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# ECONOMETRIC ANALYSIS OF FACTORS AFFECTING THE BUYING OR SELLING AGRICULTURAL LANDS

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**Abstract:** The aim of this study is to determine the factors affecting the purchase or sale of agricultural lands in certain neighborhoods in the Dulkadiroğlu district of Kahramanmaraş province and the degree of influence of these factors. For this, a study was conducted by obtaining data from the parcel owners in the determined neighborhoods. As a result of the data obtained from the land owners in the areas determined with the help of the questionnaire, a model was established about the factors that affect the purchase or sale of agricultural lands, what kind of benefit or loss it has in the purchase or sale of agricultural lands, and the dependent variable in this model is the independent variables. The econometric test was determined using the Engle Granger two-stage estimation method to reveal the relationship between In line with the answers given by all landowners who participated in the purchase and sale survey, on all lands: 69.68% of the surveyed farmers have tractors and equipment, 94.95% of them have irrigated and flat lands, the number of crops planted is 9, the nearest settlement The average distance to the area is 19 km, and the land purchase or sale prices were determined by a survey. According to the estimation results, the factors that are effective in the purchase and sale of land determined in the survey are the factors whose degree of influence is stated: When purchasing land; 62.54% is the existence of a land investment relationship, 14.74% is the relationship between heirs, 12.35% is livestock activities and 10.35% is the transition from the treasury to private property. 39.57% of land expropriation, 38.25% of financial insufficiency, 8.70% of relations between heirs, 6.06% of immigration, 5.80% of abandonment of agriculture and 1.58% of changes in land productivity affected land owners.

**Keywords:** Agricultural land prices, Land structure, Tractor and equipment availability, Reason for buying and selling

## 1. Introduction

Valuation studies are carried out with various criteria such as insurance, taxation, expropriation, and methods are determined according to the purpose for which it is to be carried out. Knowing the target of the valuation is very important in terms of making the valuation correctly and expressing the results in an efficient way. When it comes to value, it defines four economic factors. Scarcity is in the form of desire, utility and purchasing power (Pirgaip, 2019).

These four economic factors that create the value affect the supply and demand of the real estate. Factors affecting the value can be grouped as external factors (legal legislation, socio-cultural factors and economic factors) and internal factors (scarcity, physical conditions, utility and transferability). The characteristics of the land, human needs and the location of the land are important in determining the land value (Büyükkaracığan, 2021). The market value and values of the land may vary from region to region, as well as the factors affecting the market value and value in each region. Since the factors affecting the land value are

individual and objective, it is not easy to evaluate and cluster (Yomralıoğlu, 1993). Population growth, physical characteristics of the land, economic conditions, government policies and regional factors may affect the determination of the current market value of agricultural land (Rehber, 2012). Together with, the current market value and values of the land are used as an important data source in order to make investments in private and public areas, to solve the problems experienced with the land and to create scientific studies (Utkucu, 2007; Öztürk Çoşar et al, 2011).

Many studies have been conducted on the subject of market value and value analysis in agricultural lands in Turkey (Hurma, 2007; Vural et al., 2009; Engindeniz et al., 2009; Karakayacı, 2011; Karakayacı, 2015; Keşli, 2017; Başer et al., 2019). According to these studies, it is possible to scientifically evaluate what kind of effects are in the majority of land purchase or sale with the help of surveys made with our farmers, taking into account the geographical structure of the lands in certain neighborhoods selected in the study prepared to determine what kind of factors affect the determination

of the current value and value of the land. For this, the factors affecting the purchase or sale of land and the degree of impact of these factors are clustered with each other. In addition, it is necessary to determine how these factors affect buying or selling. It is thought that what are the effective factors in the purchase and sale of land for various purposes and that it will contribute to minimizing these factors.

It is expected that the study will guide the determination of the valuation of the farmers in the purchase or sale of land in the determined areas and the extent to which the factors affecting the activities of the farmers in the purchase and sale are affected. With the findings to be obtained in this study, it will enable the determination of the current value based on years, based on realistic and scientific principles, by considering factors such as the location of the land, its structure, dry-wet condition, roughness, distance to the settlement area in the sale or purchase of agricultural land in the title deed transactions in the region. In addition, it is thought that this study will be beneficial for the investment plans to be implemented in the area where the study is applied.

The aim of this study is to try to find the degree of influence of the factors that are effective in the purchase or sale of agricultural lands in selected neighborhoods of the Dulkadiroğlu district of Kahramanmaraş province. For this, with the help of the two-stage estimation method, which is an econometric program, the factor effect degree is selected from the very least to the least and the model is established, and the homogeneity of the model is measured with the two-step method, which is cluster analysis, after the significance level of the model is checked. These data will be obtained from the survey study and the results will be found. The dependent variable in the model to be used; In the survey conducted, it is the purchase or sale of land by the surveyed land owners. The independent variables are plot size of the land, land purchase or sale price, land slope status, irrigation status of the land, average land productivity rate, crops planted on the land, the presence of tractors and equipment used in the land, the distance of the land to the nearest center or settlement area, and for what purpose the land was purchased or is sold.

## 2. Materials and Methods

### 2.1. Materials

In this study, it covers a 27-year period in which agricultural lands were bought or sold in 9 neighborhoods in the Dulkadiroğlu district of Kahramanmaraş between the years 1995-2021. The reason for choosing Dulkadiroğlu district as the place where the study will be conducted is primarily the thought that data on the purchase and sale of agricultural land can be partially obtained, and the density of farmers engaged in agricultural work as the first criterion in the selection of neighborhoods in Dulkadiroğlu district. The second criterion is that the land existence and agricultural activities are more common than the other

districts. The neighborhoods where the study will be conducted were determined according to these two criteria, and the survey was conducted in 9 neighborhoods determined in Dulkadiroğlu District of Kahramanmaraş Province in 2021. Dulkadiroglu District; A survey was conducted with 630 farmers who were subject to the purchase and sale of agricultural lands in Kapıçam, Tvekkeli, Yeniyurt, Çınarlı, Abbaslar, Alibeyuşağı, Kocalar, Sivricehüyük and Çiğli neighborhoods between the years 1995-2021. Made under the assumption that it has not changed and all the information obtained is given. In the survey conducted in 9 neighborhoods, between the years 1995-2021, a total of 9597000 m² decares where the purchase and sale took place was determined, and the total land parcel sizes of the neighborhoods are given in Table 1.

**Table 1.** The total parcel size of the lands in the neighborhoods

| Districts | Land Parcel Size (m²) |
|---|---|
| Kapıçam | 980500 |
| Tevekkeli | 746500 |
| Yeniyurt | 1133000 |
| Çınarlı | 1395000 |
| Abbaslar | 1241000 |
| Alibeyuşağı | 1664000 |
| Kocalar | 468000 |
| Sivrivehüyük | 550000 |
| Çiğli | 1419000 |
| Total | 9597000 |

A survey was conducted by randomly reaching as many people as possible and it was determined that 7.93% of the people who participated in the survey were female and 92.07% were male. In addition, the average number of children in the family was determined as 5, and their education level was determined to be 95.33% primary school or literate.

**Table 2.** Wet-water parcel sizes of the lands in the districts

| Districts | Aqueous Land Size (m²) | Anhydrous Land Size (m²) |
|---|---|---|
| Kapıçam | 980500 | 0 |
| Tevekkeli | 746500 | 0 |
| Yeniyurt | 933000 | 200000 |
| Çınarlı | 1286000 | 109000 |
| Abbaslar | 1241000 | 0 |
| Alibeyuşağı | 1664000 | 0 |
| Kocalar | 468000 | 0 |
| Sivricehüyük | 550000 | 0 |
| Çiğli | 1243000 | 176000 |
| Total | 9111500 | 485000 |

It has been determined that there is 485000 m² of waterless land and 9111500 m² of irrigated land. In addition, while Yeniyurt Mahallesi has the most non-

watery land among these neighborhoods, Alibeyuşağı neighborhood has the most irrigated land, and it has been determined that the average ratio of irrigated land productivity and non-watery land productivity is higher than irrigated land (Table 3 and 4).

It has been determined that the crops planted in this region are wheat, barley, cotton, beet, corn, chickpea, watermelon, pepper and cucumber, respectively. Wheat, barley and chickpea cultivation is common in dry lands, while planting of the other listed products is common in irrigated lands. In addition, it has been determined that two crops are planted annually on irrigated lands, while one crop is planted on non-watery lands. Since the geographical shape of the lands is partially uneven in the region where the lands are located, the structure of the lands is flat and the soil is generally normal or slightly stony soil. It has also been learned that all of the lands that have been sold or bought without water are slightly hilly, and the irrigated ones are flat lands, and the distance of the lands to the nearest center or settlement area: 16-18 km on average in Kapıçam district, 19-21 km on average in Tevekkeli district, on average in Yeniyurt district. 19-20 km, an average of 19-22 km in Çınarlı district, an average of 25-27 km in Abbaslar district, an average of 24-25 km in Alibeyuşağı district, an average of 20-22 km in Kocalar district, an average of 20-23 km in Sivricehüyük district and an average of 16 km in Çiğli district. It has been concluded that it is -18 km.

**Table 3.** Average productivity of the lands in the districts

| Districts | Irrigated Land Average Productivity |
|---|---|
| Kapıçam | Sugar beet=4000-8000 kg<br>Corn=700-1000 kg<br>Cotton=300-500 kg<br>Wheat=400-500 kg<br>Barley=300-400 kg<br>Cucumber=300-500 kg |
| Tevekkeli | Sugar beet=4000-8000 kg<br>Corn=700-1000 kg<br>Cotton=300-500 kg<br>Wheat=400-500 kg<br>Barley=300-400 kg<br>Cucumber=300-500 kg |
| Kocalar | Sugar beet=6000-12000 kg<br>Corn=1000-1500 kg<br>Cotton=500-900 kg<br>Wheat=600-700 kg<br>Barley=500-600 kg<br>Cucumber=400-700 kg<br>Pepper=300-500 kg |
| Alibeyuşağı | Sugar beet=6000-12000 kg<br>Corn=1000-1500 kg<br>Pamuk=500-700 kg<br>Wheat=500-600 kg<br>Barley=400-500 kg<br>Cucumber=300-400 kg<br>Pepper= 450-500 kg |
| Sivricehüyük | Sugar beet=4000-7000 kg<br>Corn=800-1000 kg<br>Pamuk=300-500 kg<br>Wheat=500-600 kg<br>Barley=400-500 kg<br>Cucumber=300-400 kg<br>Pepper=250-400 kg |
| Abbaslar | Sugar beet=10000-13000 kg<br>Corn=1000-1700 kg<br>Pamuk=400-600 kg<br>Wheat=700-800 kg<br>Barley=400-500 kg<br>Chickpeas=300-400 kg |
| Çınarlı | Sugar beet=7000-12000 kg<br>Corn=1000-1500 kg<br>Cotton=500-700 kg<br>Wheat=500-600 kg<br>Barley=400-500 kg<br>Cucumber=350-400 kg<br>Pepper=400-500 kg;<br>Chickpeas=300-400 kg |
| Yeniyurt | Sugar beet=4000-8000 kg<br>Corn=800-1000 kg<br>Cotton=400-600 kg<br>Wheat=400-500 kg<br>Barley=300-400 kg<br>Cucumber=300-500 kg<br>Pepper=250-300 kg<br>Chickpeas=250-300 kg |
| Çiğli | Sugar beet=6000-12000 kg<br>Corn=1000-1500 kg<br>Cotton=500-700 kg<br>Wheat=500-600 kg<br>Barley=400-500 kg<br>Chickpeas=300-400 kg |

**Table 4.** Average productivity of the lands in the districts

| Districts | Average Productivity of Dry Land |
|-----------|----------------------------------|
| Çınarlı | Wheat=300-400 kg<br>Barley=250-300 kg<br>Chickpeas=200-300 kg |
| Yeniyurt | Wheat=300-400 kg<br>Barley=200-300 kg<br>Chickpeas=200-300 kg |
| Çiğli | Wheat=300-400 kg<br>Barley=250-300 kg<br>Chickpeas=200-300 kg |

In the survey study, the average percentages of tractor and equipment availability are given in Table 5. It has been found that 69.68% of the land owners have tractors and agricultural equipment, and the remaining 30.32% do not have tractors and equipment. While the reasons stated in the survey are among the factors affecting the purpose for which the land owners buy or sell land, 36.53% have investment relations, 48.07% transition of the land from the treasury to private property, 13.47% relations between heirs, and %36.5 in Kapıçam Mahallesi. While 1.93 of them bought land due to livestock activities; Land was sold 67.56% due to financial inadequacy, 8.10% due to relations between heirs, 21.62% due to expropriation of the land and 2.70% due to immigration. While purchasing land in Tevekkeli Neighborhood, 44.12% due to the existence of investment relations, 50% due to relations between heirs and 5.88% due to livestock activities; 46.15% of the land was sold due to financial inadequacy, 15.35% to quit agriculture, 23.12% to relations between heirs and 15.38% to immigration. While purchasing land in Kocalar Mahallesi, 63.63% of them have investment relations and 36.37% of them are due to livestock activities; 63.63% of the land was sold due to financial insufficiency, 9.10% to quit agriculture and 27.27% to migration. While purchasing land in Sivricehüyük Neighborhood, 60% due to the existence of investment relations, 30% due to relations between heirs and 10% due to livestock activities; the land was sold 40% due to financial insufficiency, 50% due to relations between heirs and 10% due to immigration. While purchasing land in Yeniyurt Mahallesi, 64.30% due to investment relations, 17.85% due to relations between heirs and 17.85% due to livestock activities; 60.72% of the land was sold due to financial inadequacy, 12.53% to quit agriculture, 14.25% to relations between heirs and 12.50% to immigration. While purchasing land in Çiğli Neighborhood, 72% is due to investment relations, 12% due to relations between heirs, 4% due to the transition of the land from the treasury to private property and 12% due to livestock activities; 29.54% of the land was sold due to financial insufficiency, 52.30% due to expropriation of the land, 4.54% to abandon agriculture, 6.81% due to relations between heirs and 6.81% due to immigration. While purchasing land in Alibeyuşağı District, 73.34% due to investment relationship and 26.66% due to livestock activities; Land was sold due to financial inadequacy of 73.34%, leaving agriculture 13.33% and migration 13.33%. While purchasing land in Çınarlı Mahallesi, 80.77% due to investment relationship and 19.23% due to livestock activities; 13.07% of the land was sold due to financial insufficiency, 83.02% due to expropriation of the land, 1.30% to abandon agriculture and 2.61% to migration. While purchasing land in Abbaslar Neighborhood, 82.87% due to the existence of investment relations, 11.42% due to relations between heirs and 5.71% due to livestock activities; 63.90% of the land was sold due to financial insufficiency, 8.33% to quit agriculture, 11.11% to relations between heirs and 16.16% due to changes in land productivity.

**Table 5.** The presence of tractors and equipment in the districts

| Districts | Number of People Who Participated in the Survey | Number of Own Tractors and Equipment | Number of Those Without Tractors and Equipment |
|-----------|------------------------------------------------|---------------------------------------|------------------------------------------------|
| Kapıçam | 89 | 52 | 37 |
| Tevekkeli | 60 | 30 | 30 |
| Yeniyurt | 60 | 40 | 20 |
| Çınarlı | 179 | 113 | 66 |
| Abbaslar | 71 | 71 | 0 |
| Alibeyuşağı | 60 | 51 | 9 |
| Kocalar | 22 | 17 | 5 |
| Sivricehüyük | 20 | 20 | 0 |
| Çiğli | 69 | 45 | 24 |
| Total | 630 | 439 | 191 |

**2.2. Methods**
**2.2.1. Cluster analysis**
Cluster analysis is a method that provides classification by gathering the units examined in a study into groups determined according to their closeness, explaining the common features of the units and making general definitions about these classes (Kaufman and Rousseeuw, 1990). Cluster analysis analyzes the available data with determined methods and divides them into groups with unknown labels. The clusters resulting from this process

show a high level of intra-cluster homogeneity and inter-cluster heterogeneity (Kantardzic, 2003). Cluster analysis is a multivariate statistical analysis method used to group individuals or objects according to their similarities (Tatlıdil, 1996). Clusters created as a result of clustering analysis are more similar to the units in the same cluster than the units in the other cluster. Cluster analysis is a group of methods that make up the data matrix and show the natural communities to sub-cluster the unidentified units that are similar to each other (Romesburg, 1984). As a result of the cluster analysis, each unit in the cluster is very similar to the other units in the cluster according to a predetermined criterion. Thus, high homogeneity within clusters and high heterogeneity between clusters are provided in the clusters formed. If the grouping is successful, when the clusters are placed on the graph geometrically, the units within the cluster are very close to each other, while the units in different clusters are far from each other. Social sciences, medicine, agriculture etc. It is a method that has a relationship with other multivariate analyzes such as cluster analysis, multivariate analysis of variance, logistic regression analysis, and multidimensional scaling, which are widely used in engineering sciences. Clustering can often be encountered in our normal lives. For example, students in a classroom can be counted as a cluster. Many similar examples can be given. Before biologists can make a meaningful definition between various animal species, they need to group animal species correctly. In short, it is inevitable to encounter a clustering problem in a research (Everitt, 1974). Cluster analysis has been used as a general data reduction technique to develop large data sets. The purpose of cluster analysis is to group the unclassified data according to their similarities and help the researcher to obtain appropriate information (Çelik, 2013). Clustering is a test that brings together similar areas in the same class and dissimilar areas in a different class (Guha, 2000). Cluster analysis is a method used for research and identification purposes as well as being useful in statistical fields. It has been foreseen as a useful research technique in terms of seeing the effect of many variables and observation subjects on the units (Doğan, 2008). In cluster analysis, real or standardized data are used. In addition, while the assumption of normality of values in the multivariate statistical method is not important in cluster analysis, the normality of distance values is considered sufficient (Tatlıdil, 2002). The choice of clustering processor and solution techniques is vital for the successful use of analysis (Punj and Stewart, 1983). Clustering methods; they are methods that make use of distance, similarity or diversity matrix to classify values or data as homogeneous and heterogeneous among themselves (Özdamar, 2018). The most used clustering methods are; hierarchical and non-hierarchical methods (Yılmaz, 2011).

**Two-step method**

The two-step method is an algorithm created to test big data classes. The algorithm, on the other hand, clusters the observations in the classes using the approach preference. Compared to ordinary cluster analysis methods, it allows for both categorical and continuous features. Also, this method can automatically select the most compatible class for itself. The method proceeds with the following steps: pre-classification, outlier resolution, and final classification domain (Schiopu, 2010). In the pre-classification phase, it scans the data record one by one and decides whether the existing record will join one of the previously created classes or starts a new classification based on the distance criterion. In the classification phase, the subclasses formed before the classification are classified according to the required number of classes (Ceylan et al., 2017). The method uses two types of interval measures: log-likelihood and Euclidean distance (Schiopu, 2010). Two-ward method is also a hybrid classification technique that is formed by combining hierarchical methods from non-hierarchical classification methods and Ward method from K-means methods. Since the two-ward algorithm provides even more similar clusters in itself, it has been used by many people in various studies (Ceylan et al., 2017). In this study, 5 data sets were created and 3 clusters were determined and analyzed.

**2.2.2. Engle-granger (EG) two-stage estimation method**

The stages of EG cointegration analysis, which is defined as revealing the long-term relations of the linear combinations of the time series, which are not mentioned as stationary alone, with the stationarity processes at a sufficient stability are as follows:

**Stage 1**

In order to see the effect of shocks in the economic system, the model is estimated by using the level values of the variables by the classical least squares method (Equation 1).

$$Y_t = a_0 + a_1 X_t + u_t \tag{1}$$

**Stage 2**

Whether the error terms obtained from the estimated regression are stationary or not is determined by applying the Augmented Dickey Fuller (ADF) or Dickey Fuller (DF) test (Equation 2, 3 and 4).

$$\Delta u_t = \beta u_{t-1} \tag{2}$$

$$\Delta u_t = \alpha + \beta u_{t-1} \tag{3}$$

$$\Delta u_t = \alpha + \beta u_{t-1} + \delta_t \tag{4}$$

$H_0 : \beta = 0$   (There is no cointegration relationship between the variables).

$H_1 : \beta < 0$   (There is a cointegration relationship between the variables).

$H_0$  If the hypothesis is rejected and the error term is determined to be stationary, the stationary error term is substituted in the error correction model (Equation 5 and 6):

$$\Delta y_t = \alpha_1 + \alpha_y\, e_{t-1}$$
$$+ \sum \alpha_{11}(i)\Delta y_{t-i} \qquad (5)$$
$$+ \sum \alpha_{12}(i)\Delta x_{t-i} + u_{yt}$$

$$\Delta x_t = \alpha_2 + \alpha_x\, e_{t-1}$$
$$+ \sum \alpha_{21}(i)\Delta y_{t-i} \qquad (6)$$
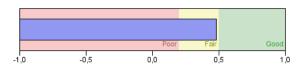$$+ \sum \alpha_{22}(i)\Delta x_{t-i} + u_{xt}$$

Here $e_{t-1}$ is the error correction term. The above illustration is a representation of the Vector Autoregressive (VAR) model and the coefficients of the equation can now be estimated with the Least Squares Method (KEKK). Special cases of finding a cointegration relationship with the Engle-Granger method;

1. $y_t \sim I(1)$, $x_t \sim I(0)$ and $u_t \sim I(1)$ ise $y_t$ and $x_t$ variables are not cointegrated.
2. $y_t \sim I(1)$, $x_t \sim I(1)$ and $u_t \sim I(0)$ it could be $y_t$ and $x_t$ variables, only $[\beta, -1]$ When it is a cointegrating vector, it is cointegrated.
3. $y_t \sim I(0)$, $x_t \sim I(0)$ and $u_t \sim I(0)$ When it does, the problems about cointegration don't make much sense.
4. $y_t \sim I(0)$, $x_t \sim I(1)$ and $u_t \sim I(1)$ ise $y_t$ and $x_t$ variables are not cointegrated ( Engle and Granger 1987).

In this study, it was determined that the series were stationary after taking the first differences in the model established.

## 3. Results and Discussion

In this study, the land purchase-sale price, the irrigation status of the land, the tractor and equipment availability of the farmers who buy or sell the land, and the land for what purpose, in 9 neighborhoods determined in the Dulkadiroğlu District of Kahramanmaraş Province between 1995-2021. The aim is to establish a model related to the factors affecting the purchase or sale and to specify the degree of influence with the cointegration method and to test the homogeneity of the model established with the two-ward method, which is a clustering method. In the applied analysis results, the values in the models established in Figure 1 are homogeneous. In addition, in the application of the Engle-Granger method in determining the degree of influence of the independent variables in the model, the stationarity of the dependent and independent variables in the model was tested with the help of the Dickey-Fuller (DF) method to test the stationarity of the series, and it was determined that the series were stationary after the first differences were taken. Since the probability value is less than 0.05 in Table 6, the series is stationary. In addition, when the Argument Dickey-Fuller (ADF) test statistic is taken into the absolute value, the value of 14.2478 is determined to be stationary since the absolute values of the crystal test values are greater than the sum of 8.8658.



**Figure 1.** The result of the Two-Step method (Silhouette measure of harmony and separation)

In the application of the Engle-Granger method in determining the degree of influence of the independent variables in the model, the stationarity of the dependent and independent variables in the model was tested with the help of the Dickey-Fuller (DF) method in order to test the stationarity of the series, and after the first differences were taken, the stationarity results of the series are given in Table 6.

**Table 6.** The stationarity result of the dependent variable after taking the first difference

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440702 |
| %5 Level | -2.865999 |
| %10 Level | -2.569203 |
| t | -14.24784 |
| Probability | 0.0000 |

Since the probability value is less than 0.05 in Table 7, the series is stationary. In addition, Argüment Dickey-Fuller (ADF) test statistic shows that the series is stationary since the sum of absolute values of crystal test values is greater than 8.8755, with a value of 21.6281 in absolute value. Since the probability value is less than 0.05 in Table 8, the series is stationary. In addition, Argüment Dickey-Fuller (ADF) test statistic shows that the series is stationary when the absolute value of the crystal test values is greater than 8.8759, with a value of 12.8532 in absolute value. Since the probability value is less than 0.05 in Table 9, the series is stationary. In addition, Argüment Dickey-Fuller (ADF) test statistic is 13.1978 in absolute value, since the absolute values of crystal test values are greater than the sum of 8.8759, the series is stationary. Since the probability value in Table 10 is less than 0.05, the series is stationary. In addition, when the Argument Dickey-Fuller (ADF) test statistic is taken into the absolute value, the series is stationary because the absolute value of 16.3577 crystal test values is greater than the sum of 8.8756. Table 11. The probability value is less than 0.05. This refers to the stationarity in the error terms level value and the independent variables in the established model affect the dependent variable in the long run. There is cointegration in the values at the level. These series are cointegrated series. It was understood that $H_0$ was not accepted in the hypothesis given while establishing the model. In the survey conducted with the land owners who were the subject of purchase and sale between 1955 and 2021, there is the degree of influence of the factors in the purchase or sale of land.

**Table 7.** The stationarity result of the independent variable $X_{1it}$ after taking the first difference

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440584 |
| %5 Level | -2.865946 |
| %10 Level | -2.569175 |
| t | -21.62817 |
| Probability | 0.0000 |

**Table 8.** The stationarity result of the independent variable $X_{2it}$ after taking the first difference

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440736 |
| %5 Level | -2.569211 |
| %10 Level | -2.569211 |
| t | -12.85328 |
| Probability | 0.0000 |

**Table 9.** The stationarity result of the independent variable $X_{3it}$ after taking the first difference

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440719 |
| %5 Level | -2.866006 |
| %10 Level | -2.569207 |
| t | -13.19785 |
| Probability | 0.0000 |

**Table 10.** The stationarity result of the independent variable $X_{4it}$ after taking the first difference

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440668 |
| %5 Level | -2.865984 |
| %10 Level | -2.569195 |
| t | -16.35776 |
| Probability | 0.0000 |

After the stationarity test of the series obtained from the data in the established model, the degree of influence of the independent variables on our dependent variable was determined using the Engle-Granger (Co-Integration) method;

**Table 11.** Engle-Granger (Co-Integration) result

| Augmented Dickey-Fuller Fullness Test Statistics | |
|---|---|
| %1 Level | -3.440600 |
| %5 Level | -2.865954 |
| %10 Level | -2.569179 |
| t | -9.817367 |
| Probability | 0.0000 |

According to the results of the research, in line with the answers given by all land owners who were included in the survey, in all lands: 69.68% of the surveyed farmers have tractors and equipment, 94.95% of them have irrigated and flat lands, the number of crops planted is 9, the nearest settlement The average distance to the land area is 19 km, and the land purchase or sale prices were determined by a survey, and among the factors that were effective in the purchase and sale of land determined in the survey, the factors whose degree of influence were stated: when purchasing land; 62.54% is the existence of a land investment relationship, 14.74% is the relationship between heirs, 12.35% is livestock activities, and 10.35% is the transition from the treasury to private property. 39.57% of land expropriation, 38.25% of financial insufficiency, 8.70% of relations between heirs, 6.06% of migration, 5.80% of abandonment of agriculture and 1.58% of changes in land productivity have affected land owners.

In order to determine the current value of agricultural lands, the region where the land is located and the capitalization rate must be directly proportional. However, since the capitalization rate varies from region to region and even from land to land, this rate should be taken separately for each region in scientific studies to be carried out. Researchers who will make appraisals should have a good grasp of the regional conditions and analyze them well, as well as have necessary and sufficient knowledge of the economic and technical aspects of agricultural production. In addition, in the determination of the current values of agricultural lands, these and similar transactions are carried out more quickly and easily with the market value maps obtained by using Geographic Information Systems (GIS).

While determining the current value of agricultural lands, various factors have effect sizes and the degree of impact of each factor differs from region to region. For this reason, it is very important to determine the factors affecting the market value in determining the current market value of agricultural lands. Since all factors cannot be taken into account in determining the current market value, fair market value cannot be obtained. In the article or thesis work to be done after that; The fact that the people in the surveyed area were not fully reached and the information was not given in full, and the fact that the land purchase or sale in each neighborhood was not coincided with each year as a result of the determined years, was determined to cause disruption in the analyzes applied to the data should be preferred and it was foreseen that the existence of land expropriation should be paid attention to.

In this study, first of all, a model was established with the help of the factors that are effective in buying and selling by making use of the survey conducted in 9 selected neighborhoods in Kahramanmaraş Dulkadiroğlu district.

$H_0$: In the survey conducted with the land owners who were the subject of purchase and sale between the years 1995-2021, there is no effect of the factors in the

purchase or sale of land.

H$_1$: In the survey conducted with the land owners who were the subject of purchase and sale between the years 1995-2021, there is the degree of influence of the factors in the purchase or sale of land.

The hypotheses are stated and the model is established. This model given in Equation 7:

$$Y_{it}=\beta_0 +\beta_1X_{1it} + \beta_2X_{2it} + \beta_3X_{3it} +\beta_4X_{4it} +u_{it} \qquad (7)$$

Y$_{it}$: Land purchase and sale of the surveyed farmers between 1995 and 2021.

X$_{1it}$: Land purchase and sale prices of the surveyed farmers between 1995 and 2021.

X$_{2it}$: Irrigation status of the lands of the surveyed farmers.

X$_{3it}$: Tractor and equipment assets of surveyed farmers between 1995 and 2021.

X$_{4it}$: The purpose for which the surveyed farmers buy or sell land.

First of all, using the two-step method, which is a cluster analysis, the homogeneity of the data was tested with 5 inputs and 3 clusters.

While determining the current values of agricultural lands in various regions of Turkey, the effect sizes of the factors that are effective may differ from region to region. As a matter of fact, the most important factors affecting the fair value of agricultural lands are; He demonstrated with an econometric model that inflation and land rent are effective on agricultural land prices. He stated that changes in government programs would also affect land prices (Belongia, 1985). Factors affecting agricultural land prices; classified as those with agricultural characteristics and others, and the factors they took into account; they examined land rent, government payments and land properties (Dunford et al., 1985). In a study conducted in some villages of Ankara province, he explained the methods used in the valuation of agricultural lands. In addition, he examined the issue of the presence of some factors related to value in field lands in the province of Ankara. As a result, he determined that the average sales prices and capitalization interest rates of the lands differ according to the types of businesses (Vural, 1991). In a study conducted in Erzurum and Erzincan provinces, the values of agricultural lands and various factors affecting these values were discussed. As a result of the statistical study, the aesthetic location and slope for the irrigated lands of Erzurum province and the landform value for the barren lands were determined as the factors affecting the value. For the irrigated lands of Erzincan province, aesthetic location, fragmentation and landform were found to be effective factors (Birinci, 1997). In a study conducted in the Ereğli district of Konya province, 4 villages out of 87 village settlements defined 5% of the campus-targeted sampling system. In these 4 village settlements, 894 agricultural enterprises constitute the data set in the study. The data in the research consists of data obtained through questionnaires from 64 agricultural enterprises.

Useable capitalization rates have been determined according to the variety of land based on agriculture in the Ereğli district of Konya province. In the study area, 2.19% of the enterprises are operated by tenancy, 1.67% by shareholding and 96.14% by property. While 22.81% of the enterprises have dry agricultural lands, 77.19% of them have irrigated agricultural lands. The capitalization rate in the study area was determined as 7.38% in orchards, 5.62% in irrigated agricultural lands and 6.63% in dry agricultural lands (Tanrivermis et al., 2004). In the research conducted in the Bogota region of Colombia, located in the south of the American country, they conducted a research on the high-speed train transit network, which is thought to have an effect on the land values in the region. As a result of the research, it was determined that there was an increase of 14% in the appraisal of the lands in the region (Rodriguez et al., 2009). In a study conducted in the Keskin district of Kırıkkale, plot size, land rent, distance to the village center, distance to the province and district road, and the distance to the nearest railway and water source (Koç, 2011). In a study conducted in the Menemen district of İzmir, the soil quality was determined as the outbuilding status and parcel size in the land (Öztürk et al., 2013). In a study conducted in the Lâdik district of Samsun, the probability of stoniness, slope, irrigation rate, yield and the distance of the land to the nearest residential area were determined (Baser et al., 2016). In a study conducted in Kemalpasa district of Izmir, soil structure and fertility were determined as road and transportation conditions, irrigation conditions, land location and size (Karaca et al., 2016). In another study conducted in İzmir, the quality of the parcel in Bergama district, the productivity of the parcel in Bayındır district, the application of rotation in the parcel in Tire district, the proximity of the parcel to the village center in Torbalı district, and the mode of operation or saving of the parcel in Ödemiş district were determined (Öztürk et al., 2017). In a study conducted in Evren district of Ankara, soil structure, shape and slope were determined as land irrigation status, width and productivity (Bayramoğlu et al., 2021).

## Author Contributions

## Conflict of Interest

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