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SOCIODEMOGRAPHIC DETERMINANTS OF HOMEOWNERSHIP. THE CASE OF TURKEY

***Abstract.** In this study, sociodemographic factors affecting the homeownership were investigated using data from the 2017 Household Budget Survey conducted by the TURKSTAT. To logistic regression analysis, it was confirmed that sociodemographic variables such as gender, age, household type, annual disposable income, household size, education level, marital status, employment status and activity status have an impact on homeownership. As a distinction from the literature, canonical correlation analysis with optimal scaling was implemented to examine the interactions between the sub-categories related to these variables. When the positions of the variables were examined, the main variables with the highest load value are ownership type, housing type, and income. In addition, the secondarily effective variables with the highest load value are age and education. On the basis of subgroups, it was seen that being a home owner/tenant was correlated with subcategories of age and working status, while preference for housing type was correlated with subcategories of education and household size. The results of sub-categories may provide guidance for future housing projects and policies.*

***Keywords:** Homeownership, Housing Demand, Housing Mobility, Logistic Regression, Canonical Correlation with Optimal Scaling*

JEL Classification: R21, O18, C35, C30

1. Introduction

The need for shelter has always been one of the basic necessities since the beginning of humanity. The basic structure to meet this need is housing. In order to sustain their lives, individuals generate demand for housing either by owning a house or by benefiting from the right to use it. Housing mobility arising from the changes in social and economic conditions, as well as the existing housing not being able to meet the potential needs of individuals, results in additional demand for housing. (Öztürk and Fitöz, 2009).

Mobility in the housing sector is considered an indicator of social status as and represents the mobility arising from the needs of the household. However, explaining the concept of housing mobility only with the individual's desire to own houses or social concerns is not sufficient. Considering the macroeconomic aspects, the tendency to purchase housing increases especially during the periods of economic uncertainty and stagnation which bring along low-interest policies. Such conditions cause housing to be considered as a reliable investment tool and play an important role in making housing demand as one of the key economic determinants (Trimbath and Montoya, 2002).

Homeownership is a necessity in terms of meeting the need for accommodation; a social concept in terms of the relationships of family members; a physical concept in terms of the sustainability of vital activities; a societal concept in terms of the interactions of individuals with other households and the continuity of social relations. In addition, it is an administrative concept in terms of shaping environmental and urbanisation policies; a political one in consideration of class differences; an economical one when considered as a tool for production, consumption, and investment; a legal one in terms of legal regulations; and a technological one in terms of the applicability of building construction technologies (IMO, 2011). Including and concerning various fields, the concept of housing demand is considered in the literature as a subject that attracts attention from and is frequently addressed by different disciplines.

It can be said that, if the factors affecting housing demand were to be categorised under two groups as micro and macro factors, micro factors would be social preferences and sociodemographic characteristics that are mostly evaluated within the framework of the household; and macro factors would be variables such as housing loans, interest rates, and taxes (Bourassa et al., 2015).

However, macroeconomic policies are largely determined by social dynamics. At this point, the characteristics of individuals and their place in the society become important. In other words, if the characteristics of the smallest structural unit of the society are better identified, the corresponding policies can be carried out more successfully on both social and macroeconomic scales. Due to the importance of individuals and households within the society, in this study, the data from the Turkish Statistical Institute (TURKSTAT) 2017 Household Budget Survey were analysed to identify sociodemographic determinants that affect homeownership

status in individuals. Firstly, a detailed literature review on the sociodemographic determinants of homeownership, which is a subject of study for different scientific disciplines, and on the factors that affect housing demand was conducted. Before proceeding to the analyses, the methodology, data, and empirical strategy of the study were introduced. Then, the sociodemographic determinants were obtained by logistic regression analysis and the correlation structure between these determinants and homeownership was examined in detail. In order to obtain more detailed information about the sub-groups, categorical interactions were examined with the help of canonical correlation analysis with optimal scaling. In the last part of this study, significant findings are given and the results are discussed.

There are previous studies in the literature to determine demographic factors for homeownership. However, the literature review presents that these factors are directly correlated with fast-changing social and economic conditions. Therefore, studies with current data should be conducted in order to present updated socio-economic conditions. In addition to that, despite having a very dynamic housing market and increasing housing demand due to its growing population, recent studies from Turkey on determinants of housing demand are not very common in the literature compared to similar studies from other countries. The main objective of this paper is to address this issue and provide a new insight by utilising current data from official resources through multivariate analysis.

2. Literature review about factors affecting homeownership

Housing is accepted as one of the basic needs of humans (Tatlı, 2013). It is usually estimated that accommodation expenses constitute a large portion of the overall household budget. In addition to that, the housing sector is one of the main categories of the economic structure of a country. The parameters obtained from this sector are often used as indicators for monitoring the status of the national economy. Therefore, determining the factors affecting homeownership can be considered as an important challenge for decision makers.

There are many studies in the literature that examine the ownership of housing. In the literature, two main groups of factors that affect home ownership are stated: social and economic. Rothenberg et al. (1991), Lauridsen and Skak (2007), have demonstrated the social and economic determinants of homeownership through their studies. A thorough literature research reveals that the household head's income (Hood, 1999; Fontenla and Gonzalez, 2009; Ergöz-Karahan, 2009; Öztürk and Fitöz, 2009), age (Lauridsen and Skak, 2007), gender (Fontenla and Gonzalez, 2009), marital status (Martin, 1966; Fontenla and Gonzalez, 2009), educational status (Ergöz-Karahan, 2009; Tatlı, 2013), household size (Martin, 1966; Gan et al., 2014) and dependent population number (Fontenla and Gonzalez, 2009) are the major factors that affect the homeownership. The factors of age, gender, education level, having a house for a long period of time not only affect homeownership, but also are good indicators of house value estimation (Haurin et al., 2010).

In a study by Tatlı (2013) that was conducted in order to determine the factors affecting household ownership and to determine how these factors affect the ownership of households, surveys were developed to determine the demographic, social characteristics, homeownership, income and expenses of the household. Then, chi-square analysis and logit modelling were performed to determine whether the relationship between variables was significant. Thus, the probabilities of the head of the household being a homeowner were investigated. The research indicates that an increase in monthly income raises the probability of homeownership. Also, it was found that the heads of the married households were about three times more likely to own a house than those who were not married. Another study by Fontenla and Gonzalez (2009) found that the demand for housing of married household heads was 2.2% higher than that of unmarried household heads in Mexico, which is a developing country similar to Turkey.

According to Ergöz-Karahan (2009), all factors such as the way of life, resources, perceptions, cultures, and personal characteristics of households and individuals, property status was found significant in determining housing and residential preferences in Istanbul, Turkey.

According to Özlük (2014), there are many variables that determine the demand for housing in Turkey, such as the tastes and preferences of the household, the customs and customs of the society. However, economic and demographic factors determine the demand for housing in general. Economic factors include housing prices, income and consumption, savings for housing acquisition, housing financing systems, and demand for housing for return purposes. Demographic factors include the urbanisation rate, household size, population growth, marriage and divorces, and internal and external migrations. In 1927, 25% of the population lived in urban centers in Turkey. This number increased to 75% in 2012. Especially, after 1980 in Turkey, neoliberal policies, industrialisation, tourism, and large-scale migrations due to security problems accelerated the urbanisation process in Turkey.

In a study which aims to develop an integrated model of dynamics of housing market and address the question of how housing demand is directed, homeownership characteristics of households have been investigated to understand how the demand for housing is diverting. The researchers claim that the models in the literature do not efficiently address the housing demand in non-western countries. For the purpose of developing an integrated model, a field study was conducted in Istanbul. The findings of this research indicate that all the factors such as lifestyle, resources, perceptions, cultures, and personal characteristics, property status constitute the major criteria that play a role in the selection of residential areas for households and individuals (Ergöz-Karahan, 2009). Gender is also a crucial factor affecting homeownership. Having a balcony is demanded by a large sample in the field study.

Another study investigates the relationship between the features of the house and the characteristics of the people that demand the house. In the study, a survey was conducted among staff from Ataturk University, Erzurum, Turkey, and the data obtained from the individuals with housing demand were analysed by using multivariate correspondence analysis, which is one of the techniques used for analysis of the categorical data with multiple dependent variables. The relations between the

variables of the house, the type of house, the size of the housing, the number of rooms, and the characteristics of the personnel, age, income, property ownership, and payment options were determined (Abar and Karaaslan, 2013).

Another study aims to define residential housing market supply and demand determinants in Turkey by using regression analysis. There is a positive relationship between Housing demand and Gross Domestic Product (GDP) per capita. Also, among the variables, the increase in the M2 monetary level, namely, the liquidity expansion, is found to have a positive impact on homeownership. There is also a positive relationship between national income, house prices, and interest rates per capita and housing demand according to their study (Öztürk and Fitöz, 2009).

Literature research indicates that property prices are expected to be one of the most important factors affecting homeownership. Therefore, factors affecting Property prices should be examined and criteria should also be determined.

In a study by Güriş et al. (2011), income, age, gender, education, marital status, employment status of the household head and type of housing have been determined as the factors affecting the possibility of homeownership in urban areas. In rural areas, variables such as gender and marital status were not specified among the factors that affecting home ownership. However, having a social insurance plan is included as a factor. In addition to that, the findings further indicate that choosing to live in rural or urban areas should have a significant impact on homeownership status.

A paper by Eichholtz and Lindenthal (2014) also focus on the differentiation of the demand for residential real estate by age and other demographic characteristics. The researchers use an updated methodology with a clear segmentation between life cycle variables that change with age for each household, and other variables which are determined by other characteristics of the household than age. The main findings of the study indicate that housing demand usually increases with age and is determined by a household's human capital. The study also highlights that there is significant evidence that factors such as high education levels, good health, and high income will increase a household's demand for housing.

Briefly, there are several factors that affect homeownership studied in the literature. However, these factors can be basically divided into two segments: (1) structural properties and (2) householders' characteristics. These two segments are nested and determine the actions of having a house. This study mainly focuses on householders' characteristics which are listed below:

- Income (Hood, 1999; Fontenla and Gonzalez, 2009; Ergöz-Karahan, 2009; Öztürk and Fitöz, 2009; Attanasio et al., 2012; Tatlı, 2013; Abar and Karaaslan, 2013);
- Age (Lauridsen and Skak, 2007; Abar and Karaaslan, 2013);
- Gender (Ergöz-Karahan, 2009; Fontenla and Gonzalez, 2009);
- Marital status (Martin, 1966; Fontenla and Gonzalez, 2009);
- Educational status (Ergöz-Karahan, 2009; Tatlı, 2013);
- Household size (Martin, 1966; Tatlı, 2013; Gan et al., 2014);
- Dependent population number (Fontenla and Gonzalez, 2009);
- Demographic and social characteristics (Ergöz-Karahan, 2009; Tatlı, 2013).

3. The Purpose and Scope of the Study

In this study, the data acquired within the scope of the Household Budget Survey conducted by the Turkish Statistical Institute (TURKSTAT) in 2017 are used. The dataset of the study was obtained as a result of computer-aided face-to-face interviews using the stratified two-stage sampling method between January 1 and December 31, 2017. The TURKSTAT data consists of two data sets, household survey and individual survey in the same survey. In the study, sociodemographic variables and additional variables related to homeownership were used. For this reason, household and individual data sets were combined. Worked with household heads. Missing data on the relevant variables were discarded, and those with income were dealt with. Thus, the data set consists of 9651 observations.

The main purpose of the study is to determine the sociodemographic characteristics that affect homeownership status. In addition, since the choice of housing is important as well as being a home owner, it was requested to evaluate these two situations as a whole. In this study, ‘Do sociodemographic variables and variables related to homeownership affect home ownership?’, ‘Do sociodemographic variables and variables related to homeownership affect the preferred housing type?’, ‘What is the degree of relationship between the two sets of variables?’ and ‘Are there prominent relationships between categories?’ Answers to research questions were sought.

Within the scope of the study, a logistic regression will be made by first taking home ownership and housing type as dependent variables separately. Then, the canonical correlation with optimal scaling analysis will be used to make detailed categorical analyses with the variables found to be significant in the logistic regression. In order to implement the analysis to the variables in the TURKSTAT Household Budget Survey, certain categories were combined, and certain variables were converted into categorical variables. The research was carried out on 9651 individuals. Information about the variables used in the study, their categories and descriptive statistics are given in Table 1.

Table 1. Description of variables

Variable	Description	Frequencies (%)	Mod
Ownership Type	OW1: Tenant	22.2	OW2
	OW2: Homeowner	77.8	
Housing Type	H1: Detached house	46.2	H2
	H2: Apartment building	53.8	
Gender	G1: Male	85.9	G1
	G2: Female	14.1	
Household Size	The total number of individuals living in the household.		HS2
	HS1: one	8.7	
	HS2: two	25.5	

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Variable	Description	Frequencies (%)	Mod
	HS3: three	22.4	
	HS4: four	21	
	HS5: five	11.3	
	HS6: six	5.4	
	HS7: seven	2.6	
	HS8: eight	1.4	
	HS9: nine	0.7	
	HS10: ten	0.4	
	HS11: more than ten)	0.6	
Household Type	HT1: Nuclear family with one child	17.8	
	HT2: Nuclear family with two children	17.6	
	HT3: Nuclear family with three or more children	12.5	
	HT4: Couple with no children	20.6	HT4
	HT5: Patriarchal or extended family	16.8	
	HT6: Family with one adult	14.2	
	HT7: Students, workers etc. who are living together	0.7	
Education	E1: Did not graduate	11.1	
	E2: Primary school	43.5	
	E3: Secondary school	12.8	
	E4: Vocational or technical secondary school, Elementary school, General high school, Vocational or technical high school (high school etc.)	16.7	E2
	E5: 2 or 3-year college, 4-year college or faculty, 5 or 6-year faculty (university etc.)	14.8	
	E6: Postgraduate degree, PhD	1.2	
Marital Status	M1: Single	17.1	
	M2: Married	82.9	M2
Employment Status	ES1: Employed	66.3	
	ES2: Employed, however still associated with their job	0.4	ES1
	ES3: Not employed	33.2	
Activity Status	AS1: Looked/looking for a job	1.9	
	AS2: Continued/continuing education (including apprentices and trainees)	0.4	
	AS3: Retired or left work (other than optional retirement)	18.4	
	AS4: Disabled and/or unfit to work	1.8	
	AS5: Elderly (not retired, but thinks they are too old to work, 65+)	3.7	AS8
	AS6: Homemaker (including the care of children, elderly people, patients etc.)	5.9	
	AS7: others	0.2	
	AS8: Wage or salary earner (Full time)	42.1	
		1.4	

Variable	Description	Frequencies (%)	Mod
	AS9: Wage or salary earner (Part time)	20.7	
	AS10: Employer / self-employed (Full time)	3.5	
	AS11: Employer / self-employed (Part time)		
Age	Open-ended question with 10 categories forming deciles. (A1: youngest A10: oldest represents the group.)	Min: 17 Max: 99 Mean: 51.28	
Annual Disposable Income	The total household income was divided by household size and the per capita disposable income in the household was calculated. Open-ended question with 10 categories forming deciles (I1: lowest, I10: highest represents income group.)	Min: 1160.47 Max: 1230700 Mean: 47924.3348	

According to Table 1, since the head of household is generally male in Turkey, the frequency of males is higher. In addition, the sample consists of married, wage or salary earner (full time) employees and also represents the Turkish society. In the sample, the average age was found to be approximately 51 years, and the average annual disposable income was approximately 47924. According to Table 1, when frequencies and mode categories are examined, the data set in question reveals a structure similar to Turkey.

4. Methodology

4.1. Logistic Regression Analysis

Certain assumptions must be made in order to carry out regression analysis, which has a very wide range of uses. If the assumptions are not met, necessary adjustments should be performed. While the dependent variable must be continuous in regression analysis, there is no such restriction for independent variables. However, the dependent variables of interest in social sciences are mostly categorical and usually have two levels. In the case where the dependent variable has two levels, the linear regression equation is expressed in the form of probability and defined as a Linear Probability Model (LPM) (Aldrich et al., 1984).

The logistic function is obtained by drawing the probability of P_i from the logit model. The resulting function is continuous, and in the form of an S-shaped sigmoid curve, and the estimate values are always in the range of 0 to 1 (Menard, 2002). Additionally, in logistic regression, assumptions of homogeneity, normality, and continuity are not required to be met.

4.2. Nonlinear Canonical Correlation Analysis

Optimal scaling multivariate analysis techniques are used in cases where assumptions cannot be met in multivariate data sets with categorical variables. Optimal scaling techniques also differ in terms of the variable sets and numbers used within themselves. The optimal scaling canonical correlation technique put forward by Gifi is the technique suitable for the most comprehensive dataset of this group of techniques (Gifi, 1990). When examining the relationship between variables with this technique, it is possible to examine all variables together with their subcategories.

In nonlinear multivariate analysis techniques, optimal scaling and alternating least squares of optimal scaling techniques are used to analyse categorical data. Optimal scaling canonical correlation analysis is a method used to reveal similarities between two or more variable sets consisting of metric and non-metric scale levels by applying nonlinear transformation (Golob and Recker, 2003).

Nonlinear canonical correlation analysis does not have any assumptions such as having a linear relationship for variables with different scale levels or a distribution condition for the variables. The nonlinear canonical correlation analysis is only affected by the outliers of the variables in the clusters to be analysed. It is also a method that can be applied in case of missing data in the data set. In general, nonlinear canonical correlation analysis can be expressed as the problem of minimising the loss function under certain constraints. This optimisation problem is expressed as follows: G_j indicator matrix, Y_j category quantification matrix, X object scores matrix, J_k , k , the the number of variables in the set (Van der Burg et al., 1984).

$$\text{Min } \sigma(X, Y) = \sum_{k=1}^K \text{tr} \left(X - \sum_{j \in J_k} G_j Y_j \right)' \left(X - \sum_{j \in J_k} G_j Y_j \right)$$

$$\text{Constraints: } X'X = nI, \quad u'X = 0$$

$$\text{For some variables: } Y_j = y_j a_j' \quad \text{ve } G_j y_j \in C_j$$

Here, C_j denotes the appropriate set of nominal, ordinal, or quantitative transformations for the variable. a_j is the $(p \times 1)$ dimensional canonical weight. These weights are obtained for subcategories of variables as well as for variables within the cluster to maximise canonical correlation (Bell, 1997).

In this method, instead of examining the direct relationship of the variables with each other, the similarities of the clusters including by two or more variables are examined on a graph. At this point, the subcategories of the variables gain importance, and the relationship structure of the subcategories is collectively interpreted according to their positions on the graph.

5. Empirical Findings

Analysis results of the study are discussed in two sections. In the first section, logistic regression analysis was applied to the data set, a significant model was obtained, and the results were given. In the second section, the correlation structure between the categories of variables determined on the significant model was examined with canonical correlation with optimal scaling, and the findings were included. The analyses were carried out with the SPSS 21.0 package program.

5.1. Logistic Regression Analysis Results

Logistic regression was applied with ownership variable and housing type variables separately and the results are given below. The aim here is to identify significant variables. The analysis is based on the final category and the Enter method was used. Model 1 is the logistic regression model where the dependent variable is the ownership type, and model 2 is the logistic regression model where the dependent variable is the housing type. In the Model 1, $y=0$ indicates the tenant, while $y=1$ indicates the homeowner. In Model 2, $y=0$ indicates a detached house, while $y=1$ indicates an apartment building.

Table 2. Omnibus tests of model coefficients

			Chi-square	df	Sig.
Model 1	Step 1	Step	3364.844	9	.000
		Block	3364.844	9	.000
		Model	3364.844	9	.000
Model 2	Step 1	Step	3574.962	9	.000
		Block	3574.962	9	.000
		Model	3574.962	9	.000

According to Table 2, in both models, the significance value of the model was found to be 0.000, and since this value is less than 0.05, it can be construed that 'the final version of the model is statistically significant'.

Table 3. Model summary

		Step	-2 Log likelihood	Cox & Snell R ²	Nagelkerke R ²
Model 1	1		6855.368	.294	.451
Model 2	1		9748.135	.310	.414

Table 3 shows that -2 Log likelihood value is 6855.368 and 9748.135. In the models, considering the number of significant variables other than the fixed variable, the Chi-Square critical value was taken as the basis ($\alpha= 0.05$) and the -2 Log likelihood (calculation) value was found to be greater than the critical value, resulting in the rejection of the basic hypothesis.

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H_0 : All coefficients are equal to zero, except for the constant.

H_1 : At least one is different.

In conclusion, the model was found to be significant. Furthermore, the Nagelkerke R² value, which can be said to have the widest use in models with qualitative dependent variables, was found as 0.451. This value is sufficient for studies in the field of social sciences. In fact, various sources state that it is acceptable for this value to be 30%.

Table 4. Classification table for ownership type

	Observed	Predicted		Percentage Correct
		tenant	homeowner	
Model 1	tenant	1064	1079	49.7
	homeowner	542	6966	92.8
	Overall Percentage			83.2
Model 2		3205	1253	71.9
	detached house	1210	3983	76.7
	apartment building			74.5
	Overall Percentage			

The Correct Classification Rate calculated for the estimates based on the final version of the models are 83.2%. and 74.5% These values are a criterion that can replace R², and the value obtained is satisfactory. The classification performance of the model, i.e., its predictive power, is good. The model results are presented in Table 5.

Table 5. Model Results

Dependant Variable	Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Ownership Type	Gender	-.800	.126	40.051	1	.000	.449
	EmploymentStatus	.640	.077	69.731	1	.000	1.896
	HouseholdType	.192	.025	60.311	1	.000	1.211
	HouseholdSize	.190	.024	62.713	1	.000	1.209
	Education	-.314	.030	111.091	1	.000	.731
	MaritalStatus	.919	.134	47.322	1	.000	2.507
	ActivityStatus	.169	.025	45.860	1	.000	1.184
	Income	.239	.013	317.249	1	.000	1.270
	Age	.514	.016	1024.871	1	.000	1.672
	Constant	-5.580	.459	147.591	1	.000	.004
Housing Type	Gender	1.296	.116	125.870	1	.000	3.655
	EmploymentStatus	-.172	.063	7.461	1	.006	.842
	HouseholdType	-.206	.020	110.916	1	.000	.814
	HouseholdSize	-.247	.018	190.266	1	.000	.782
	Education	.474	.025	359.721	1	.000	1.607

MaritalStatus	-.250	.112	4.994	1	.025	.778
ActivityStatus	-.236	.020	139.806	1	.000	.790
Income	.259	.010	609.418	1	.000	1.296
Age	-.269	.013	458.682	1	.000	.764
Constant	1.462	.388	14.194	1	.000	4.316

It was determined that the variables having a significant impact on ownership and housing type were all of variables. While the gender and education variables have a negative effect on the ownership type variable, they have a positive effect on the housing type variable. Females are less likely to own a house than males and more likely to live in an apartment. The increase in education level decreases the probability of homeowner and increases the probability of living in an apartment. The increase in income increases both the probability of being a homeowner and the probability of living in an apartment. In the remaining variables, the differences between the categories have a significant effect on both the ownership type and the housing type variables.

The purpose of performing logistic regression was to determine whether independent variables had an effect on ownership type and housing type, and whether there were significant differences between categories. Following these determinations, an attempt was made to identify and interpret the points that stand out in the interaction between the categories of significant variables and the categories of ownership variables. At this stage of the study, these differences were investigated using Optimal Scaling and optimal scaling canonical correlation, one of the multivariate analysis techniques.

5.2. Nonlinear Canonical Correlation Analysis Results

First of all, the number of categories and scale types of the variables included in the analysis is given in Table 6.

Table 6. List of Variables

Set		Number of Categories	Optimal Scaling Level
1	Ownership Type	2	Single Nominal
	Housing Type	2	Single Nominal
2	Age	10	Ordinal
	Activity Status	11	Multiple Nominal
	Education	6	Ordinal
	Household Size	11	Ordinal
	Household Type	7	Multiple Nominal
	Marital Status	2	Single Nominal
	Gender	2	Single Nominal
	Employment Status	3	Multiple Nominal
	Income	10	Ordinal

In Table 6, the scale type of variables is determined to be categorical and suitable for canonical correlation analysis with optimal scaling.

Table 7. Iteration History

	Loss	Fit	Difference from the Previous Iteration
0	0.455770	1.544230	
6	0.449890	1.550110	.000002

According to Table 7, convergence was achieved by minimizing the loss function after 6 iterations. At the end of this iteration process, the category quantification and object score determination steps were carried out.

In Table 8, the values given for the dimensions are an indication of the suitability of the data for analysis. The loss and fit values determine the suitability of the result and determine the general significance of the analysis.

Table 8. Summary of Analysis

		Dimension		Sum
		1	2	
	Set 1	.188	.267	.455
Loss	Set 2	.184	.266	.451
	Mean	.186	.267	.453
	Eigenvalue	.814	.733	
	Fit			1.547

The eigenvalues in Table 8 were obtained by taking the difference of the mean loss values from 1 for both dimensions separately. The total fit value is calculated by adding both eigenvalues. Here, the first and second eigenvalues were obtained as 0.814 and 0.733, respectively. The total fitness value is 1.547. The total number of dimensions (2) gives the value at which the fit is maximum. The average loss value is equal to the difference between the maximum fit and the calculated fit value, and it was calculated as $2 - 1.547 = 0.453$.

If there are two sets of variables, the formula $pd = 2 \times (\text{eigenvalue}) - 1$ is used to obtain the canonical correlation coefficient per dimension. Consequently, the canonical correlation coefficients obtained for both dimensions are $2 \times 0.814 - 1 = 0.628$ and $2 \times 0.733 - 1 = 0.466$, respectively. According to these values, there is a moderate (62.8%) relationship between homeownership and sociodemographic characteristics according to the first dimension.

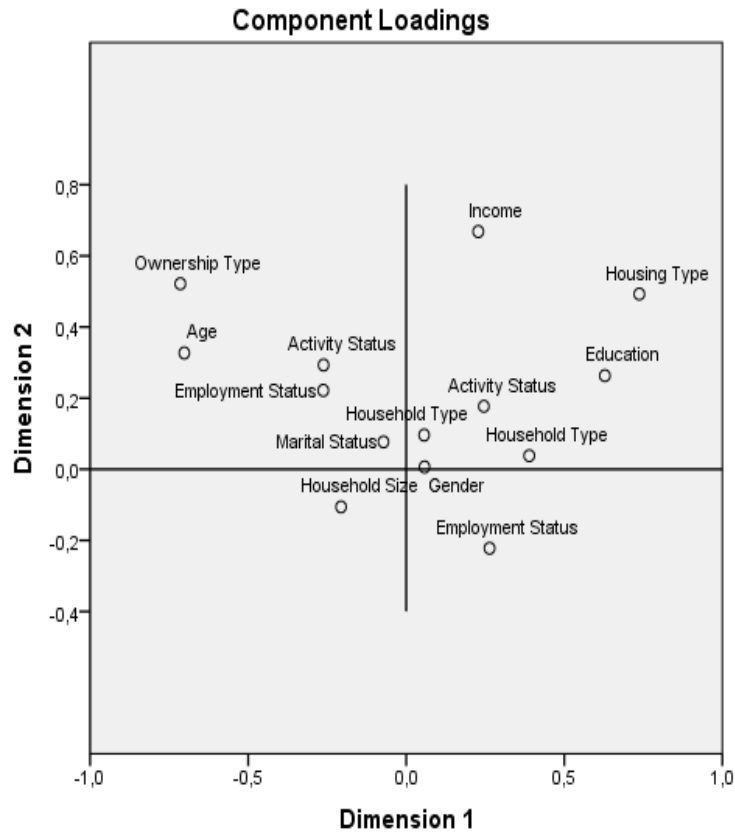


Figure 1. Graphical representation of component loads

The correlation coefficient between the quantified variable and the object scores gives the component loading values. If the component loads of the variables are quite high, it is interpreted as an indicator of the importance of the solution to achieve reliable results. The employment status, household type, and activity status variables is a multiple nominal variable, so there are two points plotted for it. Each quantification is interpreted as a single variable. According to Figure 1, the vector lengths of the variables are obtained by drawing a vector from each variable to the origin. The vector lengths obtained are an indicator of how useful and important the relevant variable is for the solution. Variables with a long vector length are interpreted as more effective variables in the solution. When Figure 1 is examined, 'property type', 'housing type' and 'income' variables are seen as the variables with the highest load value. In addition, the secondary effective variables with the highest load value are 'age' and 'education'.

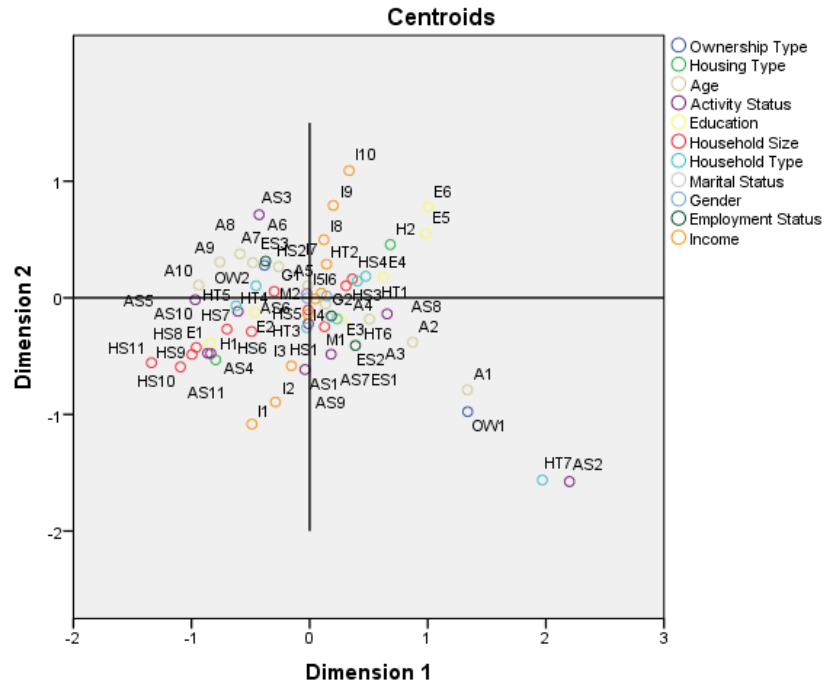


Figure 2. Graphical representation of centroids

In the centroids graph given in Figure 2, all category points of each variable are included. This graph allows one to comment on correlation structures for all category points according to their positions relative to each other. The categories with the highest correlation can be identified. By examining the relatively homogeneous structures in detail, subgroups with this structure can be determined.

By examining Figure 2, other categories close to these categories were interpreted based on the categories belonging to the homeownership variable:

- Those in the ‘couple with no children’(HT4) and patriarchal or extended family (HT5) household type, and in more old age group (A5, ..., A10) and not employment (ES3) were found to be the categories located closest to the category point of being a homeowner. In addition, married people (M2) located closest to the category point of being a homeowner.
- In the first age group [below the age of 32] (A1), was found to be the categories located closest to the category point of being a tenant.
- It was observed that nuclear families with one and two children (HT1, HT2) generally preferred the housing type of apartment building.
- Members of the activity status group Disabled and/or unfit to work (AS4), did not graduate (E1) and household size group more than seven (HT7, ..., HT11) prefer to reside in detached houses.
- Members of education group Vocational or technical secondary school, Elementary school, General high school, Vocational or technical high school

(high school, etc.), 2 or 3-year college, 4-year college or faculty, 5 or 6-year faculty (university, etc.), Postgraduate degree, PhD (E4, E5, E6) prefer to reside in apartment building.

- As expected; students, workers, etc. who are living together and continued/continuing education (including apprentices and trainees) is located very far from other categories.

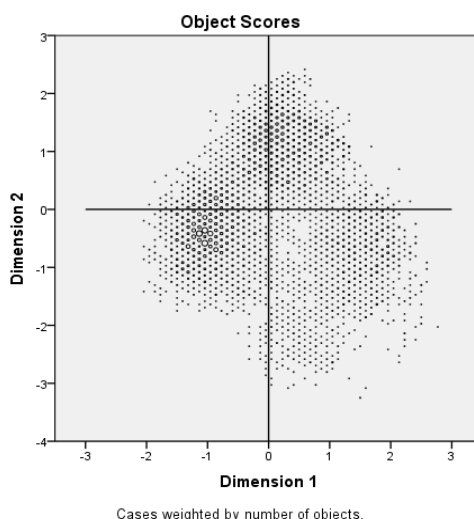


Figure 3. Cases weighted by number objects

The plot of object scores is very important for outlier. Outliers have such different quantifications from the other objects that they will be at the boundaries of the plot, thus dominating one or more dimensions. As it can be seen, there is no outlier observation that is located very far from others within the scope of the analysis.

6. Conclusions

There are micro and macro determinants in economic and social aspects that affect homeownership. In the literature, there are many studies, both in the social and economic sense, on topics that include housing policies, housing characteristics, and social attitudes and behaviors. Based on the studies conducted, it is seen that the sociodemographic characteristics of the individual become important in terms of homeownership. In view of this, the sociodemographic characteristics that affect homeownership in Turkey were analysed in this study. For this purpose, logistic regression analysis was applied by using the data of TURKSTAT Household Budget Survey 2017 and factors affecting homeownership were determined. According to the analysis results, variables such as gender, age, household type, annual disposable income, household size, education level, marital status, employment status, and activity status were the factors that impact homeownership. In order to consider the subject from different aspects, the interactions between the sub-categories of each

variable were also examined. The evaluation of more than one dependent variable together and to determine the interaction between the sub-categories, a canonical correlation analysis with optimal scaling which applied method to examine the correlation structure between the categories of variables in a low-dimensional space, was performed. It has been determined that the findings obtained in both analysis techniques support each other. These findings obtained in the study are widely consistent and confirm with the findings displayed in the existing literature.

According to the results, the most important variables that affect homeownership were the housing type and the annual disposable income. It is noteworthy that the group that is located closest to homeownership is the middle-aged group who are couple with no children. However, it is noted that single individuals are more closely located to homeownership than being a tenant, which should be analysed with additional data as a part of further research.

Regarding the tenant status, the most prominent demographic groups were, as expected, the younger generation. Another analysis result shows the preference of apartment buildings by nuclear families with one or two children.

Another results displays that disabled, large household size, not graduate, individuals are dwelled in detached. This housing type is also relatively closely interrelated with low-income groups. It can be argued that detached houses (slum) in Turkey are more common in small town, villages, and/or suburban areas with low-income profile. However, the close interrelation between disability and detached housing and household size may be subject to further research.

As a result of this study, it can be claimed that certain demographic variables play significant roles in homeownership. While the income factor is an important indicator for household type and home ownership, age, education level, and household size also play an important role. The examination of categorical interactions, which constitutes the unique nature of the study, reveals the importance of sub-groups. Further research on identification of sub-groups that are related to each other may provide additional insight and guidance in determining housing policies.

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