of government policies and the stability of the economic political environment.

Government effectiveness is an important factor in the decision-making processes of countries. As it affects many areas, it is important for the agricultural sector. In countries with good government efficiency, the decision-making process will be more objective and faster, and will play a significant role in the development and welfare of the country.

2.1. Government Activity

Government activity, which is among the governance indicators in the world and published by the World Bank, had an effect for countries in different aspects. In countries with a high government efficiency index value, policies were implemented in a timely, planned and effective manner. In this context, there could be improvements in economic, social and political terms. There are numerous studies in the literature showing the positive effects of government effectiveness on economic growth and development. In the study conducted by Güney (2018), it was determined that government effectiveness affects social welfare significantly and positively. In another study by Şaşmaz (2019), a bidirectional causality relationship was found between government efficiency, the rule of law and economic welfare. A study conducted by Acemoglu and Robinson (2010) revealed that political institutions affect economic growth. The policies of political institutions such as the government, influence which goods and services would be produced by using the country's sources (Hall and Jones, 1999). The production output of companies and capital accumulation could be increased by the efficient policies of the government and similar political institutions.

Physical and human resources of countries have direct effects on economic growth. However, the functioning of the economy and the functioning of institutional mechanisms are important in ensuring the efficient use of the resources and sustainable development of the country.

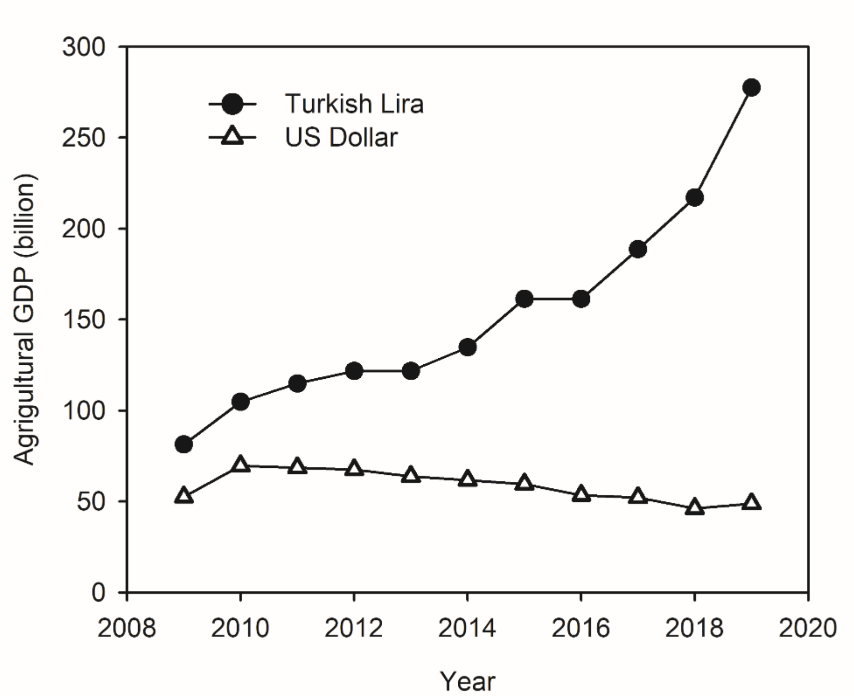

Figure 2. Agricultural GDP in Turkey (billion TL, billion $)

The government effectiveness index, calculated by the World Bank (World Bank, 2022), expresses the quality of public services, the quality of policy making and implementation, and the loyalty of governments to their economic policies . The government efficiency index takes values between -2.5 and +2.5 (Kaufmann et al., 2011). As the index value approaches +2.5, the quality of public services, the independence of these services from political pressures, the quality of policy making and implementation and the effectiveness of government's increase (Akal et al., 2012).

In Figure 3, the government effectiveness index of EU15 countries and Turkey from 2002 to 2019 was compared. As seen in the figure, the average value of the government efficiency index of EU15 countries was above +1. Although it had positive values for Turkey, its average was between 0 and 0.5, remaining well below the EU 15 country averages.

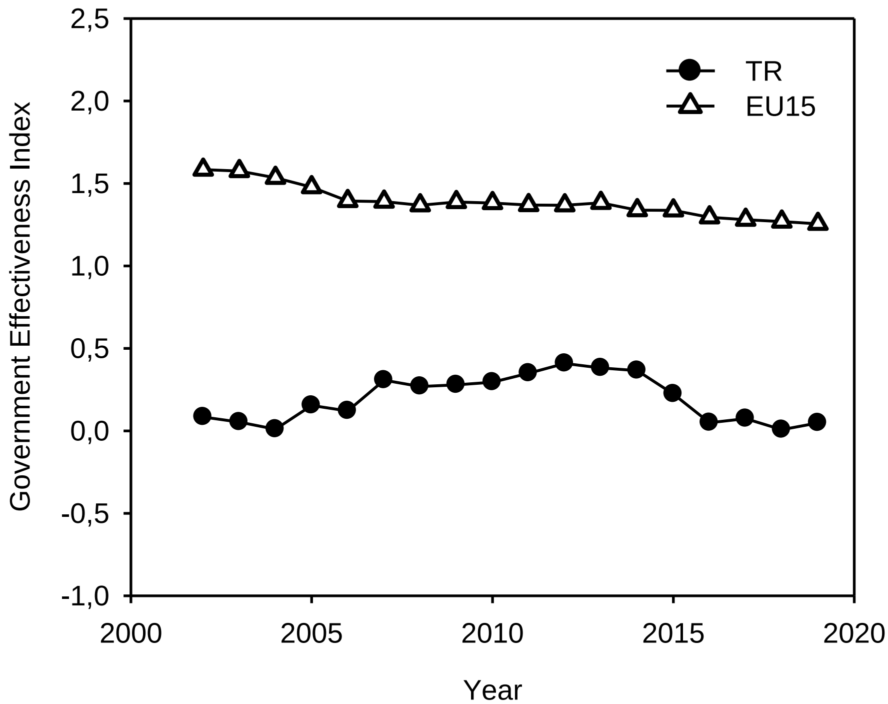

Figure 3. Government efficiency index in EU15 countries and Turkey

2.2. Political Stability

The concept of stability generally means continuity and stability in a certain order. Accordingly, the concept of political stability means that the current governments remain in office with stability and continuity. However, there are some exceptions to this situation. Although their leaders or governments had been in power for a long time, countries like Germany, the Soviet Union and

Italy after the First World War and recently in countries like North Korea, Libya, Iraq and Afghanistan have been among unstable countries (Biçen, 2020).

Countries act more comfortably in terms of investments and consumption with the establishment of political stability (Goldsmith, 1987). In the case of political instability, uncertainty prevails and the concerns of investors and consumers increase about the future. Atmosphere of uncertainty negatively affects the entry of foreign capital investments into the country, which in turn causes the politicians turn to populist policies to secure their reelection. Thus, it leads to the deterioration of the domestic economic balance of the countries.

Regime changes, frequent changes in government through legitimate or illegitimate reasons, social violence, protests, terrorism, military coup, civil war, political assassinations, economic and financial crises, political polarization, corruption, ethnic division are the situations cause political instability (Biçen, 2020).

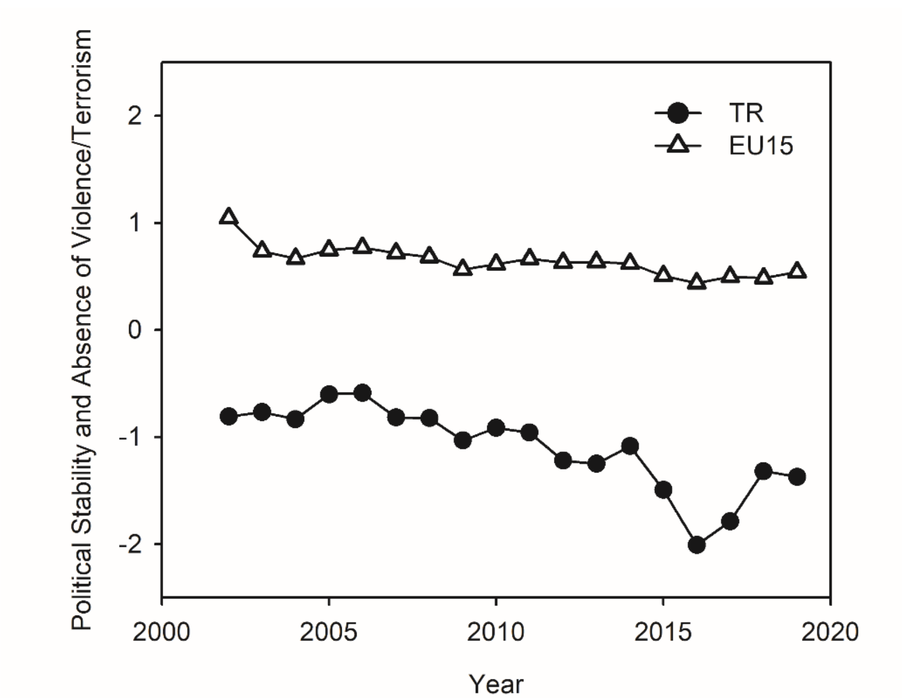

Figure 4. Political stability index in EU15 countries and Turkey.

There are many studies in the literature showing the relationship between economic development and political stability index, which expresses the perception of political instability or political violence including terrorism in the country. It is not possible to achieve economic development in a country without political stability. Ensuring political stability, which is expressed as the perception of the possibility that the government will not be destabilized or overthrown by unconstitutional or violent means, is increasing its importance for national economies (Kaufmann et al., 2011; Soyyiğit and Yavuzaslan, 2019).

The political stability index, like the government effectiveness index, takes values between -2.5 and +2.5, and as the value increases, the political stability in the country increases, and as the value decreases the political stability decreases. In Figure 4, the political stability index averages of EU15 countries and Turkey's political stability index between 2002-2019 were given. The average of the political stability index of EU15 countries took a positive value between 0.5 and 1 and followed a stable course. It has been observed that Turkey had a negative value below 0 in the political stability index. Turkey's political stability index had shown a break in 2016 and fell to below minus 2 and it had slightly increased in 2018.

3. Material and Methods

3.1. Data Set

The long-term impact of government efficiency, political stability and gross domestic product on agricultural value added were investigated for the EU-15 countries and Turkey for the period 2002-2019. In Table 1, the definition of abbreviations, countries and time period of the study were presented.

Descriptive statistics for the variables were reported in Table 2. Results indicated that all series used in the analyze were skewed to the left compared to the mean. While the agricultural value added series had a kurtic curve, other series had step curves.

Variable series include time and cross-section dimension together. Therefore, panel data analyzes were used in this study. First of all, each series was investigated whether it was cross-section dependent or not. Then, the unit root tests were conducted based on the cross-section dependency of test results. The model of the series was estimated according to the unit root properties, the homogeneity test for the model was conducted, and finally the long-term coefficients were estimated.

Table 1. Definitions of variables

Variables	Abbreviation	Countries	Period
Agriculture, forestry and fisheries, value added per worker (Constant 2010, USD)	AVA	Austria Belgium Denmark	
Government Effectiveness Index	GOV	Finland France	
Political Stability Non-Violence Index	POL	Germany	
GDP per capita (Constant 2010, USD)	GDP	Greece Ireland Italy Holland Portugal Spain Sweden Turkey Luxembourg United Kingdom	2002-2019

Table 2. Descriptive statistics

	Mean	Std. Dev.	Min.	Max.	Skewness	Kur-tosis	Obser-vations
LAVA	10.4750	0.6206	8.8490	11.5664	-0.6761	2.7165	270
LGOV	4.1628	0.4814	1.5606	4.6051	-2.5395	10.5798	270
LPOL	4.4557	0.1490	3.9861	4.6051	-1.2930	3.6833	270
LGDP	10.5376	0.4255	8.9950	11.2844	-1.5112	5.2424	270

L indicates that the natural logarithms of the series were taken.

In panel data analysis, the cross-section dependency of the series should be considered in the selection of the unit root test and method to be used. Ignoring cross-sectional dependence could have serious consequences, such as unexplained residual dependence, which results in loss of efficiency of the estimator and causes invalid test statistics. To determine the cross-sectional dependence, LM (Breusch and Pagan, 1980), CD (Pesaran, 2021) and bias corrected scaled LM tests (Baltagi et al., 2012) were used. Breusch and Pagan (1980) LM test statistic, which it stands for the null hypothesis indicating that there was no cross-sectional dependence was calculated as follows;

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^{2} \quad \sim \quad \chi^2(\frac{N(N-1)}{2}) \tag{1}$$

The asymptotic χ^2 distribution was obtained for all (i,j) while $T_{ij} \to \infty$ for constant N, under the assumption that the error terms were normally distributed. Pesaran (2021) developed a more general cross-section dependency test for dimensional distortions that was applied to panels with T→∞ and N→∞ in random order. The test was calculated as follows:

$$CD = \sqrt{\frac{2}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}T_{ij}\hat{\rho}_{ij} \quad \sim \quad N(0,1) \tag{2}$$

The scaled LM test (Baltagi et al., 2012), which provides an asymptotic deviation correction, was calculated as follows:

$$LM_{BC} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}T_{ij}\hat{\rho}_{ij-1}^{2} - \frac{N}{2(T-1)} \quad \sim \quad N(0,1) \tag{3}$$

It is important to use second generation panel unit root tests when there is cross-sectional dependence between the unit of the series in unit root analysis. Pesaran (2007) proposed a unit root test based on standard unit root statistics over the generalized cross-section Dickey-Fuller (CADF) regression. The CADF equation was estimated by adding the lagged values of the cross-section means and the first differences of the cross-section means to the standard ADF equation. CIPS statistics were given in equation (4).

$$\Delta Y_{it} = \alpha_i + \rho_i^{*}Y_{it-1} + d_0\bar{Y}_{t-1} + d_1\Delta\bar{Y}_t + \varepsilon_{it} \tag{4}$$

In equation (1), $\bar{Y}_t$ represents the average of all N observations over time t. After the CADF regression was estimated, the t statistics of the lagged variables were averaged to obtain the CIPS statistics. CIPS statistics were shown in equation (5).

$$CIPS = N^{-1}\sum_{i=1}^{N}CADF_i \tag{5}$$

The combined asymptotic limit of CIPS statistics was not standard and critical values were calculated for various T and N values (Pesaran, 2007). The delta test, developed by Pesaran and Yamagata (2008), was used to determine homogeneity of the slope coefficient in the cointegration equation. The slope homogeneity was tested in panels with multiple observations of the cross-section (N) and time (T) dimension.

$$Y_{it} = \alpha_i + \beta_i X_{it} + \varepsilon_{it} \tag{6}$$

In the general cointegration equation (eq. 6), the slope coefficients were tested whether β_i differ among the sections. The null hypothesis of the delta (Δ) test states that the slopes were homogeneous stating that was all slope coefficients were the same across cross-section units. The modified version of the Swamy test was calculated as a first step for the Δ test.

$$\hat{S} = \sum_{i=1}^{N}(\beta_i - \beta_{WFE})' \frac{x_i' M_\tau x_i}{\sim\sigma_i^2}(\beta_i - \beta_{WFE}) \quad (7)$$

The test statistics that differ for large and small samples are as follows:

$$\text{Large sample: } \Delta = \sqrt{N}\,(\frac{N^{-1}\hat{S}-k}{2k}) \quad \sim \chi_k^2 \quad (8)$$

$$\text{Small sample: } \Delta = \sqrt{N}\,(\frac{N^{-1}\hat{S}-k}{\sqrt{2k(T-k-1)/T+1}}) \quad \sim N(0,1) \quad (9)$$

In equations (8) and (9), N is the number of sections; S, Swamy test statistic; k represents the number of explanatory variables.

The existence of a long-term relationship between the variables was investigated according to the Westerlund test (2005). The cointegration relationship is expressed as in equation (10).

$$LVLAD_{it} = \gamma_1 + \gamma_1 t + \beta_1 GOVR_{it} + \beta_2 POLR_{it} + \beta_3 GDP_{it} + e_{it} \quad (10)$$

$$\hat{e}_{it} = \rho_i \hat{e}_{i,t-1} + v_{it} \quad (11)$$

It was accepted in the panel-specific cointegration vectors that all panels had individual slope coefficients as shown in equation 10 in Westerlund test. The VR test statistics were obtained by testing for a unit root in the estimated residuals by using the DF regression in equation 11. Westerlund (2005) proposed two different test statistics based on a model where the AR parameter was panel specific or the same across all panels. The null hypothesis, which states that there was no cointegration, in the panel-specific AR test statistics, against the alternative hypothesis that some panels were cointegrated; in the same AR test statistic, it was tested against the alternative hypothesis that all panels were cointegrated. The panel-specific AR test statistic and the same AR test statistic were given as in equations (12) and (13), respectively.

$$VR = \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{E}_{it}^2 \hat{R}_i^{-1} \quad (12)$$

$$VR = \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{E}_{it}^2 (\sum_{i=1}^{N} \hat{R}_i)^{-1} \quad (13)$$

In equations (12) and (13), $\hat{E}_{it}$ and $\hat{R}_i$ represent the sum of the error terms and squares of the error terms obtained from the panel regression equation (10), respectively. In the study, the Pooled Mean Group (PMG) ARDL estimation method was used in the estimation of the long-term coefficients.

The PMG model takes the cointegration form of the simple ARDL model and adapts it to a panel setting, allowing the intersections, short-run coefficients, and cointegration terms to differ between cross sections. Specifically, the PMG model could be given as in equation (14).

$$\Delta LVLAD_{it} = \phi_i EC_{it} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta LVLAD_{it-j} + \sum_{j=0}^{q-1} \beta_{ij} \Delta GOVR_{it-j} + \sum_{j=0}^{q-1} \alpha_{ij} \Delta POLR_{it-j} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta GDP_{it-j} + \varepsilon_{it} \quad (14)$$

$$EC_{it} = LVLAD_{i,t-1} - X_{it}'\theta \quad (15)$$

In the PMG model, both the dependent variable and the regressors were assumed to have the same number of lags in each cross-section. Also, for notational convenience, it was assumed that the regressors have the same number of lags in each cross-section, and this assumption is not strictly necessary for the estimation. Pesaran et al. (1999) had derived the point log-likelihood function of long-run coefficients and correction coefficients as in equation (16).

$$l_t(\varphi) = -\frac{T_i}{2} \sum_{i=1}^{N} log(2\pi\sigma_i^2) - \frac{1}{2} \sum_{i=1}^{N} \frac{1}{\sigma_i^2} (\Delta LVLAD_i - \phi_i EC_{it})' H_i (\Delta LVLAD_i - \phi_i EC_{it}) \quad (16)$$

The log-probability in equation 15 can be directly maximized. However, Pesaran et al. (1999) proposed an iterative procedure based on the first derivatives of (15). Accordingly, the first least squares estimate of θ based on the $Y_t = \theta X_t$ regression are used to calculate the estimates using the first derivative relations of ϕ_i and σ_i^2. These estimates are then used to calculate new estimates of θ, and the process continues until convergence. Given the final estimates of θ, ϕ_i and σ_i^2, estimates β_{ij} and λ_{ij}^* can be calculated.

4. Results and Discussions

The effect of government efficiency, political stability and gross domestic product on agricultural value added for the of period 2002-2019 for the EU-15 countries and Turkey were investigated through econometric tests. Cross-section dependency tests of the series were applied and the results were presented in Table 3.

Table 3. Cross-section dependency tests

	LM	LM_{BC}	CD
LAVA	903.5758***	54.6382***	29.4778***
LGOV	263.5792***	10.4742***	4.8089***
LPOL	378.0912***	18.3762***	12.6824***
LGDP	925.9269***	56.1805***	21.2391***

*** denotes significance with a margin of error of 0.01.

All series had inter unit correlations in all cross-section dependency tests (Table 3). In this context, unit root analysis of series containing cross-section dependency was analyzed with the CADF approach of Pesaran (2007), one of the second generation unit root tests (Table 4).

The cross-section extended IPS (CIPS) unit root test results presented in Table 4 showed that all series were stationary (*I(1)*) in their first unit difference. Therefore, the long-term relationship between the variables was investigated by Westerlund cointegration analysis (2005). Before proceeding to the cointegration test, the Delta test was applied to determine whether the slope coefficient in the cointegration equation was homogeneous.

Values in parentheses indicated probability values. Blomquist and Westerlund (2013) used Quadratic-Spehere kernel with HAC robust standard errors and bandwidth of 15, which takes autocorrelation residuals into account.

The slope heterogeneity test results of the cointegration equation were given in Table 5. The null hypothesis, stating the slope coefficients were homogeneous, were not rejected for all three tests. Therefore, homogeneity of the countries studied in this the study was supported.

Table 4. Pesaran – CIPS unit root test

	Constant	Max Lag	Constant&Trend	Max Lag
LAVA	-1.8053	3	-1.8297	3
DLAVA	-3.2037***	3	-4.4849***	3
LGOV	-1.3078	3	-2.5982	3
DLGOV	-4.2098***	3	-3.7729***	3
LPOL	-2.0169	3	-1.7431	3
DLPOL	-3.5418***	3	-3.9424***	3
LGDP	-1.5631	3	-2.0061	3
DLGDP	-2.3912**	3	-3.1479***	3

*** and ** denote significance with an error margin of 0.01 and 0.05, respectively.

Table 5. Slope heterogeneity test

	Statistics
$\hat{\Delta}$ Test	-0.751 (0.453)
$\widehat{\Delta_{adj}}$ Test	-0.950 (0.342)
$\hat{\Delta}$ Test (HAC)	-1.539 (0.124)
$\widehat{\Delta_{adj}}$ Test (HAC)	-1.947 (0.052)

According to Westerlund cointegration test result (Westerlund, 2005), the null hypothesis, stating there was no cointegration, was rejected at 0.05 significance level. (Table 6), Accordingly, this result indicated that there was a long-term relationship between the variables. After the determination of the cointegration relationship, the long-term coefficients and error correction coefficients of the variables were reported in Table 7.

Table 6. Panel cointegration test

	Statistic	Probability
VR Test	-1.6510	0.0494

The null hypothesis stating that there was no cointegration was tested against the alternative hypothesis that stating all panels were cointegrated according to the same AR test statistic.

Table 7. PMG prediction results: ARDL (1, 2, 2, 2)

	Coefficient	t-Statistics	Probability
LGOVR	-4.5552	-9.3119	0.0000
LPOLR	0.2526	2.6427	0.0091
LGDP	0.9010	5.7066	0.0000
EC_{-1}	-0.3320	-3.1706	0.0019

According to the pooled average group ARDL estimation results, an inverse and statistically significant relationship between government efficiency and agricultural value added was found for the whole panel (Table 7). A 1% increase in government efficiency was expected to reduce agricultural value added by 4.55% in the long run. When the political stability coefficient was examined, a positive and statistically significant relationship with agricultural value added was found. Accordingly, a 1% increase in the political stability index was expected to increase the agricultural value added by 0.25%. Finally, a positive and statistically significant relationship was found between gross domestic product and agricultural value added. According to the results, a 1% change in the gross domestic product was expected to change the agricultural value added by 0.90%. In this study, the short-term equation was also estimated and the error correction coefficient obtained was given in Table 7. The error correction coefficient was statistically significant with a negative value of -0.332 indicating the long-term relationship between the variables.

CONCLUSION

Today, increases in food demand and concerns about the sustainability of food supply make it necessary to implement policies to increase value added in the agricultural sector. The effectiveness and sustainability of these policies implemented in this process are important for countries. The stability period of the countries is important in ensuring the effectiveness of the policies and realizing the economic growth targets. In this context, policy steps to increase value added should be measurable and flexible against possible future risks.

Agricultural value added is one of the most strategic issues related to agricultural production and policies in Turkey. As a matter of fact, Turkey had a relatively low agricultural value added when compared to EU-15 countries. In the study, it was aimed to identify the determinants of agricultural value added for the selected 15-EU countries and Turkey. In this context, GDP per capita, political stability and government efficiency indices were used as the determinants of agricultural value added. While a significant and positive relationship was found between agricultural value added and per capita GDP and political stability index, a significant and negative relationship was found with government effectiveness.

Growth was an important parameter in increasing the agricultural value added. The results of the study indicated that a 1% change in GDP was expected to change the agricultural value added by 0.90%. The increase in GDP would increase the infrastructure investments on agriculture and other sectors and increase the use of technology resulting an increase in agricultural value added. Therefore, the positive and significant relationship between agricultural value added and GDP indicated that the model was in line with expectations.

A 1% increase in the political stability index was expected to increase the agricultural value added by 0.25%. In the state of political stability, future consumption and investment decisions of national and international economic actors would be positively affected since uncertainties regarding the future were reduced. In this case, it would have positive effects on the growth of agriculture and other sectors and the increase in added value.

The agricultural value added was expected to decrease at 4.55% in the long run by a 1% increase in government efficiency. The negative relationship between agricultural value added and government activity could be explained by decimating the share of the agricultural sector in GNP in economically developed countries. As countries develop, the production factors used in the agricultural sector (labor force, capital, etc.) would be transferred to other sectors where they were advantageous in terms of resource efficiency. Therefore, the growth in other sectors was higher than in the agricultural sector. Agricultural value added increased during economic growth, however, it fallen behind other sectors.

Capital accumulation was required to use agricultural technology to increase the agricultural value added, which was related to the state's support to the producers and the monetary funds to be transferred for the agricultural sector. Turkey falls behind EU countries in using advanced technologies and innovative practices and production of high value-added products from the agricultural sector perspective. The rapid integration of agricultural products into the international market, product differentiation processes, branding and innovation increased the added value of agricultural products in EU countries, which brought these countries to forefront in agricultural production and productivity. Especially countries that have successfully implemented technology and digital transformation processes had gained a cost advantage in their production processes and increased their profits.

Despite the incentives and policies implemented for the agricultural sector in Turkey, productivity and agricultural value added production remained limited and fell short of the targeted measures. It was important to implement state support in the agricultural sector to increase the producer's capacity in generating value added. However, these supports should provide a mechanism encouraging the use of technology and producing high quality agricultural products, making learning a priority, increasing skills and knowledge, and producer should learn surviving without state support.

International trade is one of the ways to increase agricultural value added in Turkey. This could lead to increase the quality of agricultural products, to produce at international standards and to increase value added. Growth and development in agriculture could be achieved by increasing production amount. The effective use of input factors and productivity were directly related to the technology and capital accumulation. Therefore, technology investments should be supported primarily to increase agricultural value added in Turkey. Since Turkey is under the pressure of climate change and agricultural sustainability is at risk, agricultural policy steps should be considered at a strategic level and effective policies should be developed to increase agricultural production.

References

Acemoglu, D. and Robinson, J., 2010. The role of institutions in growth and development. *Review of Economics and Institutions,* 1 (1-33.

Akal, M., Kabasakal, A. and Gökmenoğlu, S. M., 2012. Explaining competitiveness of OECD countries by instituional and mixed models. *Business Economics Research Journal,* 3 (1)**,** pp.

Bahşi, N., 2005. *Public investment in agriculture and it's effect on agricultural growth.* MS, Çukurova Üniversitesi Fen Bilimleri Enstitüsü.

Baltagi, B. H., Feng, Q. and Kao, C., 2012. A Lagrange Multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of Econometrics,* 170 (1)**,** pp 164-177.

Bayraktutan, Y. and Arslan, İ., 2008. The effects of fixed capital investments on economic growth in Turkey: cointegration analysis (1980-2006). *Karamanoğlu Mehmetbey Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* 10 (14)**,** pp 1-12.

Biçen, Ö. F., 2020. Is political stability a sufficient factor to provide economic growth? An examination on BRICST countries. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,* 23 (43)**,** pp 119-139

Blomquist, J. and Westerlund, J., 2013. Testing slope homogeneity in large panels with serial correlation. *Economics Letters,* 121 (3)**,** pp 374-378.

Breusch, T. S. and Pagan, A., 1980. The Lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies,* 47 (1)**,** pp 239-253.

Bucak, Ç., 2021. Economic complexity index, human development index and carbon emissions in EU15 countries and in Turkey: Panel data analysis. *Ege Stratejik Araştırmalar Dergisi,* 12 (1)**,** pp 71-88.

Erdinç, Z. and Aydınbaş, G., 2021. Panel data analysis of value-added agriculture determinants. *Anadolu Üniversitesi Sosyal Bilimler Dergisi,* 21 (1)**,** pp 213-232.

Goldsmith, A. A., 1987. Does political stability hinder economic development? Mancur Olson's theory and the third world. *Comparative Politics,* 19 (4)**,** pp 471-480.

Güney, T., 2018. Effect of government effectiveness on social welfare. *Uluslararası Yönetim İktisat ve İşletme Dergisi,* 14 (4)**,** pp 919-928.

Hall, R. E. and Jones, C. I., 1999. Why do some countries produce so much more output per worker than others? *The Quarterly Journal of Economics,* 114 (1)**,** pp 83-116.

Kaufmann, D., Kraay, A. and Mastruzzi, M., 2011. The worldwide governance indicators: methodology and analytical issues. *Hague Journal on the Rule of Law,* 3 (2)**,** pp 220-246.

Lu, R. and Dudensing, R., 2015. What Do We Mean by Value-added Agriculture? . *Choices: The Magazine of Food, Farm, and Resource Issues, Agricultural and Applied Economics Association,* 30 (4)**,** pp 1-8.

Pesaran, M. H., 2007. A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics,* 22 (2)**,** pp 265-312.

Pesaran, M. H., 2021. General diagnostic tests for cross-sectional dependence in panels. *Empirical Economics,* 60 (1)**,** pp 13-50.

Pesaran, M. H., Shin, Y. and Smith, R. P., 1999. Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association,* 94 (446)**,** pp 621-634.

Soyyiğit, S. and Yavuzaslan, K., 2019. An investigation on the factors affecting agricultural value added: the case of E7 countries. *Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* 10 (19)**,** pp 403-429.

Şanlısoy, S., 2010. Political instability - economic process policies interaction. *Sosyoekonomi,* 13 (13)**,** pp 191-214.

Şaşmaz, M. Ü., 2019. The causality relationship between government effectiveness, the rule of law and economic welfare in transition economies. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi,* 20 (2)**,** pp 150-163.

Terin, M., Aksoy, A. and Güler, O., 2013. A study on determination of economic factors affecting agricultural growth. *Iğdır Üniversitesi Fen Bilimleri Enstitüsü Dergisi,* 3 (3)**,** pp 41 - 50.

TUIK, 2020. Annual GDP by Production Method, Current Prices, TUIK

Tunç, H., 2020. *Tarımda katma değer yaratmanın ekonomi-politiği. Tarla Sera Dergisi* [Online]. Available: https://www.tarlasera.com/haber-11941-tarimda-katma-deger-yaratmanin-ekonomi-politigi [Accessed 20.12 2021].

Westerlund, J., 2005. New simple tests for panel cointegration. *Econometric Reviews,* 24 (3)**,** pp 297-316.

World Bank, 2022. *Worldwide Governance Indicators* [Online]. Available: http://info.worldbank.org/governance/wgi/Home/Reports [Accessed March 15 2022].