

# Home-ownership, Housing Demand and Household Wealth Distribution in Turkey

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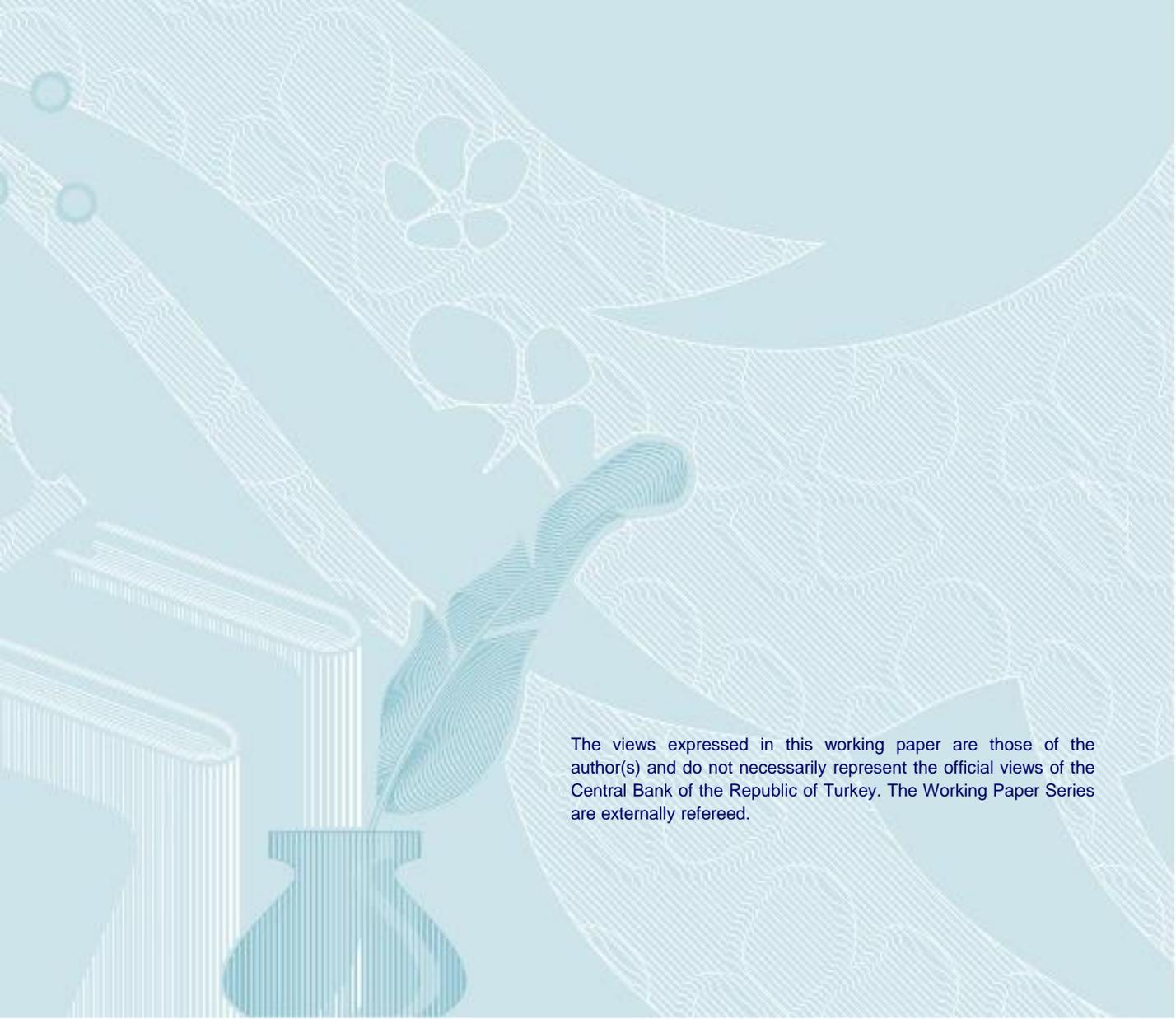
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# Home-ownership, Housing Demand and Household Wealth Distribution in Turkey <sup>a</sup>

Evren Ceritođlu <sup>b</sup>

## Abstract

*This paper analyses recent housing market developments in Turkey. In particular, we estimate permanent income elasticity, price elasticity and interest rate elasticity of housing demand. For this purpose, we utilize twelve consecutive waves of the Turkish Statistical Institute (TURKSTAT) Household Budget Surveys (HBS) from 2003 to 2014. The most difficult aspect of empirical analysis is the estimation of a hedonic house price index. We find that permanent income elasticity of housing demand is approximately 24% in our restricted sample. Price elasticity of housing demand is between -29% and -35%, but it is not statistically significant. Interest rate elasticity of housing demand has a negative sign, but it is measured as a very small value and it is not statistically significant. Our estimates are modest compared to previous empirical findings for the Turkish economy and emerging market economies in the literature. Moreover, robustness checks reveal that the importance of income on housing demand remained at the same level between 2003 and 2014, while the roles of house prices and interest rates are weakened during this time period with respect to past periods. As a result, our empirical analysis confirms that income is the main determinant of home-ownership and housing wealth.*

**JEL Classification:** C23, D12 and R21

**Key words:** Home-ownership, Hedonic house price index, Housing demand, Household wealth distribution

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## **Non – Technical Summary**

This paper analyses housing market developments in Turkey. In particular we try to understand the reasons behind the fall in home-ownership rates, monitor the changes in household wealth distribution and establish the main determinants of housing demand. Expansionary monetary policies implemented in advanced economies after global financial crisis diminished interest rates and stimulated housing boom across the globe. Housing is the largest component of household wealth in Turkey as in many countries. As a result, household consumption and saving behavior might have been affected significantly.

Previous empirical literature mainly analyses the effects of ageing population on home-ownership rates and housing wealth accumulation in advanced economies. However, emerging market economies generally have young and growing populations. Moreover, there is a high rate of internal migration from rural regions to big cities, which intensifies the need for accommodation.

Our main data source is Household Budget Surveys (HBS), which are prepared by the Turkish Statistical Institute (TURKSTAT) from 2003 to 2014. HBS are defined as cross-sectional surveys, which provide data on household consumption expenditures, disposable income and housing wealth in addition to their social and demographic features. One plausible explanation of the drop in home-ownership rates is relative price changes. We observe that the share of rent in household budget decreased on average, while the ratio of house value to household disposable income increased in the period of analysis. Moreover, we find that the profitability of housing investment declined during this period.

We find that middle income groups benefited from recent housing boom more than the highest and the lowest income groups. Finally, our empirical analysis reveals that income is the most important determinant of home-ownership and housing demand in Turkey.

## I. Introduction

This paper analyses recent housing market developments in Turkey. In particular, we search for answers for three main questions: I) Why is home-ownership rate declining? II) How does housing boom affect household wealth distribution? III) What are income, price and interest rate elasticities of housing demand? Turkey has the youngest population with a median age of 30.4 and one of the lowest home-ownership rates with 64.1% as of 2014 among OECD countries. Moreover, Gross Domestic Product (GDP) per capita surged from 8,807 US\$ in 2003 to 19,610 US\$ in 2014, which is measured at current prices using Purchasing Power Parity (PPP) according to OECD figures. Therefore, we expect home-ownership rate to increase gradually over time, but home-ownership rate decreased by 6 percentage points between 2003 and 2014, which is puzzling at first sight. From a theoretical point of view, home-ownership is expected to rise with income (Andrews and Caldera Sanchez, 2011). Households might prefer to reduce their housing wealth as they age, but Turkish society is still very young for this purpose.

Previous empirical literature mainly analyses the effects of ageing population on home-ownership rates and housing wealth accumulation in advanced economies (Flavin and Yamashita, 2002; Forrest and Lee, 2004; Lindh and Malmberg, 2008; Chiuri and Jappelli, 2003 and 2010; Angelini *et al.*, 2014; Alik-Lagrange and Schmidt, 2015). Several papers focus on the responsiveness of housing supply to changes in prices and the influence of housing policies such as taxation, land use and rental regulations on housing market in OECD countries (Andrews *et al.*, 2011; Caldera Sanchez and Johansson, 2012). However, emerging market economies generally have young and growing populations. Moreover, there is a high rate of internal migration from rural regions to big cities, which intensifies the need for accommodation. There are only a limited number of studies, which analyze the determinants of housing demand in emerging market economies and compare their findings with advanced economies (Halicioglu, 2007 and Fontenla and Gonzales, 2009). Halicioglu (2007) find that income is the most important factor for housing demand in Turkey. However, her empirical analysis is based on aggregated time-series data from 1964 to 2004 due

to lack of a reliable micro-economic data set. Fontenla and Gonzales (2009) find that price elasticity of housing demand is negative for the Mexican economy, but their estimate is smaller than previous empirical findings for advanced economies. Moreover, they show that permanent income elasticity of housing demand is positive and sizeable, while interest rate elasticity of housing demand is negative.

The most difficult aspect of empirical analysis is the estimation of a hedonic house price index. There is an extensive literature on formation of hedonic house price indices for advanced economies, but empirical research on this topic for the Turkish economy is scarce (Goodman, 1978; Sheppard, 1999, Kiel and Zabel, 2008; Hill, 2011). Hülügü *et al.* (2016) performs a hedonic price adjustment for the housing market in Turkey from the first quarter of 2010 to the first quarter of 2015, when house prices increased by 78.8 percent. Their empirical findings suggest that attributing all the price changes to real appreciation in house prices might be misleading. In particular, they assess that one fourth of nominal changes and one half of relative changes in house prices stem from quality growth in this period.

We utilize twelve consecutive waves of the Turkish Statistical Institute (TURKSTAT) Household Budget Surveys (HBS) from 2003 to 2014. Our econometric results confirm that income is the most important determinant for housing demand in Turkey, which supports previous findings of Halicioğlu (2007). First, we show that the probabilities of being a home-owner, having a second home and having outstanding housing debt increase with age at a decreasing rate. Moreover, the probabilities of being a home-owner, having a second home and having outstanding housing debt increase monotonically with the income level of the household head. Second, we realize that tenants benefit from rising housing demand more than home-owners. The upward trends in both housing investment return rate and nominal house price to rent ratio indicate that the profitability of housing investment is falling. As a result, the share of rent in total household budget of tenants fell considerably. This might be one of the main reasons behind the decline in home-ownership rates. Finally, we find that permanent income elasticity of housing demand is positive and statistically significant in all estimations. Price elasticity of housing demand has the expected negative sign, but it is not statistically significant in the estimations. Interest rate elasticity of

housing demand has a negative sign, but it is measured as a very small value and it is not statistically significant. In addition, our robustness checks reveal that the role of income on housing demand remained strong between 2003 and 2014, while the roles of house prices and interest rates are weakened during this time period with respect to past periods.

The outline of the paper is as follows: Section II presents a simple theoretical model to distinguish between house value and housing unit by controlling for the contribution of quality growth on house prices. Section III discusses housing market developments in Turkey and section IV provides a descriptive analysis of HBS. Section V presents the econometric results. Finally, section VI concludes this paper with a brief summary of our empirical findings and policy proposals.

## **II. Theoretical Background**

### *II.1 – Housing Demand*

We follow the contributions of Goodman (1988), Zabel (2004) and Fontenla and Gonzales (2009), when we develop our theoretical model. We assume that household's ( $i$ ) optimization problem depends on the amount of housing unit ( $q$ ) and consumption of non-durable goods and services ( $C$ ). Households have the same utility function ( $U$ ), but their utility functions differ with respect to their social and demographic characteristics ( $Z$ ), which is shown by equation (1).

$$U_i = U(q_i, C_i, Z_i) \tag{1}$$

Households optimize utility from consumption subject to their income ( $m$ ) and the price of housing unit ( $p$ ) and the price of remaining non-durable goods and services ( $C$ ), which is accepted as the numeraire and equals to one. Households maximize utility with respect to their budget constraint (2).

$$\max U(q_i, C_i, Z_i) \text{ subject to } C_i + p_i q_i = m_i \quad (2)$$

The solution of this optimization problem will give us household's demand function for housing unit (3). Household demand for housing unit depends on house prices, household income and their social and demographic characteristics. However, household demand on housing unit is actually determined by the permanent component of income rather than its transitory component. For that reason, we estimate the permanent component of household head's disposable income in the empirical analysis.

$$q_i = q(p, m_i, Z_i) \quad (3)$$

We observe house value rather than housing unit. House value comprises both the quantity and the quality of the dwelling, which depends on its properties such as size, number of rooms, construction time, the source of heating and the presence of an elevator in the apartment. Therefore, we have to identify the contribution of quality growth on house value to predict a hedonic house price index.

We define  $H$  as housing characteristics for housing unit ( $n$ ) and the value ( $V$ ) of a housing unit is dependent on its characteristics (4). Thus, we need to develop a hedonic house price index to determine the value of housing unit (Hill, 2011). We perform an econometric analysis to determine the contribution of quality growth on house values for each property and survey year in the empirical analysis.

$$V_n^i = V(H_n) \quad (4)$$

If we can identify the contribution of housing characteristics to house values, then we can analyze changes in house values, which are separated from quality growth ( $H_n^*$ ). We estimate hedonic house price index by taking the ratio of weighted average house values for each survey year to the selected base year after controlling for quality growth (5).

$$p_t = 100 * \frac{[V(H_n^*)]_t}{[V(H_n^*)]_o} \quad (5)$$

If we can calculate hedonic house price index ( $P$ ), then we can find the value of housing unit by dividing its market value by hedonic house price index (6). In this manner, we can reveal true parameters, which are implicit in equation (3).

$$q_i = \frac{v_n^i}{p} \quad (6)$$

## *II.2 – Econometric Specifications*

First, we create a dummy variable, which is one for home-owners and zero otherwise ( $D$ ). In the same way, we form a dummy variable, which is one for households, who have a second home and zero otherwise. This can be a summer house or a lake house, where family spends their holiday. Finally, we form a dummy variable, which is one for households, who have outstanding housing debt on their homes and zero otherwise. We estimate probit models to find the determinants of home-ownership, second home

investment and having outstanding housing debt (7). We use social and demographic characteristics ( $Z$ ) such as age, gender, education and income levels of the household head and family types as explanatory variables. Moreover, we add time-dummy variables for survey years in probit models. Here,  $i$  represents household and  $t$  denotes time.

$$D_{it} = \alpha_{it} + \beta Z_{it} + v_{it} \quad (7)$$

Second, we estimate a Heckman two-step selection model to separate the contribution of quality growth on house values, while the selection criterion is home-ownership. The dependent variable in the first stage of the Heckman two-step selection model is home-ownership dummy variable,  $D$ . Probit model includes age and dummy variables for gender, education, income, job status, employment sectors and health insurance coverage of the household head and family types, which are denoted by the  $Z$  matrix. Here,  $i$  represents housing unit and  $t$  denotes time (8).

$$D_{it} = \gamma_{it} + \delta_{it}Z + \varepsilon_{it} \quad (8)$$

The dependent variable in the second stage of the estimation is house value in current prices (9).  $HW$  denotes home value as before and  $X$  represents features that might raise the value of the property such as the source of heating, construction time and the presence of an elevator in the building. As a result, the explanatory variables in the first and the second stages of the model are already different from each other. Moreover, we include time dummy variables for survey years in both stages of the Heckman two-step selection model.

$$HW_{it} = \mu_{it} + \vartheta_{it}X + \epsilon_{it} \quad (9)$$

We estimate a Heckman two-step selection model to predict the permanent component of household head's disposable income, while the selection criterion is having positive income. Intuitively, this approach is similar to a Mincerian earnings equation, which is based on schooling (King and Dicks-Mireaux, 1982 and Kazarosian, 1997). The dependent variable in the first stage of the Heckman two-step selection model is a dummy variable,  $I$ , which is one for household heads, who have positive income and zero otherwise (10). Probit model includes age and age-squared of the household head and dummy variables for his/her education level, marital status, health insurance coverage and family types, which are denoted by the  $Z$  matrix. Here,  $i$  denotes household head and  $t$  denotes time.

$$I_{it} = \varphi_{it} + \theta_{it}Z + v_{it} \quad (10)$$

The dependent variable in the second stage of the estimation is household head's disposable income ( $Y$ ).  $Z$  represents social and demographic characteristics such as age and dummy variables for the household head's gender, education level, employment status, occupation and employment sectors, but we do not include dummy variables for health insurance coverage and marital status of household heads in the second stage of the Heckman two-step selection model (11). As a result, the explanatory variables in the first and the second stages of the model are different from each other.<sup>1</sup> In addition, we add time dummy variables for survey years in both stages of the Heckman two-step selection model.

$$Y_{it} = \sigma_{it} + \phi_{it}Z + \omega_{it} \quad (11)$$

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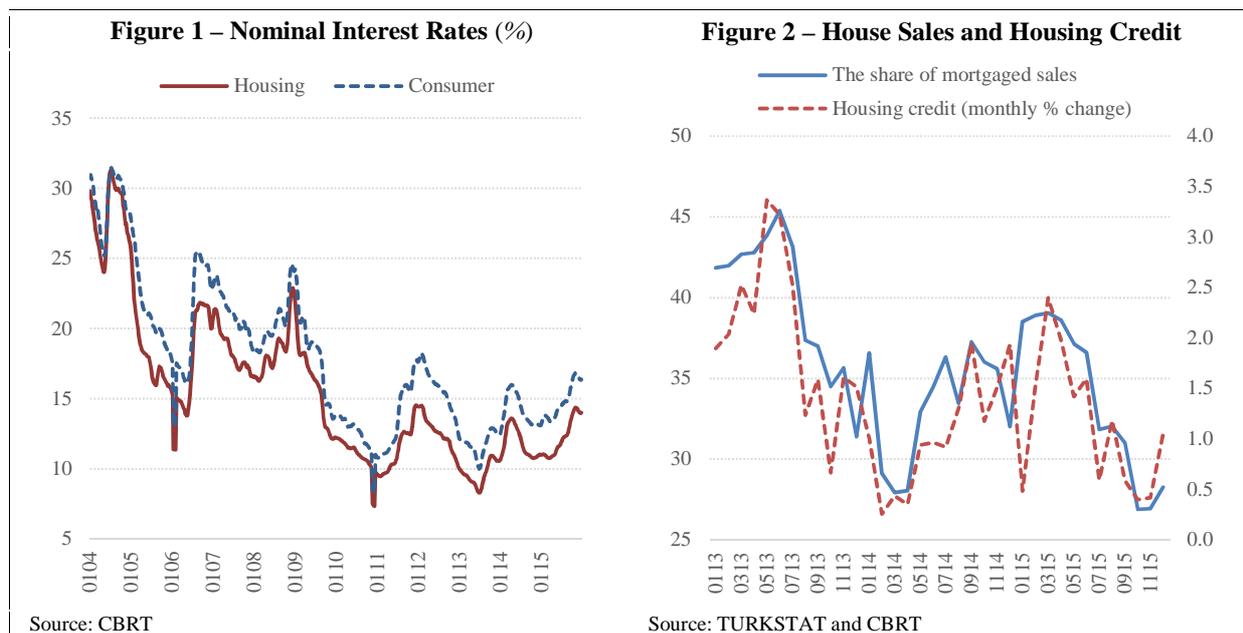
<sup>1</sup> It is not required, but it will be much better for identification if the first stage selection equation contains at least one variable that is not included in the second stage outcome equation. However, it is especially difficult to find variables that are directly related to the selection criterion in the first stage equation, but not connected with the dependent variable in the second stage equation from a cross-section survey (Puhani, 2000).

Finally, we estimate income, price and interest rate elasticities of housing demand in the empirical analysis. We assume that housing demand is a log-linear equation, which depends on permanent income ( $Y^p$ ), house price index ( $P'$ ), which does not include the contribution of quality growth on house values, nominal interest rate ( $R$ ) and social and demographic characteristics ( $Z$ ). The dependent variable is the value of housing unit ( $HV$ ), which is calculated by dividing house value with hedonic house price index ( $P$ ). Thus, we can estimate income, price and interest elasticities of house value (12). Moreover, we add time dummy variables for survey years in housing demand equation. Here,  $i$  denotes household head and  $t$  denotes time as before.

$$HV_{it} = \rho_{it} + \lambda_{it}Y^p + \varsigma_{it}P' + \psi_{it}R + \zeta_{it}Z + \xi_{it} \quad (12)$$

### III. Recent Housing Market Developments

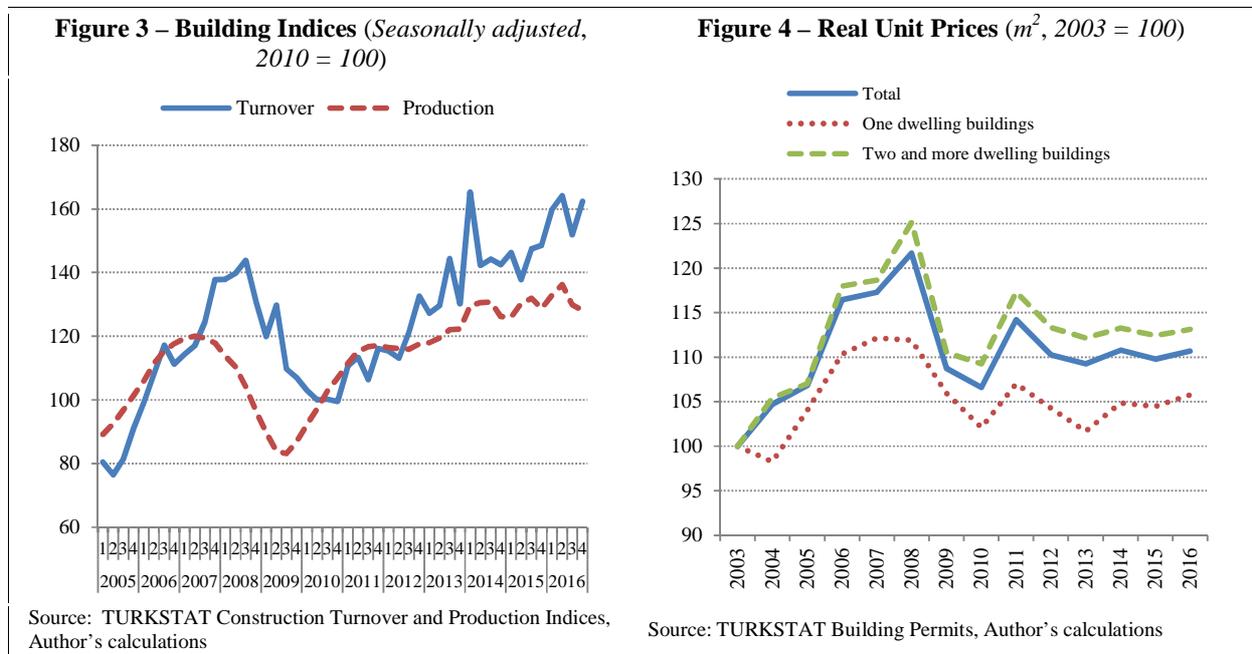
House sales showed a remarkable upsurge in the last decade in Turkey. The downward trend in nominal interest rates, which escalated parallel to the expansionary monetary policies implemented in advanced economies after global financial crisis contributed to the housing boom (Figure 1). House sales slowed down in 2012 and 2014 only temporarily, when interest rates increased moderately compared to past years. In addition, we observe that there is a close relationship between the growth of housing credit and mortgaged house sales (Figure 2). The maturity of housing credit extended by deposit banks to households is 8 years on average. Therefore, it is not surprising to discover that a relatively high ratio of households that purchased their homes after 2009 have outstanding housing debt. Housing is the largest component of household wealth in Turkey as in many countries. As a result, recent housing boom might have affected household behavior and wealth distribution significantly.



We look at TURKSTAT Turnover and Production Indices for buildings to gain more information about supply side developments in the housing market.<sup>2</sup> Turnover and Production Indices indicate that housing supply was strong in the period of analysis. Moreover, both revenues and production experienced a swift recovery after global economic crisis and continued to develop in the following years (Figure 3). We also analyze TURKSTAT Building Permits for completed or partially completed new buildings. We approximate nominal unit prices by dividing the value of building permits, which is in current TL prices to their floor area, which is given as square meters. We calculate real unit prices by dividing nominal unit prices with TURKSTAT Consumer Prices Index (CPI). Our calculations demonstrate that real unit prices per square meter increased significantly between 2003 and 2008, but it decreased sharply during global economic crisis (Figure 4). Building permits for both floor area and value decreased, but the fall in floor area was relatively stronger in this period. After that real unit prices improved modestly and remained higher than its 2003 values. These empirical observations suggest that housing demand was stronger than supply in Turkey between 2003 and 2014.

<sup>2</sup> We did not include civil engineering projects in the TURKSTAT Turnover and Production Indices, since we are mainly interested in housing demand and supply in this paper.

We observe a slight negative relationship between median age and home-ownership rates among selected OECD countries (Figure 5).<sup>3</sup> In OECD countries median age cluster between 40 and 45, but we witness different home-ownership rates, which might stem from different housing markets and structural policies (Andrews *at al.*, 2011). If we exclude Turkey from the sample, then the explanatory power of a simple linear regression of home-ownership rate on median age rises from 0.1% to 6%. From a theoretical point of view, we expect home-ownership to increase with income, but households might reduce their housing wealth as they age (Andrews and Caldera Sanchez, 2011).



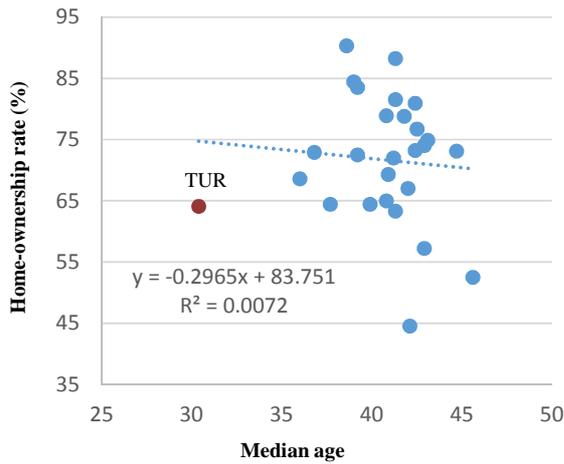
Moreover, the price to rent ratio, which is considered as a measure of the profitability of home-ownership, is highest in Turkey among all OECD countries (Figure 6).<sup>4</sup> We find similar values when we take the ratio of *hedonic nominal house price index*, which is produced the Central Bank of the Republic of Turkey (CBRT) and *rent index* from CPI, which is produced by TURKSTAT. House prices increased

<sup>3</sup> This empirical observation actually stems from Austria, Germany and Switzerland, which have relatively high median ages and low home-ownership rates. If we do not include them in the sample, then we see a positive relationship between median age and home-ownership rates, which is counter-intuitive at first glance.

<sup>4</sup> Nominal house price covers the sale of newly-built and existing dwellings. The price to rent ratio is the nominal house price divided by the rent price. This indicator is an index with base year 2010.

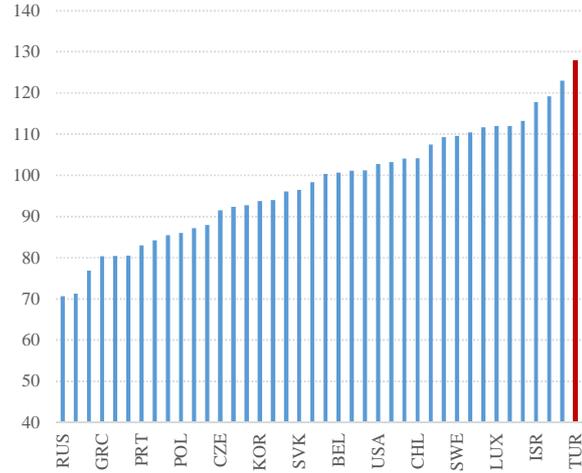
faster than rent, which indicates that the return on housing investment decreased significantly between 2003 and 2014.

**Figure 5 – Home-ownership Rate and Median Age in Selected OECD Countries (2014)**



Source: Eurostat and Census Bureau

**Figure 6 – Price to Rent Ratio in OECD Countries (% , 2014)**



Source: OECD

Youth dependency ratio, which is calculated as the ratio of individuals, who are 14 years of old and younger to working-age population, fell by 6 percentage points from 2003 to 2014 in Turkey. At the same time, old age dependency ratio, which is defined as the ratio of individuals, who are 65 years and older to working-age population, increased by more than 3 percentage points (Figure A1). In addition to that, the percentage of working-age individuals to total population showed a modest increase during this period. As a result, the number of families grew by 2.5% annually on average from 2002 to 2014, while average household size fell to 3.7 in 2014 from 4.2 in 2003 according to HBS data.

Demographic change and rising urbanization rate due to internal migration contributed to new household formation. Urbanization rate remained stable at slightly less than 70% between 2003 and 2013. A better way to analyze demographic change is to focus on internal migration to big cities like İstanbul. According to TURKSTAT Population Projections the share of İstanbul in total population will increase

from 18.5% in 2014 to 19.6% in 2023. Ankara is also expected to make modest gains during this period, but TURKSTAT predicts that the share of İzmir in total population will decrease slightly, which can be reversed in the next years (Figure A2).

#### **IV. Data**

Our main data source is HBS, which are defined as repeated cross-sectional surveys, but they do not have a panel dimension. They provide detailed data on household disposable income and consumption expenditures from 2003 to 2014. They also provide information about participants' age, gender, education, occupation and job status. However, HBS does not include information about households' geographical locations, except for the 2003 survey, which has a significantly higher number of observations. Unfortunately, HBS indicate whether households live in urban regions or rural regions only from 2003 to 2013.<sup>5</sup>

There are 107,793 household observations in the restricted pooled sample from 2003 to 2014 (Table 1). Household units, which are composed of individuals, who are living together, and families, whose household head is unemployed or an unpaid family worker are excluded from the pooled sample.<sup>6</sup> Moreover, the lowest and the highest 1% percentiles of housing wealth are trimmed out to remove potential outliers from the sample (Figure A3). As a result, the final sample set is restricted to families, whose household head is between the ages of 23 and 73 in 2003.

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<sup>5</sup> The definitions of rural and urban regions changed significantly after a recent law extended the jurisdictions of local governments. According to TURKSTAT the size of urban regions increased dramatically from 70% to 90% in 2014. For this reason, HBS 2014 does not provide information about rural and urban households. As a result, the estimations for rural and urban households cover the time period between 2003 and 2013 and the numbers of observations in these regressions are lower than the regressions for all households.

<sup>6</sup> According to the classification of HBS, a family member who plays a greater role than the rest of the members in at least one important issue is selected as the household head. Bringing income into the family is not the main criteria in the selection of the household head. The household head may be male or female though over 90% of them are actually male. The household head does not have to be the highest income earner in the family, but he/she is responsible for managing household income and consumption expenditures. Household head characteristics have a strong influence over household saving preferences.

HBS groups home ownership status of households in four categories: home-owners, tenants, families that live in public housing and finally, households that live in a house owned by a relative. We observe that the ratio of home-owners decreased from 70.1% in 2003 to 64.1% 2014 (Figure 7). The ratio of tenants decreased slightly, while the ratio of families that live in a house owned by a relative increased steadily from 5.3% in 2003 to 13.7% in 2014. Household attitudes towards housing market are changing significantly. Moreover, the ratio of households that have outstanding housing debt on their home surged from 2.1% in 2003 to 9.6% in 2014, while the ratio of households that have a second home increased from 5.8% in 2003 to 8.6% in 2014 (Figure 7). As a result, 6.6% of households have a second home, while 5.6% of households have outstanding housing debt in the pooled sample (Table 1). According to HBS, the growth rate of house value is significantly higher and also more volatile than that of household disposable income in the period of analysis. This is especially the case during global financial crisis, when the growth rate of house value decreased sharply and could not recover until 2014 (Figure A4).

**Table 1 – Descriptive Statistics** <sup>(1)</sup>

	<i>Number of obs.</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Min.</i>	<i>Max.</i>
Age	107,793	47.42	11.83	23	79
Female	107,793	10.7%			
University graduate	107,793	11.7%			
Home ownership	107,793	66.1%			
Second home ownership	107,793	6.6%			
Housing debt	107,793	5.6%			
Household size	107,793	3.97	1.88	1	30
Household disposable income <sup>(2)</sup>	107,793	13,223.4	11,822.8	0.0	512,239.0
Home value <sup>(2)</sup>	84,540	35,069.3	26,246.3	2,493.1	175,531.0

Source: TURKSTAT Household Budget Surveys

(1) Descriptive statistics are calculated using household weights for the restricted sample.

(2) 2003 TL prices

We observe annual disposable income for all households, monthly rent for tenants and monthly imputed rent for home-owners, households that live in house owned by a relative and families that live in public housing in HBS. Thus, we can calculate housing investment return rate by dividing home value to

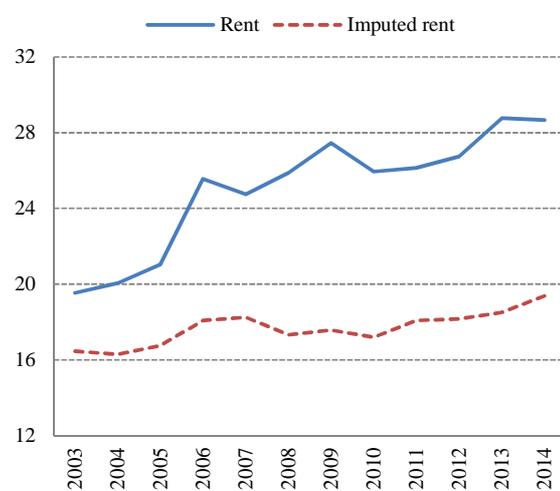
annualized actual rent and imputed rent. We find that housing investment ratios for both rent and imputed increased steadily, except for a brief fall during global financial crisis (Figure 8). As of 2014, it takes more than 28 years for a house to pay for initial investment by rent revenue. In addition, home-owners, families that live in public housing and households that live in a house owned by a family member are asked about the market value of their residences in the survey month in HBS and their responses are recorded in current TL prices, but tenants are not asked this specific question. According to their subjective evaluations the ratio of house value to household disposable income jumped from 2.2 times in 2003 to 3.1 times in 2008 for whole sample.<sup>7</sup> However, this ratio decreased gradually after global financial crisis (Figure 9). We must point out that the ratio of house value to annual household disposable income showed a small rise and reached to 2.6 in 2014, which was still higher than its initial level in 2003.

**Figure 7 – Home-ownership and Housing Debt (%)**



Source: TURKSTAT Household Budget Surveys, Author's calculations

**Figure 8 – Housing Investment Return Rate**

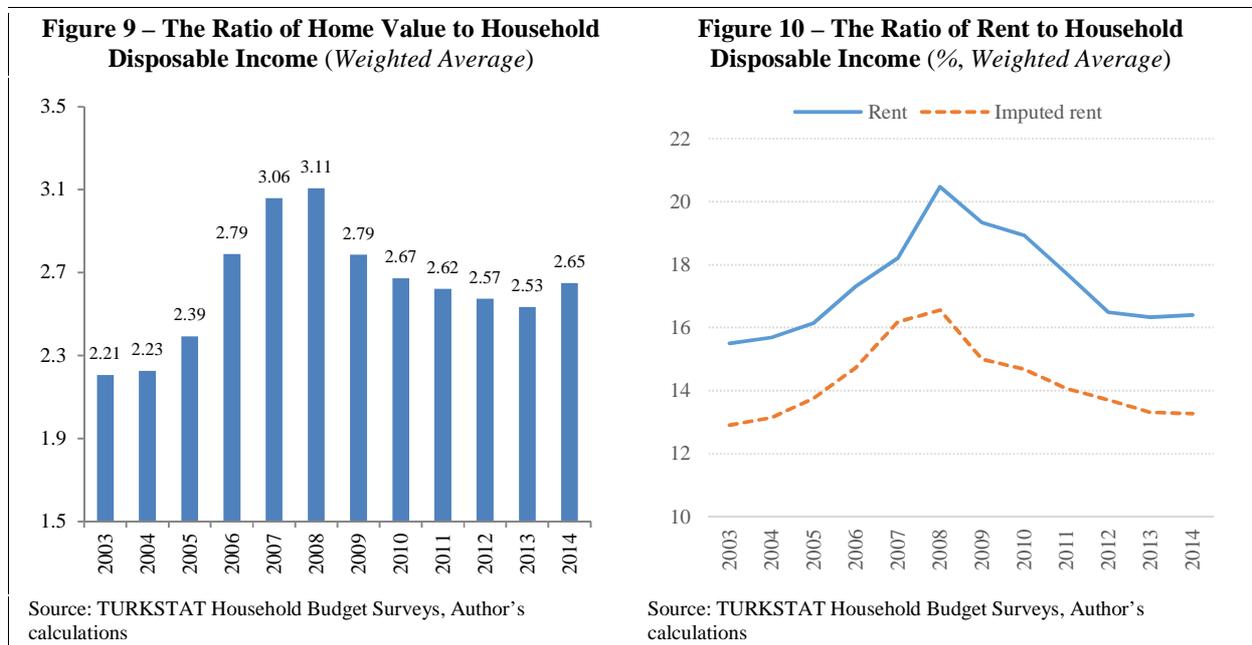


Source: TURKSTAT Household Budget Surveys, Author's calculations

We calculate the ratio of rent and the ratio of imputed rent in total household budget for tenants and home-owners, respectively. We find that the ratio of rent and the ratio of imputed rent in household budget increased gradually until global financial crisis, but both of them fell considerably afterwards

<sup>7</sup> We use weighted annual averages of house values and household disposable income.

(Figure 10). This empirical finding is in line with our initial observation that housing investment return ratio continues to increase in the period of analysis. All of these empirical observations indicate that house prices increased much faster than rent and household disposable income, which reduced the profitability of housing investment in Turkey (Figure A4). Moreover, these empirical observations suggest that house price increases put a financial strain on households and partly explain why young households are more likely to have outstanding housing debt compared to old households.



## V. Econometric Results

### V.1 – Home-ownership, Second Home Investment and Housing Debt

We estimate probit models to find the determinants of home-ownership, second home ownership and housing debt. We include *housing investment return rate*, which is based on aggregated data, as an explanatory variable in the probit models in addition to social and demographic features. This approach

enables us to eliminate potential simultaneity bias, since there is an endogenous relationship between house prices and housing demand at the household level. We calculate its annual weighted average values using actual rent data.

We observe that there is a negative and statistically significant relationship between housing investment return rate and home-ownership and having a second home at 1% confidence level, while there is a positive and statistically significant relationship between housing investment return rate and having outstanding housing debt. As a result, we find that the decline in the profitability of housing investment decreases the probabilities of home-ownership and having a second home significantly, while it raises the probability of having outstanding housing debt as expected (Table 2).<sup>8</sup> Increases in housing investment return rate indicate that the profitability of housing investment is falling, since it will require a longer time period to cover the cost of investment with rent revenue.

We find that the probabilities of being a home-owner, having a second home and also having outstanding housing debt increase with age at a decreasing rate (Table 2). Moreover, the probabilities of being a home-owner, having a second home and having outstanding housing debt increase monotonically with the income level of the household head. Families that have a female household head are less likely to be home-owners and to have a second home, but we do not observe a statistically significant difference between having female or male household head in having outstanding housing debt. The probability of being a home-owner falls with education level of the household head, but the probability of having a second home rises with the education level of the household head. Moreover, we observe that families that have two or more children are less likely to be home-owners and have a second home than families that do not have children. We find that extended families, where two or more nuclear families live together are more likely to be home-owners, but families that have a single parent are less likely to own their homes.<sup>9</sup>

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<sup>8</sup> As a robustness check, we estimate the probit models with housing investment return rate, which is calculated using imputed rent data. We observe that the rise in housing investment return rate diminishes the probabilities of home-ownership and having a second home, while it increases the probability of having outstanding housing debt significantly as before. Moreover, the relationships became even stronger.

<sup>9</sup> The probit models also include time-dummy variables for survey years. We see that the probabilities of being a home-owner and having a second home decrease in all survey years compared to 2003, whereas the probability of having outstanding housing debt increases gradually over time with respect to 2003 even after controlling for economic, social and demographic factors. These empirical findings are actually consistent with our initial observations (Figure 3).

**Table 2 – Home-ownership, Second Home Investment and Housing Debt <sup>(1)</sup>**

	Home-ownership	Second Home Investment	Housing Debt
<i>Housing investment return rate</i>	-0.0595*** (0.00211)	-0.00771*** (0.00296)	0.0650*** (0.00314)
Age	0.0675*** (0.00297)	0.0762*** (0.00509)	0.0333*** (0.00510)
Age squared	-0.000408*** (3.09e-05)	-0.000555*** (4.90e-05)	-0.000441*** (5.34e-05)
Female	-0.189*** (0.0226)	-0.106*** (0.0335)	0.0505 (0.0347)
Second income quintile	0.202*** (0.0136)	0.186*** (0.0276)	0.103*** (0.0276)
Third income quintile	0.313*** (0.0146)	0.400*** (0.0273)	0.218*** (0.0273)
Fourth income quintile	0.505*** (0.0158)	0.554*** (0.0275)	0.387*** (0.0273)
Fifth income quintile	0.716*** (0.0181)	0.861*** (0.0282)	0.587*** (0.0283)
Literate	-0.0368 (0.0295)	0.0945* (0.0482)	-0.0359 (0.0524)
Primary school	-0.141*** (0.0224)	0.301*** (0.0379)	-0.0982** (0.0399)
High school	-0.267*** (0.0263)	0.421*** (0.0434)	-0.0532 (0.0450)
Vocational school	-0.220*** (0.0281)	0.459*** (0.0449)	-0.0941** (0.0468)
University graduate	-0.345*** (0.0279)	0.580*** (0.0435)	0.0229 (0.0459)
Nuclear family with one child	-0.203*** (0.0164)	-0.154*** (0.0215)	0.0238 (0.0265)
Nuclear family with two children	-0.183*** (0.0164)	-0.222*** (0.0224)	0.0751*** (0.0260)
Nuclear family with three children	-0.0369** (0.0175)	-0.271*** (0.0256)	0.0847*** (0.0281)
Extended family	0.100*** (0.0182)	-0.0383* (0.0218)	0.0152 (0.0281)
Single parent family	-0.220*** (0.0252)	-0.0393 (0.0363)	-0.206*** (0.0415)
Constant	-0.223*** (0.0836)	-4.446*** (0.151)	-4.036*** (0.140)
R-squared	0,16	0,13	0,09
Number of Obs.	107,793	107,793	107,793

Standard errors are in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(1) The omitted categories are first income quintile, illiterate and nuclear family without children. The probit models also include occupation, employment status, economic sectors, health insurance coverage categories and time-dummy variables for survey years.

## V.2 – Hedonic House Price Index

We estimate a Heckman two-step selection model to identify the contribution of house properties on their prices. The selection criterion in the first stage of the Heckman two-step selection model is home-ownership.<sup>10</sup> As a result, our empirical findings from this stage are very similar to the analysis of the probability of home-ownership in the preceding sub-section.<sup>11</sup> There are 35,591 censored and 72,202 uncensored observations with a total of 107,793 household observations in the pooled sample. The dependent variable in the second stage of the Heckman two-step selection models is the natural logarithm of house values in current TL prices. The fitted values from this model are obtained and considered as the contribution of house properties on their prices. We calculate hedonic house price index by taking the ratio of weighted mean values of the fitted values for each survey year to the selected base year. We use household weights from HBS, which are prepared by TURKSTAT for this purpose. Intuitively, this approach is similar to the approximation of the permanent component of disposable income as in the succeeding sub-section.<sup>12</sup>

The econometric results from the second stage show that quality growth plays an important role on home values. We find that new buildings are more expensive, which is directly related to construction quality. Duplex flats are the most expensive form of housing. Moreover, houses that have central heating and natural gas as the source of heating are more valuable. The presence of an elevator in the apartment raises its value significantly. Finally, houses that provide larger living areas are more expensive (Table 3). The regression coefficient of lambda from the Heckman two-step selection model is negative, but it is not statistically significant. The explanatory power of the second stage OLS regression is 56%.

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<sup>10</sup> We observe that the main difference between houses that are owned and rental houses is their geographical location. The percentage of rental houses is significantly lower in rural regions compared to urban regions. Houses that are owned and rental houses are similar to each other in other categories (Table A1). Houses that are owned are slightly larger than rental houses in size, but rental houses are more likely to have an escalator compared to houses that are owned on average. Finally, detached houses are more likely to be owned, whereas flats are more likely to be rented.

<sup>11</sup> In this case, we do not include housing investment return rate, but the rest of the explanatory variables are exactly the same. The first stage of the Heckman two-step selection model is not presented in the paper to save space, but it is available on request from the author.

<sup>12</sup> There is one caveat that we need to mention about the effect of quality growth on home value appreciation. Unfortunately, HBS do not contain information about households' geographical regions. Moreover, HBS do not provide information about urban and rural households starting from 2014 survey. However, regional differences might play an important role on household preferences and home values.

**Table 3 – Hedonic House Price Index**<sup>(1)</sup>

Second stage OLS regression for Home Value ( <i>current TL prices</i> )	<i>Regression Coefficient.</i>	<i>Standard error</i>
Semi-detached house	6,272.883 ***	(459.596)
Ground floor	6,346.205 ***	(658.289)
Flat	13,460.460 ***	(345.240)
Duplex flat	45,588.290 ***	(1,355.289)
Other ( <i>including roof</i> )	9,875.451 ***	(1,212.488)
Central heating	14,149.280 ***	(556.845)
Boiler	14,267.690 ***	(603.623)
Other (including air conditioning)	18,806.540 ***	(1,039.269)
Coal	-1,581.647 ***	(418.328)
Natural gas	27,564.510 ***	(594.380)
Electricity	17,888.900 ***	(819.657)
Organic	-16,242.410 ***	(791.416)
Other (including fuel oil and LPG)	8,202.626 ***	(809.525)
1946-1960	1,469.673	(971.116)
1961-1970	4,599.883 ***	(918.898)
1971-1980	5,439.160 ***	(862.298)
1981-1990	4,997.447 ***	(853.068)
1991-2000	4,596.719 ***	(851.936)
2001-2005	6,160.489 ***	(934.193)
2006 and later	9,855.823 ***	(996.046)
Elevator	17,211.340 ***	(453.806)
Constant	-29,773.250 ***	(2,001.809,9)

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(1) The number of rooms, the size of residential area and dummy variables for survey years are also included in the OLS regression. The omitted dummy variable categories are detached house, stove, wood and 1945 and before in the regression, respectively.

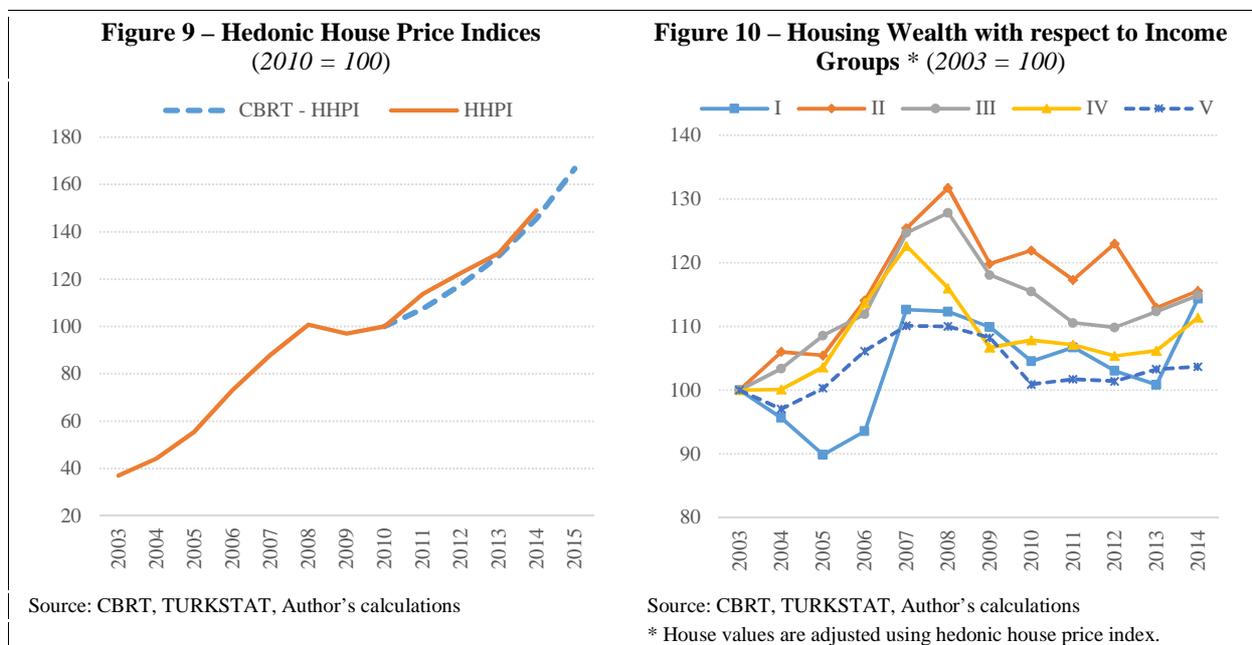
The only benchmark that we can use to examine the reliability of our hedonic house price index is CBRT hedonic house price index. We observe that hedonic house price index (HHPI), which is estimated using HBS, and CBRT hedonic house price index seem compatible between 2010 and 2014 (Figure 9). Unfortunately, CBRT hedonic house price index is available from January 2010. Moreover, we observe that the path of HHPI is consistent with macro-economic developments in the Turkish economy. HHPI increased steeply between 2003 and 2008, when household expectations were positive, real interest rates decreased sharply and housing credits increased significantly compared to past years (Figure 1 and Figure

2). However, HHPI dropped gradually during global financial crisis and recovered swiftly after 2010 as the Turkish economy experienced positive growth rates.

The location of a house in city limits and its proximity to public services could be even more important on its market value than the geographical region it resides. Kiel and Zabel (2008) analyze the effects of Metropolitan Statistical Areas (MSA), towns and streets on house prices using American Housing Survey (AHS) for the U.S. economy. They show that price indices are affected if all three levels of location are not included in the house price hedonic model. TURKSTAT added 6 new questions to the questionnaire, which are related to housing quality starting from 2009. Households are asked whether they can access to shopping centers, banks, post offices, public transportation, health care and schools easily or not based on the location of their homes. Survey respondents pick one option from given choices, which are *too difficult*, *difficult*, *easy* and *very easy* and the answer options are the same for all 6 questions. We could not use these questions in the Heckman two-step selection model to identify the contribution of house properties on their prices before, because in that case the number of observations would drop from 107,793 to 48,213 in the estimation and our empirical analysis would be restricted to only 5 years from 2009 to 2014. However, as a robustness check we re-estimated the Heckman two-step selection model by including these questions about the proximity of houses to shopping centers, banks, post offices, public transportation, health care and schools. We find that especially being close to shopping centers and health care facilities raises house prices significantly, but surprisingly being close to schools reduces house prices, which might be related to noise, traffic or the perceived low quality of public schools. Moreover, we calculated weighted mean values of the fitted values for each survey year. We see that hedonic house values, which are controlled for location in addition to house properties, are on average 2.65 percent higher than hedonic house values, which are controlled only for house properties, but they are very close to each other in terms of house price inflation in the period of analysis.

We analyze housing wealth at 2003 TL prices by dividing house values with HHPI. At this point, we turn average weighted house values of income groups into 2003 based indices to be able compare

relative wealth distribution among income groups, since the housing wealth level of the highest income group is significantly higher than the remaining income groups.<sup>13</sup> We observe that middle income groups benefited from recent housing boom more than the highest and the lowest income groups (Figure 10). Home-ownership rate is lower in the lowest income group as expected, which might have limited their gains from housing market developments. As a result, the ratio of housing wealth of the highest income group to that of the lowest income group fell slightly between 2003 and 2014. We can argue that we need to build more houses with good quality for the lowest income group.



Finally, we obtain the standard errors from the second stage of the Heckman two-step selection model. We assume that the standard errors represent true prices of housing units, since they are left when the contribution of house properties on their prices are excluded. We calculate house price index (*HPI*) by

<sup>13</sup> Housing wealth of the highest income group is 4 times greater than that of the lowest income group using nominal prices. However, if we analyse housing wealth levels using 2003 prices, then the size difference between the highest income group and the lowest income group drops to 3.5 times. If we control for quality growth in addition to house price inflation, then the size difference between the highest income group and the lowest income group reduces to 2.4 times.

taking the ratio of weighted mean values of the standard errors for each survey year to the selected base year.

### *V.3 – The Approximation of Household Head’s Permanent Income*

At this point we run a Heckman two-step selection model to distinguish the permanent component of household heads’ disposable income. The selection criterion is having positive income level. There are 1,201 censored and 106,592 uncensored observations with a total of 107,793 individual observations in the pooled sample. The number of censored observations is small, since we analyze household heads, who are more likely to work and generate income. The econometric results from the first stage show that the probability of having positive income increases with age at a decreasing rate. Female household heads are older, which highlight the role of traditional values in families, where women become household heads only after their partners are deceased. Thus, women are less likely to work for a living. We find that the probability of having positive income increases as education level increases, but falls as family size grows. We observe that a single parent is more likely to have positive income than a household head from a nuclear family without a child. Moreover, household heads that have compulsory health insurance, which is linked to their job contracts, and household heads that have voluntary health insurance are more likely to have positive income compared to a household heads that do not have health insurance coverage. However, *green-card owners*, who benefit from public health care services for free, are more likely to have positive income compared to household heads that do not have health insurance coverage, which is contrary to our initial expectations. Married household heads tend to earn more than singles, divorcees and widows as expected, but there is not a significant income gap between singles, divorcees and widows.<sup>14</sup>

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<sup>14</sup> We think that marital status affects household heads’ labor force participation choices, but it is not directly related to their income levels. We regress the dummy variables for marital status on the natural logarithm of household heads’ disposable income along with other explanatory variables, which are included in the OLS regression. We find that the dummy variables for widows and divorcees are not statistically significant, but the dummy variable for married people is positive and statistically significant at 5% confidence level. However, a Wald test shows that the dummy variables for marital status are jointly statistically significant in the probit model.

**Table 4 Permanent Income**<sup>(1)</sup>

<i>Heckman selection model – two-step estimates (regression model with sample selection)</i>				
	<i>Probit Model – Positive Income</i>		<i>OLS Regression – Disposable Income</i>	
	<i>Coefficient</i>	<i>Std. Err.</i>	<i>Coefficient</i>	<i>Std. Err.</i>
Age	-0.121***	(0.011)	332.110***	(21.039)
Age-squared	0.001***	(0.000)	-2.745***	(0.214)
Female	-1.297***	(0.045)	625.707***	(181.136)
<i>Marital Status</i>				
Married	0.240**	(0.115)		
Widower	0.975***	(0.117)		
Divorced	0.483***	(0.127)		
<i>Education Level</i>				
Literate	0.111**	(0.046)	136.680	(198.869)
Primary School	0.424***	(0.037)	872.123***	(162.395)
High School	0.592***	(0.074)	2682.195***	(192.081)
Vocational School	0.623***	(0.095)	2466.886***	(205.005)
University Graduate	0.858***	(0.095)	5519.062***	(200.587)
<i>Family Type</i>				
Nuclear family with one child	-0.204***	(0.062)	250.326**	(116.656)
Nuclear family with two children	-0.306***	(0.061)	358.101***	(116.560)
Nuclear family with three children	-0.327***	(0.060)	-32.970	(123.604)
Extended family	-0.510***	(0.053)	474.498***	(120.448)
Single parent	0.235***	(0.067)	-408.684**	(187.131)
<i>Health Insurance Coverage</i>				
Compulsory	0.673***	(0.033)		
Voluntary	0.169*	(0.098)		
Green-card	0.197***	(0.042)		
<i>Employment Sector</i>				
Industry			-84.380	(195.365)
Construction			54.294	(178.915)
Services			-530.785***	(173.711)
<i>Job-Status</i>				
Manager			3731.598***	(170.449)
Professional			2360.885***	(171.977)
Sales Personal			603.759***	(147.490)
Farmer			-216.226	(194.702)
Skilled Worker			698.180***	(131.217)
<i>Occupation</i>				
Salary Earner			1811.046***	(159.842)
Employer			8432.679***	(217.458)
Self-Employed			2126.490***	(174.737)
Constant	5.226***	(0.306)	-5458.929***	(517.628)

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(1) Time-dummy variables for survey years are also included in the OLS regression. The omitted dummy variable categories are wage-earner, unskilled worker, nuclear family without a child and agriculture sector, respectively.

The dependent variable in the second stage of the estimation is household head's disposable income, which is deflated to 2003 TL prices dividing by hedonic house price index to be compatible with house value. The econometric results underline the important role of education, since disposable income increases monotonically with education. Disposable income rises with age at a decreasing rate and women earn less than men. Salary-earners, self-employed individuals and employers earn significantly more than wage-earners. Finally, we observe that all occupation groups, except for farmers, earn more than unskilled workers (Table 4).

Our econometric results are in line with the findings of previous studies on the determinants of individual disposable income for the Turkish economy (Ceritoğlu, 2011 and Aktaş *et al.*, 2012). The fitted values for household heads that either have a positive income level or a job are obtained from this model and used as a proxy variable for permanent income in housing demand equations in the next sub-section. The regression coefficient of lambda of the Heckman two-step selection model is negative and statistically significant at 1% confidence level. The explanatory power of the first stage probit model is approximately 24%, while the explanatory power of the second stage OLS regression is 25%.

#### *V.4 – Housing Demand in Turkey*

The dependent variable of the Ordinary Least Squares (OLS) regression is the natural logarithm of subjective evaluation of home value, which is deflated to 2003 TL prices using hedonic house price index (Table 5). At this point, the sample set is restricted to 12,654 home-owners, who purchased their homes between 2003 and 2014, since hedonic house price index is available only for this time period. The main explanatory variables of interest are the natural logarithms of permanent income, house price index (HPI) and interest rate. We use annual average nominal interest rates on housing loans, which are extended by deposit banks to households and we assume that interest rate is the same for all households in empirical analysis. According to our econometric results, permanent income elasticity of housing demand is

approximately 24%, which is statistically significant in all three estimations from (1) to (3) in the restricted sample. Price elasticity of housing demand ranges between -29% and -35%, which has the expected negative sign, but it is not statistically significant in both estimations (2) and (3). Interest rate elasticity of housing demand has the expected negative sign in estimation (3), but it is not statistically significant and it is measured as a very small value.<sup>15</sup>

Almost all of the explanatory variables are statistically significant at 1% confidence level in the OLS regressions (Table 5). The econometric results indicate that house value increases with age at a decreasing rate and families that have a female household head own more expensive houses. Moreover, house value rises steadily with the education level of the household head. However, we find that families that have two or more children have less expensive houses compared to families that do not have children. We observe that extended families, where two or more nuclear families live together own cheaper houses compared to families that do not have children. Probably, the presence of dependent individuals in the household restricts resources available for housing by increasing expenditures for health and education.

Our permanent income and price elasticities of housing demand estimates are modest compared to earlier findings for emerging market economies. Fontenla and Gonzales (2009) predict that permanent income elasticity of housing demand is 80% for the Mexican economy, which is significantly higher than our finding. Halicioglu (2007) predict the long run income elasticity of housing demand around 100% for the Turkish economy, but she uses an Auto Regressive Distributed Lag (ARDL) model using aggregate time-series data from 1964 to 2004. Moreover, Fontenla and Gonzales (2009) predict price elasticity of housing demand around -30%, whereas Halicioglu (2007) estimate the long run price elasticity of housing demand -20%, which are very similar to our estimates.

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<sup>15</sup> We re-estimated our main regressions using one year lagged values of interest rates as a robustness check. However, we find that the regression coefficient of the lagged interest rate is positive contrary to our expectations and it is not statistically significant in the estimations.

**Table 5 – The Determinants of Housing Demand** <sup>(1)</sup>

	(1)	(2)	(3)
<i>Permanent income</i>	0.243*** (0.0523)	0.243*** (0.0494)	0.243*** (0.0492)
<i>House price index</i>		-0.289 (0.346)	-0.353 (0.426)
<i>Nominal interest rate</i>			-0.0128 (0.0597)
Age	0.0192*** (0.00490)	0.0192*** (0.00508)	0.0192*** (0.00502)
Age squared	-0.000141*** (4.75e-05)	-0.000141*** (5.01e-05)	-0.000141*** (4.90e-05)
Female	0.111*** (0.0317)	0.111*** (0.0304)	0.111*** (0.0316)
Literate	0.147*** (0.0453)	0.147*** (0.0435)	0.147*** (0.0447)
Primary school	0.285*** (0.0362)	0.285*** (0.0353)	0.285*** (0.0349)
High school	0.450*** (0.0472)	0.450*** (0.0454)	0.450*** (0.0441)
Vocational school	0.457*** (0.0462)	0.457*** (0.0456)	0.457*** (0.0434)
University graduate	0.603*** (0.0598)	0.603*** (0.0577)	0.603*** (0.0559)
Nuclear family with one child	0.0601*** (0.0183)	0.0601*** (0.0183)	0.0601*** (0.0180)
Nuclear family with two children	0.0236 (0.0187)	0.0236 (0.0189)	0.0236 (0.0189)
Nuclear family with three children	-0.105*** (0.0207)	-0.105*** (0.0213)	-0.105*** (0.0206)
Extended family	-0.0368* (0.0214)	-0.0368* (0.0212)	-0.0368* (0.0207)
Single parent family	-0.0410 (0.0347)	-0.0410 (0.0350)	-0.0410 (0.0360)
Constant	6.999*** (0.366)	8.330*** (1.740)	8.671*** (2.193)
Number of observations	12,654	12,654	12,654
R-squared	0.39	0.39	0.39

Bootstrapped standard errors with 1.000 replications are in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(1) The omitted categories are illiterate and nuclear family without children. The OLS regressions include occupation, employment status and health insurance coverage categories and also time-dummy variables for survey years.

If we enlarge our sample by including all home-owners in the pooled data set regardless of their purchase date, which extends to past years before 2003, then we find that permanent income elasticity of housing demand is statistically significant and its size is estimated as 25%, which is very close to our initial estimate. With this approach we are implicitly assuming that households adjust their subjective evaluations for home values with respect to house price and nominal interest rate changes, which is in fact a strong assumption. In this case, interest rate elasticity of housing demand is -2.4%, which is statically significant at 5% confidence level. Our robustness checks reveal that the importance of income on housing demand remained at the same level between 2003 and 2014, whereas the roles of house prices and interest rates are weakened in this time period.

## **VI. Conclusion**

This paper analyses recent housing market developments in Turkey. In particular, we estimate permanent income elasticity, price elasticity and interest rate elasticity of housing demand. For this purpose, we analyze twelve consecutive waves of HBS from 2003 to 2014. Our empirical analysis enables us to have a better understanding of changing household attitudes towards the housing market and the effects of housing boom on household wealth distribution with respect to ownership status. One plausible explanation of the drop in home-ownership rates is relative price changes. The upward trends in housing investment return rate and price to rent ratio indicate that rent increases slower than the growth of household disposable income and house price changes. As a result, the share of rent in total household budget of tenants fell considerably after global financial crisis.

The profitability of housing investment is falling, but we witness that housing demand is still strong. Wealthy households might have considered house purchases as a safe investment and their demand might have been stimulated by the low return of financial assets in the period of analysis (Flavin and Yamashita, 2002). Demographic change and rising urbanization rate due to internal migration might have

contributed to new household formation. Moreover, we find that middle income groups benefited from recent housing boom more than the highest and the lowest income groups. Finally, our empirical analysis reveals that income is the main determinant of home-ownership and housing demand in Turkey, which is in line with previous studies in the literature.

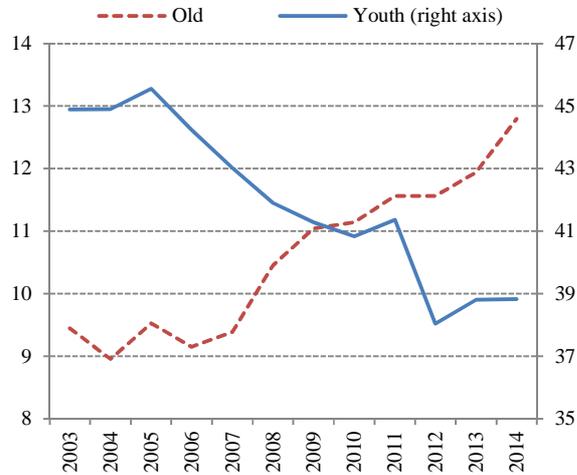
## Appendix

**Table A1 – House Properties with respect to Ownership (%)**

	Houses that are owned	Rental houses
<i>House type</i>		
Detached house	43.2	17.2
Semi-detached house	7.7	7.8
Ground floor	4.5	10.1
Flat	42.8	63.2
Duplex flat	1.0	0.7
Other (including roof)	0.8	1.0
<i>Heating</i>		
Stove	66.9	67.7
Central heating	9.6	10.8
Boiler	20.8	18.2
Other (including air conditioning)	2.8	3.2
<i>Fuel</i>		
Wood	51.6	46.3
Coal	15.1	18.6
Natural gas	24.3	25.5
Electricity	4.6	7.4
Organic	2.1	0.2
Other (including fuel oil and LPG)	2.2	2.2
<i>Building date</i>		
1945 and before	2.1	1.1
1946-1960	4.6	3.5
1961-1970	7.2	7.5
1971-1980	16.4	18.3
1981-1990	23.6	28.6
1991-2000	31.2	29.2
2001-2005	8.5	6.6
2006 and after	6.4	5.2
<i>Room number</i>		
1	0.5	0.3
2	6.0	8.0
3	39.9	44.3
4	46.7	44.5
5 and more	7.0	2.9

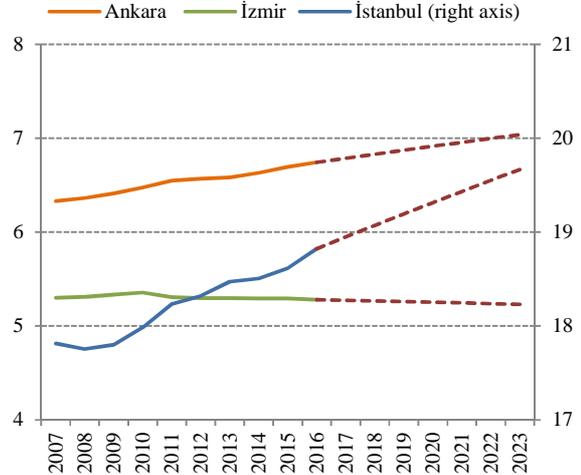
Source: TURKSTAT Household Budget Surveys

**Figure A1 – Youth and Old Dependency Ratios (%)**



Source: TURKSTAT Household Budget Surveys, Author's calculations

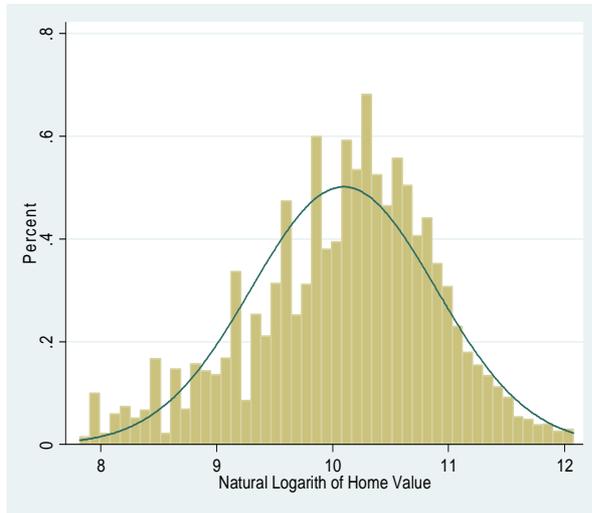
**Figure A2 – Internal Migration \* (%)**



Source: TURKSTAT Address Based Population Registration System, Author's calculations

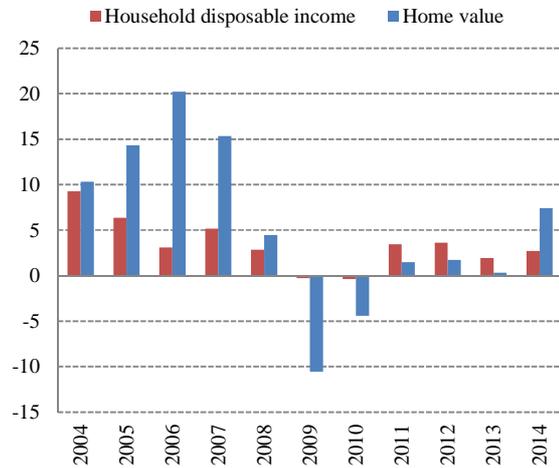
\* The dotted lines show TURKSTAT population projections for provinces from 2016 to 2023.

**Figure A3 – The Distribution of Housing Wealth (2003 TL prices)**



Source: TURKSTAT Household Budget Surveys, Author's calculations

**Figure A4 – Household Disposable Income and Housing Wealth (Annual % change)**



Source: TURKSTAT Household Budget Surveys, Author's calculations

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