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Dynamics of Housing Demand: The Case of Van Province, Turkey

Konut Talebinin Dinamikleri: Van İli Örneği, Türkiye

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Öz

Küresel olarak, son yıllarda inşaat sektöründeki büyümeyle birlikte konut arzındaki büyük artış tüketicilerin satın alma davranışını etkilemiştir. Emlak sektörünün ilerlemesinde, tüketicilerin artan refahı ve düşen faiz oranları da etkili olmuştur. Pek çok tanımı olmasına rağmen, mesken, bireylerin hayatlarını sürdürebilmelerini sağlayan mutfak, içme suyu tesisatları ve atık sistemi gibi alanların toplamı olarak tanımlanmıştır. Sonuç olarak, bir ev sosyal, kültürel, ekonomik, yasal ve teknolojik faktörler gibi çok yönlü bileşenlere sahip bir bütündür. Konut piyasası kavramı son yıllarda yerel ve merkezi hükümetler için önem kazandığından, bu konuda çeşitli araştırma ve çalışmalar yapılmıştır. Literatürde konut piyasası ile ilgili çalışmalar son yıllarda önemli bir artış göstermiştir. Küresel finansal piyasalarda faiz oranlarındaki düşüş ve artan likidite nedeniyle, konut yatırımları bu alana yapılan sermaye akımlarının bir kısmını çekmiştir. Konut piyasasının gerçek etkileri gelir artışı, genel tasarruf ve yatırım seviyesi, istihdam ve işgücü hareketliliği düzeyi açısından incelenmektedir. Konut talebine ilişkin ampirik çalışmalar temel olarak konut fiyatları ile bazı makroekonomik göstergeler arasındaki ilişkiyi araştırmayı amaçlamaktadır. Bu nedenle, konut piyasasında il düzeyinde yürütülen çalışma sayısı oldukça düşüktür. Bu bağlamda, bu çalışmanın temel amacı, Türkiye'nin Van ilinde yakın gelecekte ev satın alma kararlarını etkileyen temel faktörleri araştırmaktır. Talep denkleminde yer alan cinsiyet, medeni durum, gelir, yaş, hane halkı büyüklüğü, evin yeri, evin tipi, cazibe merkezlerine yakınlık gibi bazı hedonik (fiyat dışı) faktörlerin konut talebine etkileri analiz edilmiştir. Bu amaçla, tüketicilerin satın alma kararlarını tahmin etmek için şehir merkezinde yaşayan ve rasgele seçilmiş olan 450 kişiye anket uygulanmıştır. Logit model tahmin sonuçlarına göre, cinsiyet, medeni durum, yaş, çalışma durumu, eğitim ve gelir gibi faktörlerin bir ev sahibi olma olasılığını arttırdığı görülmüştür. Ayrıca merkezdeki evler daha çok talep edilirken, işyeri, okul ve hastane gibi yerlere yakınlık, bu talepte güvenlik, kira geliri ve yatırım faktörlerinden çok daha az etkili olmuştur.

Anahtar Kelimeler: Konut Talebi, Konut Piyasası, Logit Model, Van, Türkiye

Dynamics of Housing Demand: The Case of Van Province, Turkey*

Abstract

A house is a whole with versatile components such as social, cultural, economic, legal, and technological factors. Because of the decline in interest rates and increasing liquidity in the globalized financial markets, housing investments have attracted some of the capital flows to this field. The real effects of the housing market are examined in terms of the increases in income, the general level of savings and investments, and the level of employment and labour mobility. Empirical **s**tudies on the housing demand have mainly aimed to investigate the relationship between the prices of houses and some macroeconomic indicators. Therefore, the number of studies conducted at the provincial level in the housing market is quite low. In this context, the main purpose of this study is to investigate the key factors that affect the decisions of individuals to buy a house in the near future, in Van province, Turkey. In the demand equation, the effects of a number of hedonic (non-price) factors such as gender, marital status, income, age, household size, location of the house, type of the house, proximity to attraction centres on the housing demand are analysed. For this purpose, in order to analyse the purchasing decisions of consumers in the housing demand function, a questionnaire was applied to 450-randomly selected people who live in the city centre. According to logit model estimation results, it is observed that factors such as gender, marital status, age, working status, education, and income increased the likelihood of owning a house. Further, while the houses in the centre are more demanded, proximity to the places such as workplace, school, and the hospital is much less effective than the security, rental income, and investment factors, in such demand.

Keywords: Housing Demand, Housing Market, Logit Model, Van, Turkey.

Introduction

As the concept of the housing market has been becoming important for local and central governments over the past decades, various researches and studies have been carried out on this subject. In economics, studies on the housing market have seen a significant increase in recent years (Tse, Rodgers & Niklewski, 2007; Fadiga and Wang, 2009; Agnello and Schuknecht, 2010, etc). Because of the decline in interest rates and increasing liquidity in the

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globalized financial markets, housing investments have attracted some of the capital flows to this field. Besides, although housing being considered as an investment expenditure in macroeconomics, there also exists a consumption expenditure dimension of the housing. The real effects of the housing market are examined in terms of increases in income, the general level of savings and investments, and the level of employment and labour mobility.

The construction sector growth trend that has demonstrated significant development since the 1980s in Turkey has slowed down after 1988. Moreover, in 1988, construction demand declined as a result of the liberalization process and investment costs, which increased with increasing interest rates. Though the Turkish economy grew by 26.13% during 1993-2003 period, the construction sector as a result of the reduction of investments in the public sector showed a contraction of 22.4%. The housing sector started to revive since 2004, and the share of construction sector in GDP rose by approximately 6% in 2019. Certainly, growth in population, increasing welfare and dynamics of demographic factors have led to a tremendous booming in the housing market over the last two decades in Turkey. For example, the share of expenditures on housing and rent in the total household expenditures rose nearly to 30% in 2019 (The World Bank, Turkey Economic Monitor, 2020).

The fact that the houses have their own unique characteristics and that the total number of rental homes that change hands each year is lower than the total number of all houses cause the difficulty of monitoring the house prices in order to determine the housing price indices. Therefore, a method is used in which market evaluation can be carried out according to the characteristics of the houses. The hedonic price model is seen as a function demonstrating how the unit price of the goods changes according to its characteristics. Thus, the hedonic model makes it possible to compare different products (for example, see Alakbar & Eren, 2007). The housing demand in Turkey, as in many countries, has been an important field of economics. Traditionally, housing researches focus on defining the deficiencies and dimensions of the housing market (Karahan, 2009: 81).

The main hypothesis on which this study is based is that the demand for rental housing in the city centre of Van is not only dependent on price, but also on non-price factors that increase the housing demand. The study further aims to determine the factors affecting the preferences of individuals who live in the city centre of Van planning to buy a house and to analyse the effects of a number of hedonic (non-price) factors such as age, size, location of the housing, proximity to the attraction centres within the demand equation. In the study, for the demand equation of buying a new house,

socio-economic and demographic factors (such as age, marital status, gender, income status, education, place of residence), and hedonic variables (house's size, location, position to the sun, proximity to the centre, etc.) are considered to be the key determinants. For estimation purposes, the logit regression model is estimated to fit the data obtained from the face to face interviews with respondents who plan to buy a house.

1. Factors Affecting the Housing Demand

Housing markets have social, economic and cultural influences on society. In this context, there is a significant relationship between housing markets and economic development. Therefore, the regulations made in the housing market are both directing the economy and aiming to affect the important elements of development such as poverty, crime and education by changing the socio-cultural texture. The main reason behind such a situation is that the increased housing prices affect the welfare of individuals who consume housing services. Since the future prices of the rentals will increase in the case of a rise in housing prices, this will affect the overall welfare of households, but will not contribute to the national welfare (Uysal & Yiğit, 2016: 189). In today's world, houses are built by private sectors, the states, and the individuals. In countries in the process of industrialization, individuals who lack the purchasing power for legal houses that are built by the state or private sector are trying to meet such demands by squatting process. As a result, two similar and interwoven housing markets emerge and result in different types of housing production. Especially in recent years, housing areas have been built according to the housing demands of the upper-income group. This situation has been encountered in the housing market in the world within the changing economic and cultural systems in the last 20-30 years (Karahan, 2009: 2). On the other hand, political and economic uncertainties or economic-political stability have a significant impact on housing demand. For example, in Turkey, the election period and economic and political uncertainties were effective in the decrease in housing demand in 2007. Following the high-performance growth in 2006, the sector shrunk relatively in 2007 and showed a growth performance of 10.58%. In 2008, it grew only by 4.23%. The mortgage crisis that started in the US in 2008 and that led to the global economic recession resulted in a contraction and uncertainty in the housing market in Turkey. Despite the shrinkage seen in the previous year due to the measures taken in the economy and the policies implemented in 2010, the sector showed a high growth performance and became one of the fastest-growing economies in the world. Despite the employment losses experienced in EU countries after

the crisis, Turkey's employment rate increased by 6.2%. Thanks to the measures taken in the economy, after shrinkage of 15.39% in 2009, it showed a growth performance of 14.17 in 2010. The construction sector maintained its growth performance in 2011 as well. The economy grew by 11.11%, while the construction sector grew by 24.74% (INTES, 2019: 2). The construction sector and the housing market in this sector play an important role in economic growth. Therefore, this sector is supported by government policies. Housing loan rates are lower than consumer loan rates and vehicle loan rates. Low housing loan interest rates are an important factor affecting housing demand.

There are many factors that affect the demand for housing, but perhaps the most important one of these factors is the lifestyle, which is affected by many socioeconomic and demographic factors. For example, while lifestyle, on the one hand, is shaped by factors such as the age of individuals, the size of the household, marital status, and the number of children in the household, on the other hand, it can also be shaped by the individual's income, education level, profession, and preferences. In addition to these factors, undoubtedly, the social class in which the individual belongs and the individual's liberal or conservative values have significant impacts on the lifestyle. In turn, the lifestyle determines the characteristic features of the housing preferences such as its location, size, architecture, neighbourhood, and security facilities (see Figure 1).

2. Literature Review

The fact that there is more than one definition of housing has led many scientists from different fields to approach the housing concept differently. Housing studies cover different subject areas such as social, economic, and political among which there is a mutual interaction.

One of the earliest studies on housing demand was done by Lee & Kong (1977), where they aim to investigate the effects of permanent income and housing prices on the demand for housing. The results show that housing demand is more sensitive to shifts in single year’s calculated income, revealing a permanent income elasticity less than unity. Another study (Skaburskis, 1997) investigates the effect of gender differences in the household composition, house expenses, tenure selection, and location in Vancouver and Toronto, Canada. Based on micro-level data, logit model estimation results show that the continuing increase in women's income opportunities and job preference will reduce family structure, divorce rates,

fertility, and shift demand for housing in ways that will stimulate the growth and character of major Canadian cities. In the study, it is depicted that as women get their economic freedom, they tend to buy single-family detached houses located in the inner city. On the other hand, an interesting study by Ioannides & Zaber (2003) empirically investigates the housing demand with neighbourhood effects. The study, in fact, emphasises the impact of social environment on economic behaviour, according to the mentioned impact the rich benefit from a better social environment more than the poorer individuals do. That is, the phenomenon known as neighbourhood effect is the decision on where to accommodate and what type of a house to buy when considering the economic condition, behaviour, and characteristic of one's neighbours. Benefiting from the national sample of the American Housing Survey, they find evidence of both endogenous and contextual neighbourhood effects, which affect housing demand elasticity ranging from 0.19 to 0.66. Moreover, one recent study (Bajari, Chan, Krueger & Miller, 2013), using data from the PSID, estimates a dynamic model of housing demand and founds that housing demand has been falling among young and middle-aged households.

When moving costs are taken into consideration, their effects on housing demand have been evaluated, for example, in Amundsen (1985), Edin & Englund (1991), Goodman (1995), Nordvik (2001), and DeFusco et al. (2017), the majority of which link moving costs with how quickly houses are sold and the decisions of buyer between buying a house or renting a house. The relationship between age distribution and housing demand has also been investigated further by Lind & Malmberg (2008) for the Swedish case, estimating an Error Correction Model (ECM). Using the data from OECD, they find that large groups of young adults led to higher rates of residential construction. Moreover, the demographic structure has a controversial effect on housing demand; while an increase in young cohort size (for example ages between 15-29) shifts demand for new houses, the group of elderly individuals for example over 50 (more strictly over 70) lowers this possibility.

The impact of income on housing demand has been well analysed in the empirical literature and income effect is considered in the light of permanent income hypothesis by Friedman in 1954, whose impact is mostly estimated by household head's monthly income in household surveys. Dewilde & Lancee (2013) show that income inequality affects the accessibility, quantity, and quality of houses in 28 European countries, respectively. According to the study's regression results based on the data from EU Statistics on Income and Living Conditions for 2009, the low-income consumers experience difficulties in housing affordability even at renting a house. Briefly, majority of the recent empirical studies on housing demand find a positive relationship between the increase in income and housing demand (for example, Yang, Yi, Zhang & Zhang, 2014; Acolin & Watcher, 2017; Collinson,

2011; Holmqvist & Turner, 2014; Sinai & Souleles, 2005; Zheng, Xia, Hui & Linzi, 2018).

The study by Ong (2013) focuses on the measurement of the relationship between housing price and macroeconomic variables such as population, income (GDP), interest rate, and costs of construction in Malaysia. It has empirically been investigated that GDP plays a major role in housing prices. The paper further investigates that apart from the income effect on housing investment decisions, growing population and real property gains taxes influence this decision. The paper strongly indicates that housing bubbles getting increasingly bigger and stronger in the Malaysian residential property market. The relationship between aging and housing demand is analysed by Linlin, Xiuting & Jichang (2016) for 287 large and medium sized cities in China. Based on simulations and forecasting in the framework of the general equilibrium model, they find that aging can increase urban housing demand.

Apart from international studies on housing demand, there is a considerable number of works for the Turkish case. While some studies benefit from micro-level data by TurkStat, some other studies employ questionnaire forms. Among the studies, for example, the main purpose of the study by Karahan (2009) is to develop the integrated model of the dynamics of the household and the housing market and to explain how housing demand is oriented. In the study, among the empirical methods, face-to-face interviews are applied in the study field to develop the model. The findings of the study indicate that when factors affecting households are observed, environment, social, spatial contexts, family and personal characteristics, and lifestyle are intertwined. The main purpose of the study by Bekmez & Özpolat (2014) was to analyse the relationship between housing demand and macroeconomic determinants of housing demand. The model encompasses 1998-2013 period and employs quarterly data. "Building Use Certificates'' were determined as the determinants of the housing demand. Gross Domestic Product, Inflation Rate, Housing Loan Interest Rate, Money Supply, and Stock Exchange Index are used as independent variables. Data were obtained from the Central Bank of the Republic of Turkey (CBRT). Using the mentioned variables, the model is tested with Johansen Cointegration Analysis and Structural Error Correction Model. Lebe & Akbaş (2014) is tried put forward the short and long run effects of housing demand in Turkey and to obtain findings directing housing policies. Using the annual data of Turkey for 1970-2011 period and employing Vector Error Correction Method (VECM), they find that per capita income, marital status and industrialization have positive effect on housing demand, nevertheless house price, interest rate and employment in agriculture have reverse

impacts on housing demand. Dilek et. Al (2018) aim to investigate housing decisions of Turkish consumers in the light of consumer theory. Based on survey data on Kastamonu province, the results show that factors about financial, location, exterior and interior design, environment have considerable impacts on housing decisions.

One of the unique study by Yayar & Bursal (2019) investigates the estimation of housing rental prices in Turkey in the light of hedonic pricing model. They first use a micro data from the household budget survey by the Statistics Institute of Turkey and then estimate the empirical models using 2796 observations. According to their results, there is a statistically significant positive relationship between the rental costs of the housing and the interior (central heating, design etc.) and exterior (such as having a garage, pool or elevator) facilities or advantages of the rental flat. And finally, in addition to the literature above, Çamoğlu & Çakır's (2020) study focuses on housing investments, housing demand, and supply in the first place. Data are obtained through questionnaire forms conducted in 400 households, living in Ordu province. As a result of the research, the similarities in the socio-demographic and economic characteristics of the households are determined to be the determinant in the household's current housing and their future housing demands. It is found that factors such as the number of people and children living in households, income distribution, education, and culture level are especially effective in shaping the housing demands of the individuals. The increase in the number of people and children living in the household increases the gap between the current house and the desired house while the increase in income and education level leads to the preference of more luxurious houses outside the city centre. There are just a few studies empirically estimating the effect of demographic factors on housing demand in the eastern Turkey. One study by Alkan, Karaaslan, Abar, Çelik, & Oktay (2014) on Erzurum province, aims to determine the potential motives for housing demand, through a questionnaire. Estimation results from the multinomial logit model suggest that respondents' occupation and ages were more influential on the motives for housing demand. One the other hand, another study conducted by Aktürk & Tekman (2016) investigates the factors affecting the preferences of the individuals who live in Erzurum city centre to buy a house. 640 people are reached by using a convenient random sampling method in the study. It was found that the factors such as price, reliability of the contractor firm, the security of the house, the size of the housing, the quality of the materials used, the proximity of the housing to the city centre, the strength of the house, and the spaciousness were among important factors in the purchasing preferences of the individuals.

3. Methodology and Data Set

3.1. Methodology

This section looks at a simple case of binary outcomes, with two possible outcomes. For example, whether a person is working or not, and whether or not a customer is spending on education or housing. Binary results are easy to model, and calculation is typically performed with maximum likelihood estimation method since the Bernoulli model essentially determines the distribution of the data. If the probability of one event to occur equals *p*, then the probability of the other event not to occur must be (1 − *p*). As a function of regressors, the likelihood *p* may differ according to individuals (Cameron & Trivedi, 2005).

The logit models are specific cases that are built on a linear model in general under certain conditions. Thus, in this study, if some of the independent variables cannot be separated into continuous or appropriate (relevant) classes, then logistic regression analysis should be used rather than logit linear analysis. In simple logistic regression, we estimate the relationship between an independent variable (*X*) and the binary outcome variable (*Y*) on a scale of the logit or log odds. In other words, the relationship between predictor variable *X* and the logit of the outcome variable *Y* (i.e., the logit transformation of the probability when the outcome variable *Y=1*) is linear.

The logistic regression model is a mathematical function where the dependent variable is an asymptote to 1 and the value of the independent variable goes to infinity and is expressed as follows:

$$P_i = E(Y = 1|X_i) = \alpha + \beta X_i \quad (1)$$

$$P_i = E(Y = 1|X_i) = \frac{1}{1+e^{-(\alpha+\beta X_i)}} \quad (2)$$

$$= \frac{1}{1+e^{-Z_i}} \quad (3)$$

The quantity $E(Y|X_i)$ is called the conditional mean of the expected value of Y, given the value X (independent variable). In equations, $Z_i = \alpha + \beta X_i$ and *Pi* refers to the probability that the *i-nth* individual makes a particular choice when providing information about the explanatory variable (X_i). Obviously, the logistic distribution function transforms the regression into the interval (0, 1). The advantage of the approach is that it does not assume multivariate normality and equal covariance matrixes as, e.g., the discriminant analysis does (Press and Wilson, 1978).

Before attempting to estimate the logistic model, the logit transformation (logit) of the dependent variable is central to this study. If we denote the quantity $\pi(x) = E(Y = 1 | X_i)$, this transformation, which makes the logistic model a linear model, is defined as:

$$g(x) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right] = \beta_0 + \beta_1 X_i \quad (4)$$

The logit, g(x), is linear in its parameters, may be continuous, and may range from −∞ to +∞, depending on the range of X. In order to calculate the logistic coefficients in equation (4), the Maximum Likelihood (ML) is used as the estimation method. The ML method seeks to maximize the log-likelihood (LL), which reflects how likely it is that the observed values of the dependent variable may be predicted from the observed values of the independent variables (Garson, 2014).

If the conditional probability of y is equal to 1 given x is denoted as $\pi(x)$, then the conditional probability of y is equal to zero given x can be expressed as $1-\pi(x)$, that is, $\Pr(Y = 0 | X)$. Henceforth, the likelihood function for the pair (x_i, y_i) is;

$$\pi(x_i)^{y_i}\left[1-\pi(x_i)\right]^{1-y_i} \quad (5)$$

Then, the likelihood function can be yield as the product of the terms given in equation (5) as follows:

$$l(\beta) = \prod_{i=1}^{n} \pi(x_i)^{y_i}\left[1-\pi(x_i)\right]^{1-y_i} \quad (6)$$

The principle of maximum likelihood is to maximize the value of β, in the mathematical term, it is easier to show the equation (6) in logarithmic form.

$$L(\beta) = \ln\left[l(\beta)\right] = \sum_{i=1}^{n}\left\{y_i \ln\left[\pi(x_i)\right] + (1-y_i)\ln\left[1-\pi(x_i)\right]\right\} \quad (7)$$

Differentiation of $L(\beta)$ in equation (7) with respect to Beta parameters gives the maximum likelihood estimates of β_0, β_1 and so on.

3.2. Data Set

In this study, it is aimed to empirically analyse the effects of factors affecting housing demand in the housing market in Van province, Turkey. The housing markets have social and cultural impacts as well as economic impacts. It is assumed that there is a significant relationship between the

development and the improvement of the housing sector. Therefore, the regulations on housing markets can affect not only the economy but also important dynamics of development such as poverty and education by changing the socio-cultural pattern. Van is Turkey's 6th largest province in terms of acres, with over one million populations. The city has recently become an important cultural and tourism centre.

The data set used in the study is obtained from the questionnaires by face to face interview method with randomly selected people living in Van province, in the north-eastern of Turkey, for the year 2019. Before data collection procedure, this study has ethics committee approval by Van Yuzuncu Yil University, Ethics Committee. Interviews are done with individuals, who randomly visit the real estate offices in the city centre. In the beginning, it is planned to study with a sample of 600 individuals, however, only 450 respondents satisfied the information conditions. According to the statistics of the year 2019 Address Based Population Registration System provided by the Turkish Statistical Institute (TurkStat), the total population of Van is 1,136,757 and the number of people over the age of 18 is 754,150. In order to obtain more plausible results, questionnaires are conducted among the people over the age of 18. The minimum sample size required for a questionnaire is calculated according to the following formula (Alkan et al., 2014: 76):

$$T = \frac{Npqz^2}{(N-1)d^2 + pqz^2} \tag{8}$$

In equation (8) while T and N stand for the sample size and the population size, respectively. Moreover, while p and q, respectively, denote the probability of pairs of outcomes; when an event does occur and does not (1 – p), the term d stands for the tolerance. Finally, the last term z implies the test statistic under the (1 – α) % significance level. Then the minimum representative sample size is calculated as follows:

$$n = \frac{(754{,}150)(0.5)(0.5)(1.96)^2}{(754{,}150-1)(0.05)^2 + (0.5)(0.5)(1.96)^2} \cong 384 \tag{9}$$

In this study, to have more insight into the residents' housing demand, the sample size is limited to 450, which slightly exceeds the minimum sample size. Questionnaires are transformed, coded and analysed with STATA 16 package program. Descriptive statistics of the variables used in the questionnaire are presented in Table 1.

Table 1: Descriptive Statistics of Variables

Variables	Freq.	%	Variable	Freq.	%
Gender			**Location**		
Male	250	55.6	Cevdetpasa	63	14.0
Female	200	44.4	Akkopru	63	14.0
			Cumhuriyet	94	20.9
Age Group			Alipasa	82	18.2
20-29	68	37.3	Serefiye	86	19.1
30-39	172	38.2	Bostanici	62	13.8
40-49	89	19.8			
50 and older	21	4.7	**Household Size**		
			One individual	104	23.2
Marital Status			Two individuals	37	8.2
Married	218	48.4	Three individuals	82	18.2
Single	232	51.6	Four individuals	78	17.3
			Five and more	149	33.1
Working Status					
Yes	275	61.1	**Monthly Income**		
No	175	38.9	1000-1999 TL	57	12.7
			2000-2999 TL	122	27.1
Education			3000-3999 TL	149	33.1
High School	176	39.1	4000-4999 TL	92	20.4
Undergraduate	251	55.8	5000 TL and Higher	30	6.7
Graduate	23	5.1			
Multi-Ownership			**Demand For Houses By Type**		
None	111	24.7	One-Bedroom Suite (1+1)	31	6.9
One	247	54.9			
Two	80	17.8	Two-Bedroom Suite (2+1)	182	40.5
Three of more	12	2.6			
			Three-Bedroom Suite (3+1)	204	45.3
Motives For Housing Demand			Four-Bedroom Suite (4+1)	33	7.3
Security	186	41.3	**Demand For Houses By Heating System**		
Higher rental cost	78	17.3			
Investment	41	9.1	Central Heating (with liquid fuel or Coal)	309	68.7
Social Network	45	10			
Proximity to the workplace	29	6.5	Traditional (coal or wood)	141	31.3
Proximity to the bus stop	71	15.8			

In Table 1, 55.6% of the respondents are men and 44.4% are women, respectively. 75.5% of respondents were aged between 20 and 40, and 24.5% are older than 40. On the other hand, 62.4% of respondents are working; 61% of them have an undergraduate or graduate education level; approximately 75% of them are multi-ownership. Furthermore, while the monthly income

of the three quarters of respondent is between 1000 and 4000 Turkish Liras (TL); one-quarter of them earn more than 4000 TL. Finally, 40% of respondents have reported that there are four or more individuals in the household, an indicator of the crowded family structure of Van province.

Following Alkan et al. (2014), the dependant variable housing demand is proxied by the respondents' prospect for housing. When the distribution of future house ownership is examined, there are 247 people (approximately 55%) who stated that they plan to buy a house in the near future and 203 people (45%) stating that they do not. It is seen that the sample consisting of binary variables is distributed evenly **(Table 2).** In logistic regression analysis, the emphasis is placed on "future house ownership" (the situation when $y = 1$).

Table 2: Frequency Distribution of Dependent Variable: Future House Ownership

Buying a house in the future	Frequency	Percentage	Cumulative Perc.
0 (No)	189	42.00	42.00
1 (Yes)	261	58.00	100
Total	*450*	*100*	

Finally, a description of the independent variables is given in Table 3. Both the qualitative variables such as gender, age group income group, marital status, types of houses, and place of residence and continuous variables such as education, household size, and multi-ownership are detailed. Qualitative variables are defined as dummy variables taking the values of 1 and 0 to estimate their proportional effect on housing demand when respondents plan to buy a house. To avoid perfect collinearity among the regressors and obtain unbiased estimation results, categories carrying no information are omitted. The selection of the ranges of age and income categories mainly depends both on the literature and demographic characteristic of Van province.

Table 3. Description of Independent Variables used in Logit Model

Variable	Description
Gender (Q)	Male = 1; Female = 0
Age Group (Q)	20-29 = 1; Otherwise = 0
	30-39 = 1; Otherwise = 0
	40-49 = 1; Otherwise =0

	50 and Older =1; Otherwise = 0
Marital Status (Q)	Married = 1; Otherwise = 0
Working Status (Q)	Working = 1; Otherwise = 0
Education (C)	Years of Education
Location of the prospected house (Q)	If the respondent to buy a house in Cevdetpasa = 1; o/w = 0
	If the respondent to buy a house in Akköprü = 1; o/w = 0
	If the respondent to buy a house in Cumhuriyet = 1; o/w = 0
	If the respondent to buy a house in Alipasa = 1; o/w = 0
	If the respondent to buy a house in Serefiye = 1; o/w = 0
	If the respondent to buy a house in Bostanici = 1; o/w =0
Household Size (C)	Number of individuals in the household
Monthly Income (Q)	1000-1999 TL = 1; o/w = 0
	2000-2999 TL = 1; o/w = 0
	3000-3999 TL = 1; o/w = 0
	4000-4999 TL = 1; o/w =0
	5000 TL and higher = 1; o/w = 0
Multi-Ownership (C)	Number of houses that respondent owns beyond their primary home
Motives for housing demand (Q)	Security = 1; o/w = 0
	Higher rental cost = 1; o/w = 0
	Investment = 1; o/w = 0
	Social Network = 1; o/w = 0
	Proximity to the workplace = 1; o/w = 0
	Proximity to the bus stop = 1; o/w = 0
Demand for houses by Type (Q)	One Bedroom Suite = 1; o/w = 0

	Two-Bedroom Suite = 1; o/w = 0
	Three-Bedroom Suite = 1; o/w =0
	Four-Bedroom Suite = 1; o/w = 0
Demand for houses by heating system (Q)	Central Heating = 1; o/w = 0
	Traditional = 1; o/w = 0

(Q) = Qualitative variable (C) = Continuous variable o/w = otherwise

In our model, future house ownership, *y*, is assumed to be a binary variable:

$$y=\begin{cases}1 & if\ y^* > 0\\ 0 & if\ y^* \le 0\end{cases}$$

Therefore, it is possible to write the estimated model as follows:

$$y^* = x'\beta + u \quad ,u \sim N(0,\sigma^2)$$

In this equation **x;** *Kx1* represents the vector of explanatory variables, β represents the vector of parameters to be estimated, and ***u*** represents the error term.

4. Estimation Results

Table 4 shows the maximum log-likelihood (ML) estimation results of dynamics affecting the motives for the housing demand of respondents in Van. The table also displays the Odds Ratios (RRR) for the predictors, their standard errors, the Wald z statistics, associated p values, and the 95% confidence interval (CI) of the odds ratios. The ML value for the model is -195.08. The log-likelihood chi-square test statistic LRχ^2(27) = 222.73 with the associated p-value Prob > χ^2=0.000, which indicates that the overall model is significantly better than the model with only the intercept (the alternative hypothesis).

Table 4: Estimation Results

Independent Variable	RRR	Std.Err.	Z	Sig.	[95% CI]
Demographic Factors					
Gender					
Male	1.17	0.333	0.57	0.566	0.67-2.04
Age (base 20-29)					
30-39	1.41	0.448	1.11	0.268	0.76-2.63
40-49	2.36	0.952	2.13	0.033**	1.07-5.20

50+	2.84	1.856	1.60	0.110	0.79-10.22
Marital Status					
Married	1.98	0.583	2.35	0.019**	1.11-3.53
Working Status					
Working	3.19	0.902	4.12	0.000***	1.84-5.56
Education	1.20	0.074	3.10	0.002***	1.07-1.36
Location of the prospected house					
(Base Bostanici)					
Cevdetpasa	0.88	0.473	-0.23	0.821	0.31-2.52
Akköprü	1.48	0.820	0.71	0.479	0.49-4.38
Cumhuriyet	2.87	1.414	2.14	0.032**	1.09-7.54
Alipaşa	3.26	1.685	2.29	0.022**	1.18-8.98
Serefiye	2.29	1.147	1.66	0.098*	0.85-6.11
Household Size	0.84	0.057	-2.52	0.012**	0.73-0.96
Multi-Ownership	1.10	0.236	0.48	0.630	0.72-1.68
Monthly Income					
(base 1000-1999 TL)					
2000-2999 TL	5.35	2.895	3.10	0.002***	1.85-15.45
3000-3999 TL	3.65	1.919	2.47	0.013**	1.30-10.22
4000-4999 TL	4.19	2.324	2.59	0.010**	1.41-12.42
5000 TL and higher	11.65	9.125	3.13	0.002***	2.50-54.08
Motives for Housing Demand					
(Base Security)					
Higher Rent	2.47	1.063	2.11	0.035**	1.06-5.74
Investment	4.24	2.230	2.75	0.006***	1.51-11.89
Social Network	0.84	0.397	-0.37	0.714	0.33-2.12
Prox. to the workplace	0.29	0.184	-1.96	0.050**	0.08-1.00
Prox. to the bus station	0.45	0.195	-1.83	0.067*	0.19-1.05
Demand for houses by Type					
(base 1+1)					
2+1	3.35	2.742	1.48	0.138	0.67-16.64
3+1	7.01	5.793	2.36	0.018**	1.39-35.39
4+1	7.91	7.752	2.11	0.035**	1.16-53.96
Demand for houses by the heating system (base trad. heating)					
Central Heating	0.95	0.267	-0.18	0.859	0.54-1.65
Constant term	0.00	0.001	-4.74	0.000***	0.00-0.01
Number of obs.	450				
Log-likelihood	-195.08				
LRχ^2(27)	222.73				
Prob > χ^2	0.000				
Pseudo R^2	0.3634				

Notes: (1) * p < 0.01, ** p < 0.05 and *** p < 0.001 represent statistical significance at 10%, 5% and 1%, respectively.

(2) The constant term estimates baseline odds.

4.1. Multicollinearity Test

The term multicollinearity means a perfect linear relationship among the predictors, that is, two or more variables are near perfect combinations of one another. The problem is that as the degree of multicollinearity increases, the estimation of coefficients becomes unbiased and the coefficients' standard errors will be dramatically larger. Checking for multicollinearity, it is more common to use Variance Inflating Factor (VIF), whose value is more than 10 (as a rule of thumb) means that the variable could be considered as a linear combination of other regressors. According to Table 5, it can be inferred that the model does not suffer from the problem of multicollinearity.

Table 5. The Detection of Multicollinearity for Independent Variables

Variable	VIF	1/VIF
Gender		
Male	1.20	0.830
Age		
30-39	1.62	0.617
40-49	1.55	0.646
50+	1.22	0.816
Marital Status		
Married	1.48	0.675
Working Status		
Working	1.30	0.766
Education	1.30	0.770
Location of the prospected house		
Cevdetpasa	1.88	0.530
Akköprü	2.12	0.471
Cumhuriyet	2.43	0.411
Alipaşa	2.31	0.432
Serefiye	2.19	0.455
Household Size	1.31	0.765
Multi-Ownership	1.59	0.627
Monthly Income		
2000-2999 TL	2.95	0.339
3000-3999 TL	3.36	0.297
4000-4999 TL	2.91	0.343
5000 TL and higher	1.93	0.518
Motives for Housing Demand		
Higher Rent	1.38	0.724
Investment	1.40	0.714
Social Network	1.27	0.787
Prox. to the workplace	1.19	0.840
Prox. to the bus station	1.68	0.595
Demand for houses by Type		
2+1	4.96	0.201
3+1	5.61	0.178
4+1	2.42	0.413
Demand for houses by the heating sys.		

Central Heating	1.12	0.889
Mean VIF	2.06	

4.2. The Goodness of fit test

Fit statistics in Table 6 include the log-likelihood for the null model with the only intercept, the log-likelihood for the full model, the log-likelihood ratio test statistic, and the associated *p*-value of the McFadden's R^2, and the AIC and BIC statistics. Table 6 confirms that the small value of AIC and the negative value of BIC statistics adjust the deviance and indicate the better-fitted model.

Table 6. The fit Tests

Fit Statistics	Value
Log-Likelihood Full Model	-195.086
Log-Likelihood Intercept Only	-306.450
The Likelihood-Ratio test (27)	222.728 (0.000)
McFadden's R2	0.363
McFadden's Adj. R2	0.272
AIC (Akaike Information Criteria)	0.991
BIC (Bayesian Information criteria)	-2187.931
BIC'	-57.778

In addition to the measure of fit statistics, Table 7 shows the goodness-of-fit test results of the fitted logit model. For this purpose, two different types of test statistics scores are used to demonstrate the power of fit. First, since the probability of Pearson χ^2 is not statistically significant at the 0.05 level, it means that the fitted model is correct. Second, the Hosmer-Lemeshow chi-square test has a value of 9.35 with the degrees of freedom equal to 8. Thus, its associated *p*-value is 0.3134 and is not statistically significant, confirming that the model fits the data well.

Table 7. The Goodness of fit test

Dependent Variable	Value	Dependent Variable	Value
Number of observations	450	Number of observations	450
Number of covariate patterns	414	Number of groups	10

Pearson χ^2	428.68	Hosmer-Lemeshow χ^2 (8)	9.35
Prob > χ^2	0.0660	Prob > χ^2	0.3134

4.3. The Classification Table

The classification table provides the classification table and summary statistics, such as the sensitivity and specificity of the model. In Table 8, "D" means an event occurring or when the outcome variable takes the value of 1 (Y=1), whereas "~D" means no event occurring or when the outcome variable takes the value of 0 (i.e. Y=0). "Correct" means the model correctly predicts the category when the predicted probability is larger than or equal to 0.5, whereas "incorrect" means that the model predicts the wrong category if the predicted probability is less than 0.5. Accordingly, the overall percentage of correctly classified is 80.67%, which indicates that 80.67% of the cases are correctly predicted by the model. The sensitivity of the model is the conditional probability if the cases that are correctly classified given an event occurs. In the model, the probability of sensitivity of the cases that are correctly classified is 87.69% for the respondents having bought a house (Y=1). The specificity is the percentage of the cases that were incorrectly classified for those not buying a house (Y=0). In this case, the specificity of the model is 71.05%.

Table 8. The Classification Table

Prob	Correct		Incorrect		Percentages (%)				
	Event (D)	Non-Event (~D)	Event (D)	Non-Event (~D)	Correctly Classified	Sensitivity Pr(+| D)	Specificity Pr(-|~D)	False + Pr(+|~D)	False – Pr(-| D)
0.50	228	55	32	135	80.67	87.69	71.05	28.95	12.31

5. Interpretation of Odds Ratios

The odds ratio is widely used as a measure of association as it approximates how much more likely or unlikely (in terms of odds) it is for the outcome to be present among those subjects with y = 1 as compared to those subjects with y = 0 (Hosmer, Lemeshow & Sturdivant, 2013: 52). Therefore, the interpretation of the odds ratios means the related changes of independent variables relative to the base category. According to the findings in Table 4,

men (RRR = 1.17, p >.05) have more likely to buy a house than women respondents, however, its p-value is found insignificant. Among the age group categories, just the coefficient of the 40-49 age group is found statistically significant, meaning that the odds for buying a house among the people between ages of 40-49 are 2.36 ($p < 0.10$) times as large as the odds for people at ages of 20-29 when holding other predictors constant. It can be concluded that elderly people over the age of 40 had more tendency to buy a house than the younger people. This outcome may be related to the fact that people making their plans for having prosperity can realize it only after a specific age, i.e. 40s.

On the other hand, to be employed and to be paid plays a role in the probability of having a house. The odds of having a job is three folds of those who reported not working (RRR = 3.19, $p < 0.01$). In this respect, working people have more likely to buy a house than those not working. Interestingly, the odds of education variable are found as 1.20 ($p < 0.05$), which reflects that as people's education levels change from the high college to undergraduate, or from undergraduate to graduate, it increases the likelihood of buying a house more than one-fold.

The predictor household size is a *continuous* variable and its odds ratio is 0.84 ($p < 0.10$ and 95% CI = 0.73 – 0.96), which is less than 1. Recall that when an odds ratio is less than 1, it is interpreted as a decrease in the odds of success for each one-unit increase in the predictor when holding other variable constant. Therefore, as the number of individuals in the family increases, the occurrence of housing demand is almost 0.84 times ***less likely*** to occur when the household grows one additional individual than a small household size including only one person. This result indicates that people in Van city can only afford to buy a house when the household size is relatively small. Apparently, a growing household size raises the cost of living. Besides, even though multi-ownership rises the possibility of housing demand over lesser-ownership of houses (RRR=1.10, $p > 0.10$), the associated p-value is found insignificant.

On the other hand, it is estimated that housing demand is very sensitive to income levels of household heads. Moreover, all of the odds ratios for each income level variable in the income group had found statistically significant. For example, while a respondent having a lower income of 2000-2999 TL per month (RRR = 5.35, $p < 0.01$ 95% CI = 1.85-15.45) approximately five times increases the likelihood of buying a house relative to the lowest income group (base: 1000-1999 TL), this likelihood is more likely to occur as large as more than 11 times in the highest income group (RRR=11.65, $p < 0.01$).

Considering the effect of the location of the house on the possibility of owning a house, it is found that if the house is located in the central neighbourhoods such as Cumhuriyet (RRR = 2.87, $p < 0.05$), Alipaşa (RRR = 3.26, $p < 0.05$) and Şerefiye (RRR = 2.29, $p < 0.10$) increases the likelihood of

buying a house in more rapidly growing and developing neighbourhoods relative to less developing neighbourhoods, i.e. Bostanici and Cevdetpaşa. This result has confirmed that people are more prone the buy a house near to or at the centre of places of attraction such as shopping malls, cafes, restaurants, banks, governmental buildings, etc. in Van. In other words, a house in the suburb significantly reduces the possibility of housing demand.

When looking at reasons that most affecting the housing demand, it can be seen that the purposes of investment (RRR = 4.24, $p > 0.01$) and yielding higher rental income (RRR = 2.47, $p < 0.05$) increase the likelihood of buying a house more than 4 and 2 times, respectively than the security reasons. However, demanding a house according to its proximity to the bus stop (RRR = 0.45, $p < 0.10$) and to the workplace (RRR = 0.29, $p < 0.10$) is almost 55 and 70 per cent, respectively, less likely to occur than that occurred for the security facilities offered for it. These results show that respondents are more likely to buy a house for investment and security reasons rather than its proximity to the workplace, school, or bus stop. In addition to its location, the type of houses had also a significant impact on housing demand. According to Table 4, respondents are more likely to buy 3+1 and 4+1 houses rather than 1+1 small-sized houses. For example, a house with four bedrooms and one living room (7.91, $p < 0.05$) increases 7 times the possibility of demanding relative to a house with one bedroom and one living room. Since recently wider houses have been more demanded by customers in Van, it has seen more profitable to buy a wider house for profitable future selling.

In recent years, the increase in the use of natural gas in the province of Van has reduced the demand for coal and/or electrically heated houses, since it is more environmentally friendly and cheaper. Unfortunately, estimation results do not find a statistically significant impact of consumer preference for the natural gas over the traditional heating system.

6. Conclusion

Globally, the tremendous increase in housing supply in recent years with the growth in the construction sector has affected the buying behaviour of consumers. Increasing prosperity and declining interest rates in the real estate sector have also been effective in this situation. Although it has many definitions, a house is defined by Hoffmann and Kremer as the sum of spaces including kitchen, drinking water installations, and waste systems that allow individuals to sustain their lives (Hoffmann and Kremer, 1986: 163). Consequently, a house is a whole with versatile components such as social, cultural, economic, legal, and technological factors.

The province of Van entered into a rapid recovery process thanks to the investments and supports provided especially after the earthquake that caused major destruction in 2011, and the housing supply increased significantly in that process. According to the logit model estimation results, it is observed that factors such as gender, marital status, age, working status, education, and income increased the likelihood of owning a house. Further, while the houses in the centre are more demanded, proximity to the places such as workplace, school, and hospital was much less effective than the security, rental income, and investment factors, in such demand.

Moreover, it is observed that sales of 1 + 1 type of houses have recently increased, but the increase in square meters increases the probability of owning a house. The main factor behind this is thought to be that the families in Van are usually crowded and they demand 3+1 or 4+1 types of houses, in general. The results are in accordance with the previous findings by Karahan (2009), Lebe & Akbaş (2014), Alkan, et. al. (2014), Dilek et. al (2018) and Çamoğlu & Çakır's (2020), so that there is a positive relationship between housing demand and socio-economic factors such as income, marital status, age, education, proximity to attraction places etc. However, especially apart from those studies at provincial level, this study reveals that houses have recently been growingly demanded for investment purposes because of rapid price increases in property market.

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