TÜRKİYE CUMHURİYET MERKEZ BANKASI

WORKING PAPER NO: 17/06

Disentangling Age and Cohorts Effects on Home-Ownership and Housing Wealth in Turkey

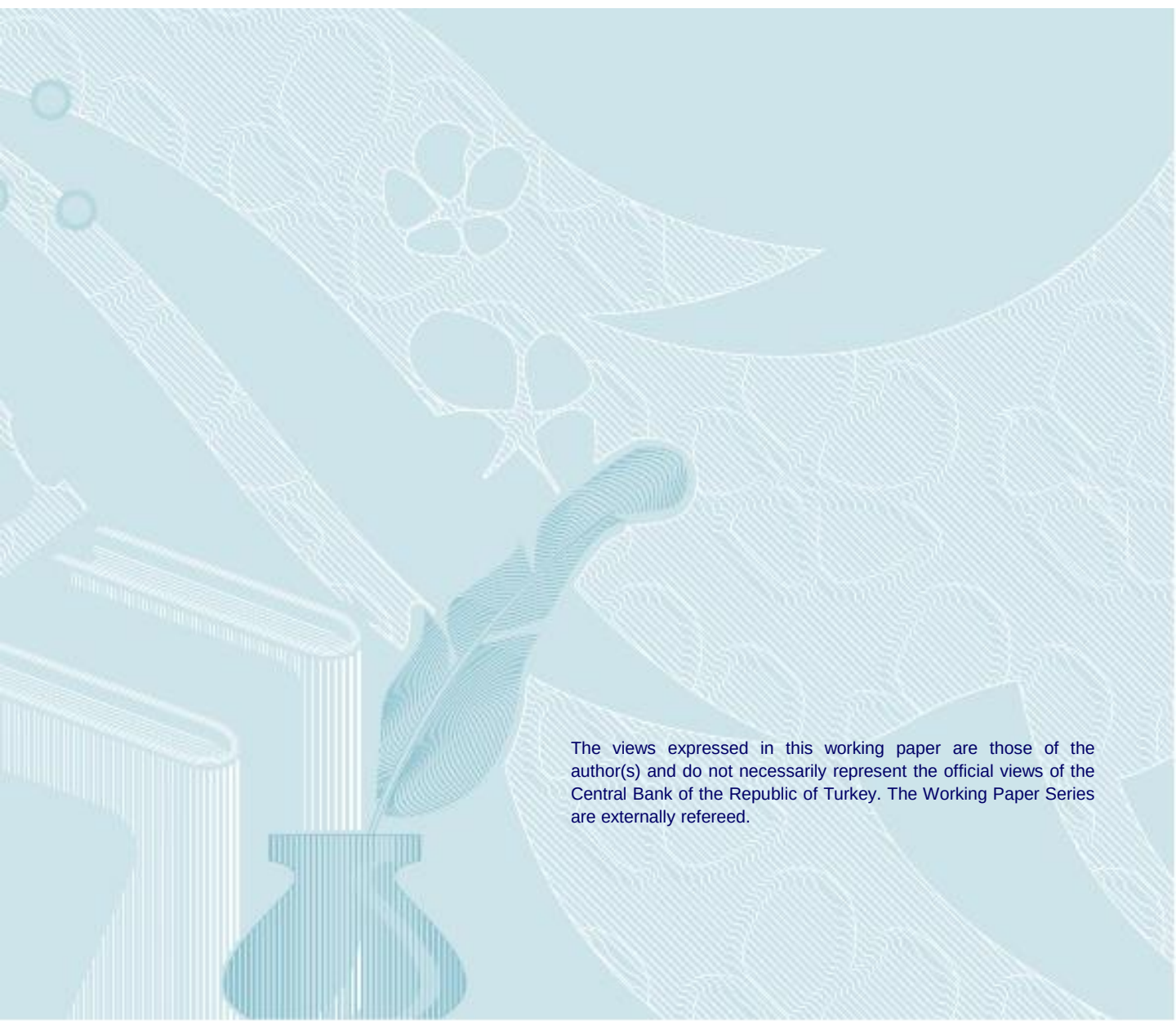
March 2017

Evren CERİTOĞLU

Address:
Central Bank of the Republic of Turkey
Head Office
Structural Economic Research Department
İstiklal Caddesi No: 10
Ulus, 06050 Ankara, Turkey

Phone:
+90 312 507 80 04

Facsimile:
+90 312 507 57 33



Disentangling Age and Cohorts Effects on Home-Ownership and Housing Wealth in Turkey [a]

Evren Ceritoğlu [b]

Abstract

This paper analyses the role of age and cohort effects on home-ownership and housing wealth in Turkey. We utilize twelve consecutive waves of the Turkish Statistical Institute (TURKSTAT) Household Budget Surveys (HBS) from 2003 to 2014. We construct a pseudo-panel data set following Deaton (1985) using birth-year cohorts in which families are grouped into cohorts with respect to the birth year of their household heads. Empirical analysis shows that young cohorts are less likely to own their homes, but they are more likely to be in housing debt. Moreover, they are willing to invest in second homes as much as old cohorts. We estimate a Heckman two-step selection model to distinguish the contribution of quality growth on house prices, while the selection criterion is home-ownership. We regress weighted average of the natural logarithm of cohort home values on age and cohort dummy variables. We find that cohort effects on home values are significantly larger for young cohorts even after controlling for age effects and quality growth.

JEL Classification: C23, D12 and R21

Key words: *Home-ownership, Housing wealth, Cohort effects, Pseudo-panel*

---

[a] I would like thank the anonymous referee for his/her valuable comments and suggestions.

[b] Economist, Structural Economic Research Department, Central Bank of the Republic of Turkey (CBRT), Ulus / Ankara 06050 TURKEY
Telephone no: + 90 312 5078024
Fax number: + 90 312 5075732
E-mail: evren.ceritoglu@tcmb.gov.tr

I. Introduction

This paper analyzes the roles of age and cohort effects on home-ownership and housing wealth in Turkey. Home-ownership is one of the main motivations behind household savings. Households generally have a positive view of housing investment, but household attitudes towards housing market change with respect to age and cohort. Young households often prefer to keep their savings in financial instruments due to liquidity and to enjoy high returns. The analysis of the changes in household attitudes is important, because housing investment plays a major role in the formation of household assets and liabilities. Chiuri and Jappelli (2003) find that the availability of housing finance, which is measured by down payment ratios, affects the distribution of owner occupancy rates across age groups using micro-economic data for fourteen OECD countries. Tunç and Yavaş (2015) provide empirical evidence for the argument that the high growth rate of consumer credit, in particular housing credit, is one of the main reasons of the recent decline in private saving ratios in Turkey.

Previous empirical literature analyses the impact of ageing population on home-ownership rates and housing wealth distribution in advanced economies (Lindh and Malmberg, 2008; Chiuri and Jappelli, 2010; Angelini *et al.*, 2014; Alik-Lagrange and Schmidt, 2015). However, developing countries have young and growing populations, which put pressure on both house prices and household finances (Forrest and Lee, 2004). Arslan *et al.* (2014) investigate the effects of demographic change on housing demand in Turkey. They analyze TURKSTAT Household Budget Surveys to determine the link between housing demand and age groups. They obtain housing demand for each age group and long term housing demand for whole population by utilizing TURKSTAT population projections. They estimate that housing demand will increase by 1.48 percent annually on average from 2009 to 2050, while 1.08 percent of the rise will stem from population growth and the remaining 0.40 percent will be driven by demographic change. Their empirical analysis indicates that the change in the age structure of population will have a sizeable effect on the growth of housing demand in addition to population growth. Ceritoğlu and Eren (2014) examine and

quantify the potential effects of demographic change on household savings in Turkey using a methodology proposed by Mankiw and Weil (1989). They predict that if the sole effect of demographic change is taken into consideration, then household saving ratio might increase around 2.2 percentage points between 2010 and 2050 due to the expected rise in working-age population. Moreover, they perform household saving ratio projections controlling for cohort effects as a robustness check following Deaton and Paxson (2000). Cohort effects are statistically significant in the econometric estimations, but their contributions to household saving ratio projections remain limited as in Demery and Duck (2006a and 2006b). However, to the best of my knowledge, the role of cohort effects on housing wealth is not investigated for the Turkish economy before. Hülagü *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 increase to a real appreciation might be misleading. In particular, they estimate 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. Empirical analysis indicates that young cohorts are less likely to be home-owners, but they are more likely to have outstanding housing debt. Moreover, they are willing to invest in second homes as much as old cohorts. Econometric results confirm that quality growth plays an important role on the rise of house prices in Turkey. We estimate a Heckman two-step selection model to find the contribution of quality growth on house prices, while home-ownership is the selection criterion. Hence, we are able to analyze the roles of age and cohort effects on home values, which are isolated from quality growth. We discover that cohort effects on home values are significantly larger for young cohorts even after controlling for age effects and quality growth.

The outline of the paper is as follows: Section II presents a simple theoretical model to analyze cohort effects. Section III provides a descriptive analysis of HBS and explains the formation of a pseudo-

panel data set for birth-year cohorts. Section IV presents the econometric results and robustness checks. Finally, section V concludes this paper with a brief summary of our empirical findings.

II. Theoretical Background

II.1 – A Simple Theoretical Model for Cohort Effects

Deaton and Paxson (2000) propose that cohort effects on household income and consumption can be determined by a simple linear model. We follow a similar approach to find the role of cohort effects on housing wealth accumulation.[1] Life-time resources, *W*, are the sum of assets at birth and the discounted present value of future labor income, *y*, (1).

$$W_i = A_i^0 + \sum_0^L y_i^l (1+r)^{-a} \tag{1}$$

In this equation *L* is the length of life, *r* is the constant real interest rate and y_{ia} is labor income of individual *i* at age *a*. According to the Life Cycle Theory consumption at age *a* is proportional to life-time resources (Modigliani, 1986). The ratio of consumption to life-time resources depends on age profile, real interest rate and household tastes and preferences. We suppress real interest rates as in Deaton and Paxson (2000) at this point.[2] Therefore, we can write age-consumption profile as follows:

$$c_{ia} = f_i(a) W_i. \tag{2}$$

[1] Previously, Demery and Duck (2006a and 2006b) followed the same approach to find the empirical importance of cohort effects on household income and consumption in the U.K. economy.

[2] Unfortunately, HBS does not provide data on the amount of housing debt and accruing interest rate. However, we include time dummy variables for survey years in the estimations to capture the effects of macro-economic developments. Moreover, we estimate the contribution of quality growth on home values, which also allows us to control for household tastes and preferences in the housing market.

We could also write age-income profile by replacing consumption with income in equation (2). A time-series of cross-sectional household budget surveys allows us to analyze average consumption and average income for different birth cohorts. If we average the logarithm of equation (2) over all individuals born in the same year, then we can write the logarithm of cohort consumption as a combination of age and cohort effects (3).

$$\overline{lnc_{ab}} = \overline{lnf(a)} + \overline{lnW_b} \tag{3}$$

Here b denotes the year of birth and the lines over the variables indicate mean values. We can estimate equation (3) by regressing the average natural logarithm of consumption for households born in year b and observed at age a in household budget surveys on a set of age and cohort dummy variables (4).

$$\overline{lnc} = D^a\alpha_c + D^b\gamma_c + u_c \tag{4}$$

In equation (4) $\overline{lnc}$ is a stacked vector of the natural logarithms of cohort consumption values with observations for each cohort for all survey years, while D^a is a matrix of age dummy variables and D^b is a matrix of cohort dummy variables. The regression coefficients α_c and γ_c represent age and cohort effects, respectively. Moreover, u_c is the sampling error (*measurement error*), which emerges because of the fact that cohort consumption values are observed from household budget surveys rather than population.

$$\overline{lnHW} = D^a\alpha_h + D^b\gamma_h + v_h \tag{5}$$

In this paper we suggest that age and cohort effects on housing wealth, *HW*, can be analyzed with the same approach (5). Here, $\overline{lnHW}$ is a stacked vector of the natural logarithms of cohort housing wealth values with observations for each cohort for all survey years, where the regression coefficients α_h and γ_h represent age and cohort effects as before.

III. Data

HBS are defined as repeated cross-sectional surveys, which do not have a panel dimension. They provide detailed data on household disposable income and consumption expenditures from 2003 to 2014. Unfortunately, HBS indicate whether households live in urban regions or rural regions only from 2003 to 2013.[3] They provide information about participants' age, gender, education, occupation and employment sector. However, the surveys do not include information about households' geographical locations, except for the 2003 survey, which also has a significantly higher number of observations.[4]

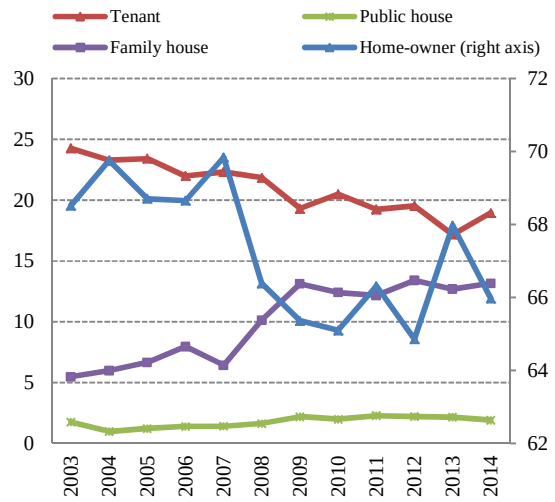
HBS divides home ownership status of households into four categories (Figure 1). The ratio of households that live in their own house decreased from 68.5% in 2003 to 66% 2014, while the ratio of households that live in a house owned by a family member surged between 2007 and 2009, but remained steady afterwards. We observe that the ratio of households, who live in public housing, which is provided by government for civil servants increased slightly, though this remains at a very low level. Moreover, the ratio of tenants decreased gradually at the same time. According to HBS data 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

[3] 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.

[4] TURKSTAT collects individual and household disposable income figures for the twelve months period prior to the survey month, but not for the calendar year due to the design of the survey questionnaires. For instance, if a household participates in the Household Budget Survey in September 2008, then annual household disposable income will refer to the twelve months period between September 2007 and September 2008. However, the monthly inflation rates are quite high and there are significant differences in the inflation rates of geographical regions in Turkey. TURKSTAT includes a regional and monthly inflation variable in the HBS since 2003. Household disposable income and housing wealth are inflated to the year-end (December) prices of the corresponding survey year by multiplying with this inflation index. Annual household disposable income and housing wealth are divided by year-end consumer price indices for each survey year and all economic variables are analyzed in 2003 TL prices.

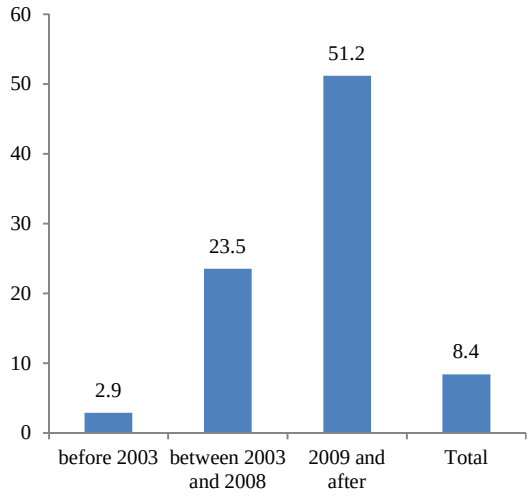
in 2003. Demographic change might explain the decline in home-ownership ratio at least partially in this period.[5]

Figure 1 – Home-ownership (%)



Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure 2 – Housing Debt (%)



Source: TURKSTAT Household Budget Surveys, Author's calculations

We observe that 6.8% of households have a second home, while 5.6% of them have outstanding housing debt according to our restricted sample set. Figure 2 presents the percentage of home-owners that have outstanding housing debt according to the year of purchase of their homes. The maturity of housing credit extended by deposit banks to households is on average five years in Turkey. Therefore, it is not surprising to discover that a relatively high proportion of home-owners that purchased their homes in 2009 and later have housing debt. However, it is striking to find that 51.2% of them still have outstanding housing debt, while this ratio is 8.4% for the whole sample. This empirical observation indicates the changing attitudes in the housing market, where a greater ratio of homes are purchased by using consumer credits compared to previous years. The fall in interest rates, which is partly related to the expansionary

[5] As a caveat we must mention that multi-generational households are common in Turkey, especially in rural regions (Cilasun and Kırdar, 2013). However, we observe that the ratio of extended families is falling steadily as we move from old cohort to young cohorts. Moreover, the ratio of extended families in total population is falling in time, since young individuals leave home and establish their own households. This might be one of the reasons behind the decline in home-ownership rates, because home-ownership rate is higher among extended families. Finally, extended families have a considerably larger family size, but the difference in the age of the household head of extended families and that of total families is decreasing steadily, which suggests that their importance on economic and social life is going to diminish over time.

monetary policies applied in advanced economies after global economic crisis, might have contributed to this process.

In HBS households are questioned about the selling price of their residences according to market conditions in the survey month and their responses are recorded in current TL prices.[6] According to their subjective evaluations the ratio of weighted average home value to annual household disposable income increased significantly from 2.1 times in 2003 to 2.9 times in 2007 in the sample. However, this ratio, which was 2.6 times in 2009, declined gradually after global economic crisis. We must point out that the ratio of home value to annual household disposable income experienced a minor decrease and realized as 2.5 times in 2014, which was still higher than its initial level in 2003. These empirical observations show that the increases in house prices puts a financial strain on young households and partly explain why young households are more likely to have outstanding housing debt compared to old households.[7]

In a seminal paper, Deaton (1985) suggests the use of cohorts from a time series of repeated cross-sectional surveys, when a genuine panel data set is not available.[8] Cohorts can be constructed by focusing on a distinct and static feature, which is observed for all individuals or households such as the birth year of the household head (Verbeek, 2008). In this paper, the cross-section dimension of the HBS is large and the number of cohorts is assumed to be fixed.

The sample set is separated into cohorts using household heads' birth years as the choice criteria.[9] Household units, which are composed of individuals, who live together, and families, whose household head is unemployed or an unpaid family worker are excluded from the pooled sample. Moreover, the lowest and the highest 1% percentiles of housing wealth are trimmed out to remove potential outliers from

[6] Home-owners and households, who live in public housing and households that in a house, which is owned by a family member, are asked about the market value of their residences in the survey month in HBS. Tenants are not asked this specific question.

[7] Moreover, we can observe annual disposable income for all households, monthly rent for tenants and monthly imputed rent for home-owners and families that live in public housing in HBS. We calculate housing investment return ratio by dividing home value to annualized rent and imputed rent. We observe that the estimated housing investment ratios for both rent and imputed increased steadily, except for a brief fall during global economic crisis. As of 2014 it requires more than twenty-eight years for a house to pay for initial investment by rent revenue on average.

[8] A cohort is defined as a group with fixed membership, individuals of which can be identified as they show up in the surveys (Deaton, 1985, pg. 109).

[9] According to the classification of the TURKSTAT 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.

the sample set (Figure A1). In addition, cohorts who were born before 1945 and after 1975 are excluded from the pooled sample to capture sufficient number of observations in each cohort cell. As a result, the final sample set is restricted to 85,169 families, who live in their homes and whose household head is between the ages of 28 and 69 from 2003 to 2014 (Table 1).

Table 1 – Descriptive Statistics (1)

	Number of obs.	*Mean*	*Std. dev.*	*Min.*	*Max.*
Age	85,169	46.88	8.93	28	69
Female	85,169	9.8%			
University graduate	85,169	11.6%			
Household size	85,169	4.12	1.86	1	30
Household disposable income (2)	85,169	13,675.8	12,209.7	0.0	512,239.0
Home value (2)	67,074	35,331.9	26,152.2	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 exclude families that live in public housing or in houses owned by family members and the sample set is restricted to home-owners, since our aim is to analyze the roles of age and cohort effects on housing demand. We track thirty-one birth year cohorts, who were born between 1945 and 1975, for 12 years from 2003 to 2014 as mentioned before. There are approximately 154 household observations for birth-year cohorts between 2003 and 2014 on average (Table A1). Hence, we can calculate the natural logarithm of home value for all cohorts for each survey year comfortably in the empirical analysis.

The number of observations in each cohort cell must be significantly large so that sample cohort averages will approximate to true cohort averages from population. Verbeek and Nijman (1992) show that the bias in the standard fixed effects estimator effects will be small provided that the cohort sizes are sufficiently large such as 100 and 200 individuals and the true means within each cohort exhibit sufficient time variation. Browning *et al.* (1985) analyze sixteen birth-year cohorts with an average cell size of 190 household observations for 7 years from Family Expenditure Surveys (FES) for the U.K. economy. Banks

et al. (2001) also analyze seven birth-year cohorts with approximately 100 household observations in each cell from FES for 25 consecutive years. Therefore, average cohort size is sufficient in this paper, which is required for consistent estimation of parameters of interest (Verbeek, 2008).

IV. Econometric Results

IV.1 – Home-Ownership, Second Home Investment and Housing Debt

First of all, we analyze the roles of age and cohort effects on home-ownership, second home investment and housing debt. We create a dummy variable, which is one for households, who live in their own homes and zero otherwise. In the same way, we form dummy variables, which assume value of one for households, who have a second home and for households, who have outstanding housing debt and zero otherwise. We calculate their weighted mean values for each cohort and survey year.

We estimate linear random effects models using our pseudo-panel data set. Our regressions are parallel to equation (5), but we do not take natural logarithms of our dependent variables, since the values of dummy variables lie between zero and one. We observe that the probabilities of being a home-owner, having a second home and also having outstanding housing debt increase with age but at a decreasing rate. Young cohorts are less likely to be home-owners, but they are more likely to have outstanding housing debt compared to old cohorts (Figure 3 and Figure 4). However, they are willing to invest in second homes as much as old cohorts. These empirical observations suggest that although young cohorts are less likely to own the houses that they live in, they are more likely to use consumer credit to purchase more expensive houses than their parents have (Table 2).

Table 2 – Home-ownership, Second Home Investment and Housing Debt (1)

	Home-owner		Second home ownership		Housing debt	
	Reg. Coef.	*Std. Error*	*Reg. Coef.*	*Std. Error*	*Reg. Coef.*	*Std. Error*
1946	-0.029	(0.016) *	0.014	(0.009)	0.003	(0.008)
1947	-0.055	(0.017) ***	0.003	(0.009) ***	-0.001	(0.008)
1948	-0.050	(0.017) ***	0.035	(0.009) ***	0.012	(0.008)
1949	-0.065	(0.017) ***	0.035	(0.009) ***	0.009	(0.008)
1950	-0.058	(0.018) ***	0.030	(0.010) ***	0.012	(0.008)
1951	-0.070	(0.018) ***	0.034	(0.010) ***	0.020	(0.008) **
1952	-0.080	(0.018) ***	0.035	(0.010) ***	0.032	(0.009) ***
1953	-0.093	(0.019) ***	0.022	(0.010) **	0.030	(0.009) ***
1954	-0.112	(0.019) ***	0.033	(0.010) ***	0.025	(0.009) ***
1955	-0.100	(0.020) ***	0.041	(0.011) ***	0.038	(0.009) ***
1956	-0.122	(0.020) ***	0.042	(0.011) ***	0.044	(0.009) ***
1957	-0.146	(0.021) ***	0.043	(0.011) ***	0.050	(0.010) ***
1958	-0.161	(0.021) ***	0.056	(0.012) ***	0.047	(0.010) ***
1959	-0.167	(0.022) ***	0.046	(0.012) ***	0.064	(0.010) ***
1960	-0.174	(0.023) ***	0.049	(0.012) ***	0.074	(0.010) ***
1961	-0.204	(0.023) ***	0.050	(0.012) ***	0.086	(0.011) ***
1962	-0.203	(0.024) ***	0.050	(0.013) ***	0.093	(0.011) ***
1963	-0.244	(0.024) ***	0.048	(0.013) ***	0.095	(0.011) ***
1964	-0.237	(0.025) ***	0.050	(0.013) ***	0.105	(0.012) ***
1965	-0.263	(0.025) ***	0.052	(0.014) ***	0.113	(0.012) ***
1966	-0.276	(0.026) ***	0.046	(0.014) ***	0.116	(0.012) ***
1967	-0.284	(0.027) ***	0.050	(0.014) ***	0.144	(0.012) ***
1968	-0.304	(0.027) ***	0.052	(0.015) ***	0.129	(0.013) ***
1969	-0.352	(0.028) ***	0.048	(0.015) ***	0.148	(0.013) ***
1970	-0.360	(0.028) ***	0.058	(0.015) ***	0.146	(0.013) ***
1971	-0.393	(0.029) ***	0.056	(0.016) ***	0.164	(0.014) ***
1972	-0.407	(0.030) ***	0.052	(0.016) ***	0.173	(0.014) ***
1973	-0.424	(0.030) ***	0.050	(0.016) ***	0.184	(0.014) ***
1974	-0.465	(0.031) ***	0.056	(0.017) ***	0.182	(0.014) ***
1975	-0.461	(0.032) ***	0.052	(0.017) ***	0.208	(0.015) ***
Constant	0.901	(0.018) ***	0.090	(0.010) ***	0.022	(0.008) ***
R-squared		0.26		0.60		0.74
Number of obs.		372		372		372
Number of cohorts		31		31		31

Standard errors are in parentheses.

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

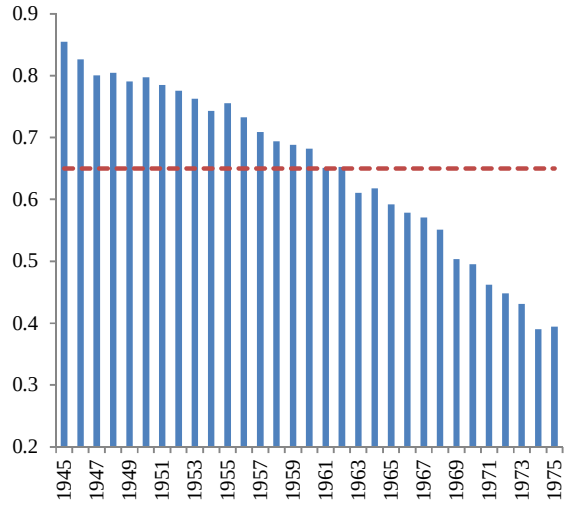
(1) Dummy variables for age and survey years are also included in the regressions.

We observe that the predicted probability of home-ownership increases steadily at the beginning of working years of the household head, but it stabilizes as he/she approaches retirement and falls slightly after retirement.[10] The probability of having a second home follows a similar pattern with the probability of home-ownership, but its level is significantly lower as expected. However, the distribution of the predicted probability of having outstanding housing debt is different. Its predicted probability rises significantly at the early working years of the household head, but it decreases swiftly after the household head reaches middle-age. The predicted probabilities of home-ownership, second home investment and housing debt from the estimated regressions reveal that households' preferences in the housing market change significantly in their life-times. Young households are less likely to own their homes, but they are more likely to have outstanding housing debt.

These empirical findings are supported by the results of the Consumer Tendency Survey (CTS), which is carried out with the cooperation of TURKSTAT and CBRT. In CTS there are several questions about households' consumption and saving decisions. First, households are asked about the possibility of making savings by investing in financial instruments such as foreign currency, gold, bank deposits and similar financial instruments in the next twelve months period. Participants answer this question by choosing one category from "*very likely*", "*fairly likely*", "*not likely*", "*not at all likely*", "*don't know*" and "*don't want to answer*" options. A dummy variable is created using this question, where households that give a positive response by choosing either very likely or fairly likely options are grouped together and are assigned a value of one, while the remaining households are assigned a value of zero.[11]

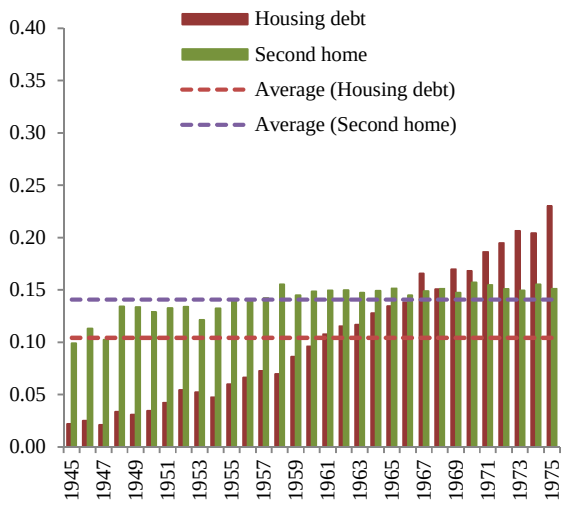
[10] The distribution of the fitted values from the random effects regressions with respect to age are presented in the Appendix (Figure A2 – Figure A4).
[11] In this paper participants that reported that they don't know or they don't want to answer the survey questions are excluded from our sample when dummy variables are created.

Figure 3 – Predicted Cohort Effects on Home-Ownership



Source: TURKSTAT Household Budget Surveys, Author's calculations

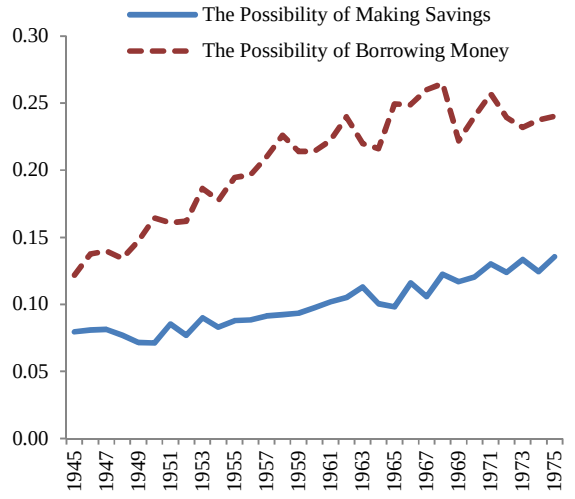
Figure 4 – Predicted Cohort Effects on Second Home Investment and Housing Debt



Source: TURKSTAT Household Budget Surveys, Author's calculations

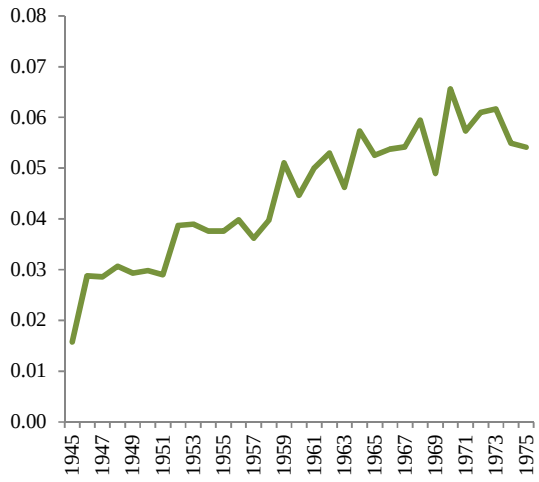
Moreover, in CTS households are asked about the possibility of borrowing money for financing consumption such as consumer credits in the next three months period. Households are also asked about the possibility of purchasing a new house the next twelve months period. Answer options are the same and dummy variables for the possibility of borrowing money and the possibility of purchasing a new house are created with the same approach. We apply the same restrictions on micro-economic data from CTS, which is only available from January 2012 to March 2016, to make it compatible with our restricted sample from HBS. We observe that the possibility of making savings by investing in financial instruments and the possibility of purchasing a new home increases consistently as we approach young cohorts (Figure 5 and Figure 6). The possibility of borrowing money is higher than the possibility of making savings for whole sample, but if we restrict our sample to the highest income group, then we observe that the possibility of making savings becomes greater than the possibility of borrowing money.

Figure 5 – The Possibility of Making Savings and the Possibility of Borrowing Money (*January 2012 – March 2016, weighted average*)



Source: TURKSTAT-CBRT Consumer Tendency Survey, Author's calculations

Figure 6 – The Possibility of Purchasing a New House (*January 2012 – March 2016, weighted average*)



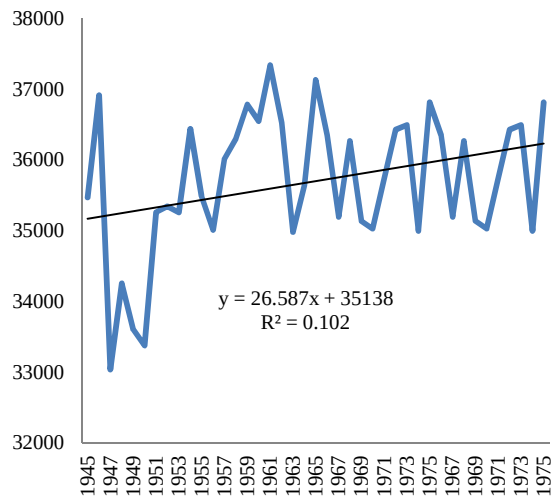
Source: TURKSTAT-CBRT Consumer Tendency Survey, Author's calculations

IV.2 – Cohort Effects on Housing Wealth

In the previous sub-section we found that the probability of being a home-owner is significantly lower for young households compared to old households. However, when we analyze average weighted home values we observe that young cohorts own more expensive houses than old cohorts (Figure 7). One of the main reasons of this observation is that young cohorts entered housing market when house prices were already high. According to the 2014 survey, 61.9% of households bought their homes before 2003, while 18.9% of them bought their homes between 2003 and 2008 and 19.2% of them purchased their homes in 2009 and in the following years. As a result, young cohorts, who purchased their homes in this period, own more expensive houses than old cohorts. At this point, we have to mention that home values are not adjusted for quality improvements in the HBS. New houses are more expensive, because they are built with better quality with more rooms and larger sizes, which reflects changing household tastes and

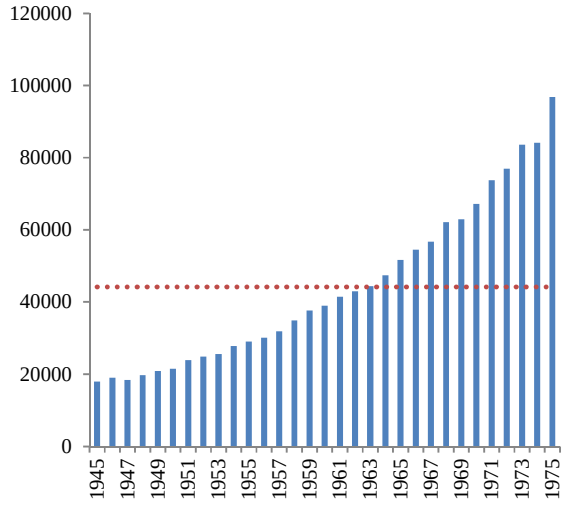
preferences. Therefore, we need to control for quality growth in the housing market in order to be able to estimate age and cohort effects on housing wealth accurately.[12]

Figure 7 – Home Value (*2003 TL prices*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure 8 – Predicted Cohort Effects (*Unadjusted home values, 2003 TL prices*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

We estimate a Heckman two-step selection model to separate the contribution of quality growth on home values, while the selection criterion is home-ownership. There are 27,591 censored and 57,578 uncensored observations with a total of 85,169 household observations in the estimation. The dependent variable in the first stage of the Heckman two-step selection model is a dummy variable, *D*, which is one for households, who live in their own homes and zero otherwise (6). Probit model includes age and age-squared of the household head and dummy variables for education and income levels, employment status, employment sectors and health insurance coverage of the household head and family types, which are denoted by the *Z* matrix. Here, *i* represents household and *t* denotes time.

[12] Building quality improved significantly in Turkey in the last decade for two main reasons. First, there were major changes in legal framework in the construction sector after to the destruction caused by the 17 August 1999 earthquake. For this reason, houses that are built after 2001 are generally considered as safer. Second, Gross Domestic Product (GDP) per capita increased significantly and financial market conditions were favorable, which stimulated housing demand in this period.

$$D_{it} = \vartheta_{it} + \beta_{it} Z + \varepsilon_{it} \quad (6)$$

The dependent variable in the second stage of the estimation is home value in 2003 TL prices (7). *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.

$$HW_{it} = \mu_{it} + \delta_{it} X + \epsilon_{it} \quad (7)$$

The econometric results from the first stage of the Heckman two-step selection model show that the probability of home-ownership increases with age at a decreasing rate and women are less likely to be home-owners. We find that the probability of being a home-owner rises as household disposable income increases as expected. However, we observe that the probability of being a home-owner falls as education level increases and family size enlarges, except for extended traditional families that have a higher chance of owning their homes compared to nuclear family without children (Table 3).

Empirical results clearly show that quality growth plays an important role on home values. We observe that new buildings are more expensive, which is directly related to construction quality. Duplex flats appear to be the most expensive form of accommodation. 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).

Table 3 – Quality Growth [(1) (2)]

Probit model for Home-ownership			*OLS regression for Home Value (2003 TL prices)*		
	Reg. Coef.	Std. Error		Reg. Coef.	Std. Error
Age	0.070	(0.005) ***	Semi-detached house	3,962.163	(290.465) ***
Age-squared	-0.0004	(0.000) ***	Ground floor	5,252.572	(403.667) ***
Female	-0.182	(0.025) ***	Flat	8,498.856	(212.295) ***
2nd Income Quintile	0.207	(0.016) ***	Duplex flat	25,782.610	(800.417) ***
3rd Income Quintile	0.309	(0.016) ***	Other (*including roof*)	3,487.408	(733.935) ***
4th Income Quintile	0.506	(0.018) ***	Central heating	8,595.671	(340.608) ***
5th Income Quintile	0.710	(0.020) ***	Boiler	7,577.439	(371.884) ***
Literate	-0.084	(0.036) **	Other (*including air conditioning*)	8,819.146	(643.909) ***
Primary school	-0.186	(0.026) ***	Coal	-286.683	(258.563)
High school	-0.317	(0.030) ***	Natural gas	15,612.740	(366.834) ***
Vocational school	-0.268	(0.033)) ***	Electricity	11,219.790	(509.183) ***
University graduate	-0.391	(0.032) ***	Organic	-10,367.090	(490.586) ***
Nuclear family with one child	-0.203	(0.020) ***	Other (*including fuel oil and LPG*)	8,352.479	(501.265) ***
Nuclear family with two child	-0.195	(0.019) ***	1946-1960	1,053.363	(669.106)
Nuclear family with three child	-0.061	(0.020) ***	1961-1970	3,115.024	(633.424) ***
Extended family	0.074	(0.021) ***	1971-1980	3,676.846	(593.111) ***
Single parent	-0.249	(0.030) ***	1981-1990	3,926.240	(584.375) ***
Constant	-1.393	(0.120) ***	1991-2000	4,068.828	(583.062) ***
			2001-2005	4,550.757	(627.748) ***
			2006 and later	3,774.789	(666.088) ***
			Elevator	8,925.953	(276.639) ***
			Constant	-8,435.840	(1,352.801) ***

Wald chi2(44) = 56543.37 Prob. > chi2 = 0.000

Standard errors are in parentheses.

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

(1) *First income quintile*, *illiterate* individuals and *nuclear family with no child* are the excluded categories in the estimation. Probit model includes dummy variables for employment status, employment sectors and health insurance coverage of household heads.
(2) 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 regression coefficient of lambda from the Heckman two-step selection model is negative and statistically significant at 1% confidence level. The predicted standard errors from this model are obtained and used as a proxy variable for home value, which is adjusted for quality growth in the next stage of

empirical analysis. Intuitively, this approach is similar to the estimation of the permanent component of individual disposable income, but we utilize the residuals instead of the fitted values as if we are searching for its transitory component. The explanatory power of the second stage OLS regression is approximately 50%. As a result of that the predicted standard errors constitute only a small fraction of home value.

First, we regress weighted average of the natural logarithm of cohort home values on age and cohort dummy variables using our pseudo-panel data set as shown in equation (5). We also include time dummy variables for survey years to capture macro-economic developments in the estimations. Age and cohort dummy variables show the differences in weighted average home values of each age and cohort category in a selected year with respect to the omitted categories under the assumption that all remaining explanatory variables are held constant. The omitted categories are cohorts, who were born in 1945; household heads, who are 58 years old and time dummy variable for survey year 2003.[13] We can observe home values of cohorts, who were born in 1945 and households, who were 58 years old in 2003 from our pseudo-panel data set. We generate cohort effects for households, who were born in the succeeding years by adding their regression coefficients for cohort effects to the realized home value of 1945 cohort in 2003 separately (Figure 8).

We observe that home value increases at a decreasing rate as households get older (Table 4). In addition, we observe that the dummy variables for cohort effects are jointly statistically significant in the random effects regression. Moreover, we find that cohort effects become stronger as we approach younger cohorts (Figure 9). The empirical findings are consistent with our initial observations and support our earlier findings that young cohorts are more likely to buy more expensive houses than their parents own.[14]

[13] Time dummy variable for survey year 2014 is also dropped in the random effects regressions in order to avoid multicollinearity.
[14] We also estimated linear regressions, where the sum of time dummy variables is constrained to zero and only ($T - 2$) time dummy variables are included in the estimations following Deaton (1997) and Chamon and Prasad (2010). We reached exact the same econometric results in the constrained linear regressions and the random effects regressions, when we used the same age and cohort dummy variables in the estimations.

Table 4 – Housing Wealth (1)

	Unadjusted home values		Adjusted for quality growth	
	Reg. Coef.	*Std. Error*	*Reg. Coef.*	*Std. Error*
1946	0.062	(0.034) *	0.010	(0.010)
1947	0.028	(0.034)	0.039	(0.011) ***
1948	0.099	(0.035) ***	0.047	(0.011) ***
1949	0.153	(0.035) ***	0.057	(0.011) ***
1950	0.181	(0.036) ***	0.086	(0.011) ***
1951	0.290	(0.037) ***	0.105	(0.011) ***
1952	0.326	(0.038) ***	0.122	(0.012) ***
1953	0.357	(0.039) ***	0.143	(0.012) ***
1954	0.439	(0.040) ***	0.170	(0.012) ***
1955	0.484	(0.041) ***	0.173	(0.013) ***
1956	0.519	(0.042) ***	0.206	(0.013) ***
1957	0.578	(0.043) ***	0.224	(0.013) ***
1958	0.669	(0.044) ***	0.248	(0.014) ***
1959	0.742	(0.045) ***	0.269	(0.014) ***
1960	0.778	(0.046) ***	0.282	(0.014) ***
1961	0.840	(0.047) ***	0.310	(0.015) ***
1962	0.875	(0.048) ***	0.347	(0.015) ***
1963	0.907	(0.050) ***	0.355	(0.015) ***
1964	0.973	(0.051) ***	0.377	(0.016) ***
1965	1.060	(0.052) ***	0.411	(0.016) ***
1966	1.113	(0.053) ***	0.437	(0.016) ***
1967	1.153	(0.054) ***	0.466	(0.017) ***
1968	1.244	(0.056) ***	0.471	(0.017) ***
1969	1.256	(0.057) ***	0.510	(0.018) ***
1970	1.324	(0.058) ***	0.526	(0.018) ***
1971	1.416	(0.060) ***	0.555	(0.018) ***
1972	1.458	(0.061) ***	0.601	(0.019) ***
1973	1.542	(0.062) ***	0.613	(0.019) ***
1974	1.548	(0.064) ***	0.636	(0.020) ***
1975	1.688	(0.065) ***	0.670	(0.020) ***
Constant	9.882	(0.037) ***	5.988	(0.011) ***
R-squared		0.84		0.90
Number of obs.		372		372
Number of cohorts		31		31

Standard errors are in parentheses.

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

(1) Dummy variables for age and survey years are also included in the regressions.

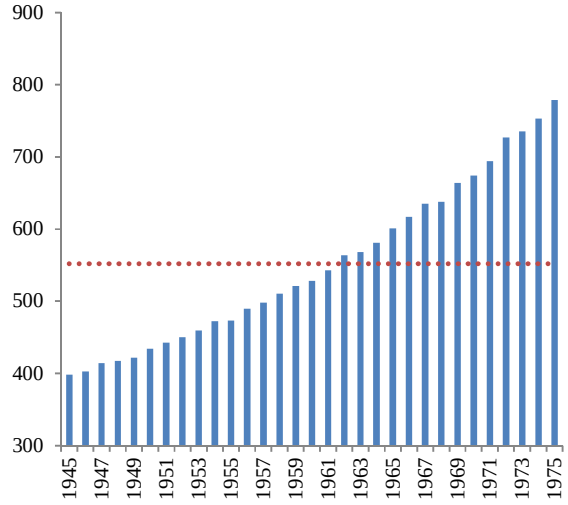
Second, we regress weighted average of the natural logarithm of cohort home values, which are adjusted for quality growth, on age and cohort dummy variables and time dummy variables for survey years. The omitted categories are cohorts, who were born in 1945, household heads, who are 58 years old and time dummy variable for survey year 2003 as before. We generate cohort effects for households, who were born in the following years with the same approach. We confirm that home value rises at a declining rate as households grow old (Table 4). The dummy variables for cohort effects are jointly statistically significant in this random effects regression. Moreover, we find that cohort effects become larger as we approach younger cohorts as before, but the predicted cohort effects are much lower in this case (Figure 9). The significant difference between cohort effects acquired from unadjusted home values and home values, which are adjusted for quality growth supports our initial view that we need to control for the contribution of quality growth on home values to estimate cohort effects on housing wealth accurately.

We observe that cohort effects, which are acquired from unadjusted home values and home values that are adjusted for quality growth are similar for households who were born between 1945 and 1948 (Figure 10). However, the gap between predicted cohort effects widens significantly as we move towards young cohorts. If we analyze unadjusted home values, then we find that cohort effect for households, who were born in 1975, is 5.4 times greater than that of households, who were born in 1945. Moreover, we see that the change in cohort effects is significant, but its slope is considerably less steep when we control for quality growth in home values. If we repeat the same exercise with cohort effects estimated using home values, which are adjusted for quality growth, then we calculate that cohort effect for households, who were born in 1975, is approximately 2 times greater than that of households, who were born in 1945. As a result, we discover that young cohorts invest more in housing even after we control for both age effects and quality growth.

These empirical findings are consistent with our earlier observations that young cohorts purchased their homes, when house prices were increasing swiftly due to both housing demand and quality growth. According to HBS home-owners have a higher saving ratio than tenants continuously from 2003 to 2014.

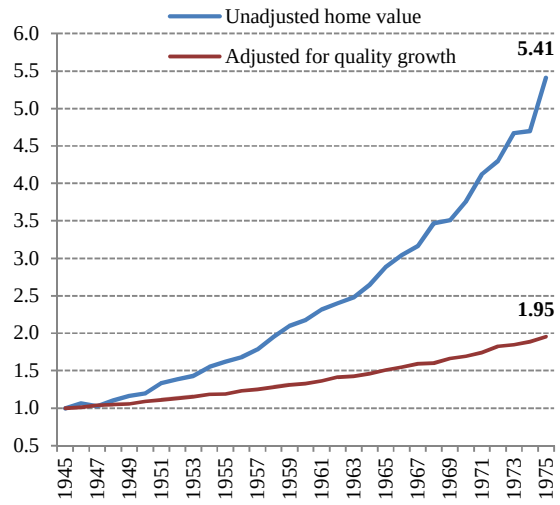
Moreover, households, who have outstanding housing debt, have a significantly higher saving ratio than those that do not have housing debt.[15] House price appreciation, which partly stems from quality growth, is a positive development for young home-owners, since they will benefit from rising house prices in the long-term. At the same time, this process might put pressure on household finances, since young cohorts are more likely to accumulate housing debt with greater amounts.

Figure 9 – Predicted Cohort Effects (*Adjusted for quality, 2003 TL prices*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure 10 – The Size of Cohort Effects (*As a ratio of 1945 value*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

IV.3 – Robustness Checks

We group families into cohorts with respect to the birth year of their household heads. For this reason, the determination of household heads has great importance in our empirical analysis. According to the classification of HBS, a family member who plays a greater role than the rest of the members in at least one issue is selected as the household head. The household head does not have to be the highest

[15] Rent and imputed rent are included in household consumption expenditures of tenants and home-owners, respectively. However, mortgage payments are not accounted in household consumption expenditures and home revaluations are not recorded in HBS.

income earner in the family, but he/she is responsible for managing household income and consumption expenditures. As a robustness check, we select the highest income earner in the family as the household head and separate our sample set into cohorts based on the birth-year of the highest income earner. We perform random effects regression for unadjusted home values following the same approach from the previous sub-section (Table 5).

We observe that cohort effects, which are acquired for both definitions of household head for unadjusted home values are very similar (Figure 11). The gap between predicted cohort effects increases significantly as we move towards young cohorts. If we choose the highest income earners in the family as the household head, then we find that cohort effect for households, who were born in 1975, is 5.5 times larger than that of households, who were born in 1945. This projection is slightly higher than our initial estimate using the definition of household heads from HBS.

Unfortunately, HBS does not provide information about rural and urban households starting from 2014 survey. However, location might be an important characteristic in the determination of home values. As another robustness check, we estimate the Heckman two-step selection model to find the contribution of quality growth on home values including a dummy variable for rural regions from 2003 to 2013. After that we perform random effects regression using home values, which are adjusted for quality growth and rural regions from 2003 to 2013 following the same approach from the previous sub-section (Table 5).

Table 5 – Robustness Checks (1)

	Highest income earner as household head using unadjusted home values		Adjusted for quality growth and rural regions	
	Reg. Coef.	*Std. Error*	*Reg. Coef.*	*Std. Error*
1946	0.072	(0.036)	0.012	(0.011) *
1947	0.043	(0.036) ***	0.036	(0.011)
1948	0.117	(0.037) ***	0.048	(0.011) ***
1949	0.182	(0.038) ***	0.058	(0.011) ***
1950	0.200	(0.038) ***	0.091	(0.012) ***
1951	0.329	(0.039) ***	0.107	(0.012) ***
1952	0.362	(0.040) ***	0.126	(0.012) ***
1953	0.399	(0.041) ***	0.145	(0.013) ***
1954	0.463	(0.042) ***	0.177	(0.013) ***
1955	0.497	(0.043) ***	0.179	(0.013) ***
1956	0.559	(0.044) ***	0.214	(0.014) ***
1957	0.616	(0.046) ***	0.228	(0.014) ***
1958	0.707	(0.047) ***	0.252	(0.014) ***
1959	0.774	(0.048) ***	0.273	(0.015) ***
1960	0.813	(0.049) ***	0.293	(0.015) ***
1961	0.867	(0.050) ***	0.315	(0.016) ***
1962	0.916	(0.051) ***	0.353	(0.016) ***
1963	0.953	(0.053) ***	0.362	(0.016) ***
1964	1.006	(0.054) ***	0.387	(0.017) ***
1965	1.093	(0.055) ***	0.420	(0.017) ***
1966	1.146	(0.056) ***	0.443	(0.018) ***
1967	1.179	(0.058) ***	0.477	(0.018) ***
1968	1.259	(0.059) ***	0.483	(0.018) ***
1969	1.296	(0.060) ***	0.522	(0.019) ***
1970	1.344	(0.062) ***	0.533	(0.019) ***
1971	1.431	(0.063) ***	0.567	(0.020) ***
1972	1.489	(0.065) ***	0.610	(0.020) ***
1973	1.558	(0.066) ***	0.623	(0.021) ***
1974	1.608	(0.067) ***	0.648	(0.021) ***
1975	1.711	(0.069) ***	0.686	(0.021) ***
Constant	9.830	(0.039) ***	6.032	(0.012) ***
R-squared		0.87		0.90
Number of obs.		372		341
Number of cohorts		31		31

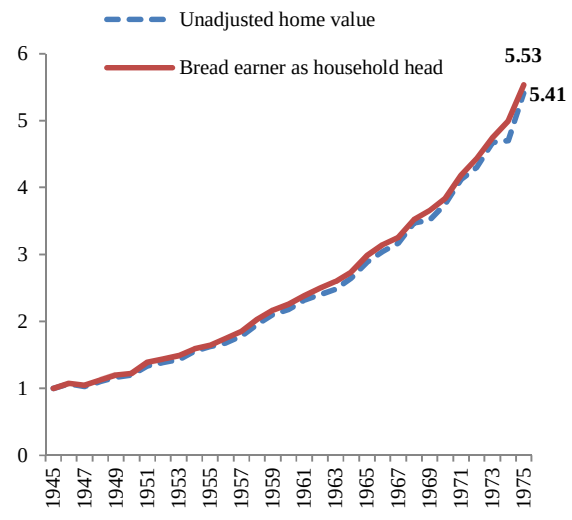
Standard errors are in parentheses.

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

(1) Dummy variables for age and survey years are also included in the regressions.

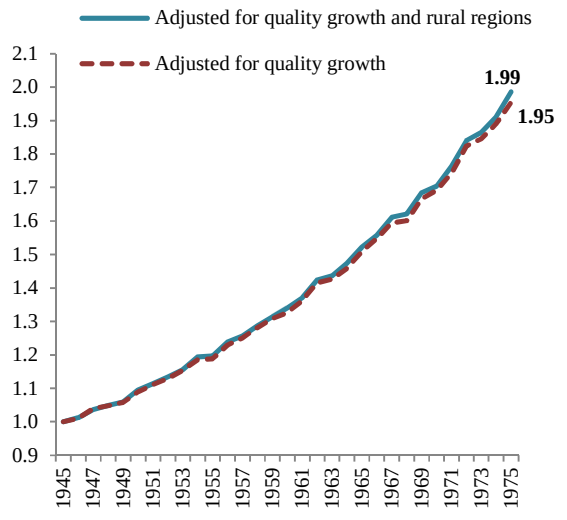
We observe that cohort effects on home values, which are adjusted for quality growth and home values, which are adjusted for both quality growth and rural regions, are very close (Figure 12). The gap between predicted cohort effects rises as we move towards young cohorts, but its slope is considerably less steep, since we control for quality growth in home values as before. If we analyze home values, which are adjusted for both quality growth and rural regions, then we find that cohort effect for households, who were born in 1975, is 1.99 times larger than that of households, who were born in 1945. This projection is marginally higher than our initial estimate for home values, which are adjusted only for quality growth. This empirical observation suggests that living in big cities such as İstanbul, Ankara and İzmir could play a more important role on home values than the difference between rural and urban regions.

Figure 11 – The Size of Cohort Effects (*As a ratio of 1945 value*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure 12 – The Size of Cohort Effects (*As a ratio of 1945 value*)



Source: TURKSTAT Household Budget Surveys, Author's calculations

V. Conclusion

This paper analyses the roles of age and cohort effects on home-ownership and housing wealth in Turkey. We utilize twelve consecutive waves of the Turkish Statistical Institute (TURKSTAT) Household Budget Surveys (HBS) from 2003 to 2014. We construct a pseudo-panel data set using birth-year cohorts in which families are grouped into cohorts with respect to the birth year of the household heads following Deaton (1985). First, we investigate the roles of age and cohort effects on home-ownership, second home investment and having outstanding housing debt. Empirical analysis indicates that young cohorts are less likely to be home-owners, but they are more likely to be in housing debt than old cohorts. However, they are willing to invest in second homes as much as old cohorts. Our empirical findings are consistent with the premises of the Life-Cycle Theory of Saving. Young households are less likely to own their homes, but they are more likely to have housing debt than old households. Moreover, young households are less likely to have a second home.

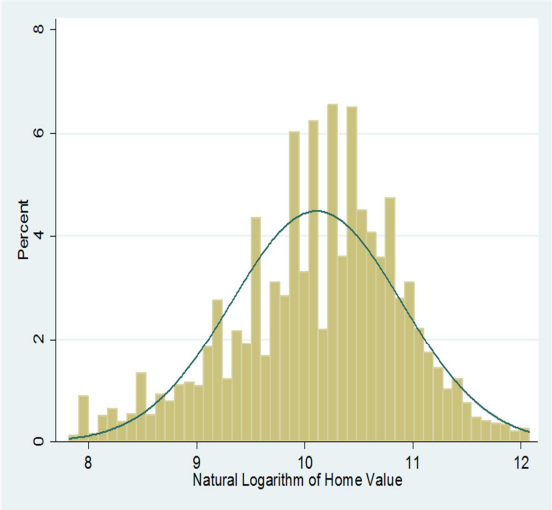
Second, we analyze the roles of age and cohort effects on home values. We observe that although young cohorts are less likely to be home-owners, they own more expensive houses than old cohorts. New houses are more expensive, since their production quality is higher. We need to control for quality growth in the housing market in order to be able to estimate age and cohort effects on home values accurately. Therefore, we estimate a Heckman two-step selection model to separate the contribution of quality growth on home values, while the selection criterion is home-ownership. Econometric results show clearly that quality growth is one of the main reasons behind house price appreciation. We find that cohort effects on home values are significantly larger for young cohorts even after controlling for age effects and quality growth.

Appendix

Table A1 – Cohort Cell Sizes

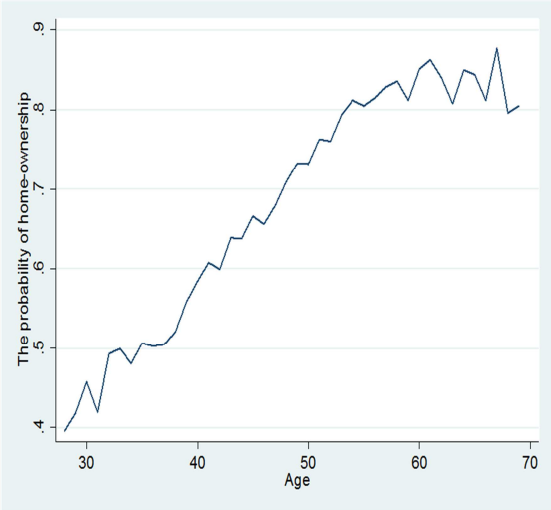
	2003	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*Average*	*Home-ownership (%)*
1945	310	92	156	70	122	92	119	116	93	106	105	72	121.1	87.9%
1946	292	126	77	166	97	110	100	79	126	79	75	81	117.3	86.0%
1947	363	79	96	68	156	66	87	89	99	136	91	103	119.4	84.6%
1948	483	105	101	107	67	138	102	105	105	112	133	81	136.6	84.4%
1949	365	168	125	89	98	97	171	110	108	98	100	160	140.8	83.4%
1950	533	175	187	143	150	139	125	175	119	133	131	140	179.2	84.1%
1951	494	138	127	169	116	118	131	114	137	107	138	93	156.8	83.4%
1952	342	166	129	142	176	102	130	122	100	165	102	101	148.1	82.8%
1953	571	106	146	137	165	153	139	140	104	109	153	106	169.1	81.5%
1954	390	227	104	150	164	133	189	124	115	155	122	164	169.8	79.6%
1955	505	168	233	152	166	153	146	188	160	142	153	139	192.1	80.5%
1956	508	169	145	212	139	156	165	179	211	169	164	178	199.6	78.4%
1957	353	141	155	133	203	122	129	111	131	168	138	137	160.1	75.6%
1958	566	124	130	142	133	144	109	142	145	140	150	144	172.4	74.3%
1959	352	208	143	149	140	141	171	140	129	133	124	149	164.9	73.6%
1960	592	174	229	165	197	163	168	205	168	169	144	160	211.2	72.7%
1961	503	140	134	206	153	164	163	141	181	139	174	156	187.8	69.7%
1962	414	149	157	151	166	121	134	155	137	167	142	139	169.3	69.8%
1963	646	137	145	158	124	140	153	156	142	133	153	127	184.5	65.9%
1964	414	208	129	154	139	140	170	159	159	126	150	196	178.7	66.7%
1965	480	142	182	149	174	145	163	214	147	152	178	160	190.5	63.8%
1966	389	140	139	187	101	139	158	143	156	138	170	160	168.3	62.1%
1967	342	115	121	102	178	100	135	105	143	140	122	131	144.5	61.4%
1968	418	144	113	112	108	142	123	139	109	89	156	135	149.0	59.4%
1969	295	144	86	90	131	109	125	110	140	149	138	164	140.1	55.0%
1970	319	103	133	117	117	127	134	125	127	132	160	116	142.5	53.7%
1971	315	83	85	153	124	118	114	131	171	119	138	120	139.3	51.1%
1972	206	90	94	103	110	125	103	103	110	120	129	141	119.5	48.8%
1973	294	68	87	94	111	115	79	105	123	111	161	120	122.3	47.6%
1974	191	96	45	83	103	81	105	110	103	114	121	132	107.0	43.4%
1975	159	61	94	73	88	84	75	110	103	88	118	105	96.5	42.9%
Average	400.1	135.0	129.9	133.1	136.0	125.1	132.7	133.7	132.3	130.3	136.5	132.6	**154.8**	**67.3%**

Figure A1 – The Distribution of Housing Wealth
(*2003 TL prices*)



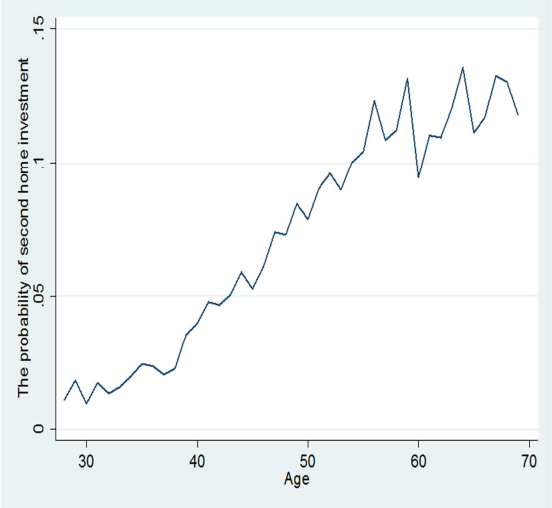
Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure A2 – The Probability of Home-ownership



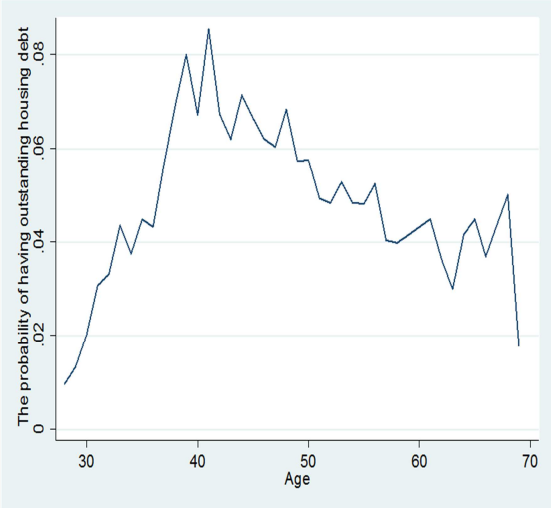
Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure A3 – The Probability of Second Home-Investment



Source: TURKSTAT Household Budget Surveys, Author's calculations

Figure A4 – The Probability of Having Outstanding Housing Debt



Source: TURKSTAT Household Budget Surveys, Author's calculations

References

Alik-Lagrange, Arthur and Tobias Schmidt (2015), "The Pattern of Home Ownership across Cohorts and its Impact on the Net Wealth Distribution: Empirical Evidence from Germany and the US", Deutsche Bundesbank Discussion Paper No 11/2015.

Angelini, Viola; Agar Brugiavini and Guglielmo Weber (2014), "The dynamics of homeownership among the 50+ in Europe", *Journal of Population Economics*, vol. 27, no: 3, pp. 797-823.

Arslan, Yavuz; Evren Ceritoğlu and Birol Kanık (2014), "The Effects of Demographic Changes on the Long Term Housing Demand in Turkey (*in Turkish*)", *Central Bank Review*, vol. 14, pp.13-29.

Banks, James, Richard Blundell and Agar Brugiavini (2001) "Risk Pooling, Precautionary Saving and Consumption Growth", *Review of Economic Studies*, vol. 68, no: 4, pp. 757-779.

Browning, Martin; Angus Deaton and Margaret Irish (1985), "A Profitable Approach to Labor Supply and Commodity Demands over the Life-Cycle", *Econometrica*, vol. 53, no: 3, pp. 503-544.

Ceritoğlu, Evren and Okan Eren (2014), "The Effects of Demographic and Social Changes on Household Savings in Turkey", *Central Bank Review*, vol. 14, pp. 15-33.

Chamon, Marcos D. and Eswar S. Prasad (2010), "Why Are Saving Rates of Urban Households in China Rising?", *American Economic Journal: Macroeconomics*, vol. 2, no: 1, pp. 93-130.

Chiuri, Maria Concetta and Tullio Jappelli (2003), "Financial Market Imperfections and Home Ownership: A Comparative Study", *European Economic Review*, vol. 47, pp. 857-875.

- (2010), "Do the Elderly Reduce Housing Equity? An International Comparison", *Journal of Population Economics*, vol. 23, pp. 643-663.

Cilasun, Seyit Mümin and Murat Güray Kırdar (2013), "Household Structure and Household Income and its Components over the Life-Cycle in Turkey", *İktisat İşletme and Finans*, vol. 28, pp. 89-116.

Deaton, Angus (1985), "Panel Data from Time Series of Cross-Sections", *Journal of Econometrics*, vol. 30, pp. 109-126.

- (1997), "The Analysis of Household Surveys: A Micro-econometric Approach to Development Policy", Baltimore, John Hopkins University Press for the World Bank.

Deaton, Angus and Christina Paxson (2000), "Growth and Saving among Individuals and Households", *The Review of Economics and Statistics*, vol. 82, no: 2, pp. 212-225.

Demery, David and Nigel W. Duck (2006a), "Savings–Age Profiles in the UK", *Journal of Population Economics*, vol. 19, pp. 521-541.

- (2006b), "Demographic Change and the UK Savings Rate", *Applied Economics*, vol. 38, pp. 119-136.

Forrest, Ray and James Lee (2004), "Cohort Effects, Differential Accumulation and Hong Kong's Volatile Housing Market", *Urban Studies*, vol. 41, no: 11, pp. 2181-2196.

Hülagü, Timur, Erdi Kızılkaya, Ali Gencay Özbekler and Pınar Tunar (2016), "A Hedonic House Price Index for Turkey", CBRT WP No: 1603.

Mankiw, N. Gregory and David N. Weil (1989), "The Baby Boom, the Baby Bust, and the Housing Market", *Regional Science and Urban Economics*, vol. 19, no: 2, pp. 235-258.

Modigliani, Franco, (1986), "Life Cycle, Individual Thrift, and the Wealth of Nations", *American Economic Review*, vol.76, no: 3, pp. 297-313.

Lindh, Thomas and Bo Malmberg (2008), "Demography and Housing Demand – What Can We Learn From Residential Construction Data?", *Journal of Population Economics*, vol. 21, pp. 521-539.

Tunç, Cengiz and Abdullah Yavaş (2015), "Not All Credit is Created Equal: Mortgage vs Non-Mortgage Debt and Private Saving Rate in Turkey", CBRT WP No: 1524.

Turkish Statistical Institute (TURKSTAT), Household Budget Surveys (HBS), 2003 – 2014.

Verbeek, Marno (2008), "Pseudo-Panels and Repeated Cross-Sections", Chapter 11 in The Econometrics of Panel Data, László Mátyás and Patrick Sevestre (Eds.), 3rd ed., Springer-Verlag, Berlin Heidelberg.

Verbeek, Marno and Theo Nijman (1992), "Can Cohort Data be Treated as Genuine Panel Data?", *Empirical Economics*, vol. 17, pp. 9-23.

Central Bank of the Republic of Turkey

Recent Working Papers

The complete list of Working Paper series can be found at Bank's website

(http://www.tcmb.gov.tr)

The Impact of Syrian Refugees on Natives' Labor Market Outcomes in Turkey: Evidence from a Quasi-Experimental Design
(Evren Ceritoğlu, Hatice Burcu Gürcihan-Yüncüler, Huzeyfe Torun, Semih Tümen Working Paper No. 17/05, February 2017)

Rebalancing Turkey's Growth by Improving Resource Allocation and Productivity in Manufacturing
(Aslıhan Atabek, Dan Andrews, Rauf Gönenç Working Paper No. 17/04, February 2017)

Mean-Reversion in Unprocessed Food Prices
(Kurmaş Akdoğan Working Paper No. 17/03, February 2017)

Rise of Services and Female Employment: Strength of the Relationship
(Şerife Genç İleri, Gönül Şengül Working Paper No. 17/02, February 2017)

Self-Insurance and Consumption Risk-Sharing between Birth-Year Cohorts in Turkey
(Evren Ceritoğlu Working Paper No. 17/01, January 2017)

Welfare Gains from Reducing the Implementation Delays in Public Investment
(H. Murat Özbilgin Working Paper No. 16/28, December 2016)

Estimating Light-Vehicle Sales in Turkey
(Ufuk Demiroğlu, Çağlar Yüncüler Working Paper No. 16/27, December 2016)

Childcare Prices and Maternal Employment: A Meta-Analysis
(Yusuf Emre Akgündüz, Janneke Plantenga Working Paper No. 16/26, December 2016)

Real Wages and the Business Cycle in Turkey
(Altan Aldan, H. Burcu Gürcihan Yüncüler Working Paper No. 16/25, November 2016)

Exports, Real Exchange Rates and External Exposures: Empirical Evidence From Turkish Manufacturing Firms
(Nazlı Toraganlı, Cihan Yalçın Working Paper No. 16/24, November 2016)

Entrepreneurship in the Shadows: Wealth Constraints and Government Policy
(Semih Tümen Working Paper No. 16/23, November 2016)

Ex-Ante Labor Market Effects of Compulsory Military Service
(Huzeyfe Torun Working Paper No. 16/22 November 2016)

Co-movement of Exchange Rates with Interest Rate Differential, Risk Premium and FED Policy in "Fragile Economies"
(M. Utku Özmen, Erdal Yılmaz Working Paper No. 16/21 September 2016)

Job Security and Housing Credits
(Kurmaş Akdoğan, Ayşe Tatar, Ayşe Arzu Yavuz Working Paper No. 16/20 September 2016)

Cyclical Variation of Fiscal Multiplier in Turkey
(Cem Çebi, K. Azim Özdemir Working Paper No. 16/19 September 2016)

Unemployment Hysteresis and Structural Change in Europe
(Kurmaş Akdoğan Working Paper No. 16/18 August 2016)

Asymmetric Government Expenditure: A Comparison of Advanced and Developing Countries
(Ali Aşkın Çulha Working Paper No. 16/17 August 2016)

Firmaların Sabit Sermaye Yatırım Kararlarının Analizi: Türkiye İmalat Sanayine Dair Bulgular
(Evren Erdoğan Coşar Çalışma Tebliği No. 16/16 Temmuz 2016)

Cross-Border Capital Flows in Emerging Markets: Demand-Pull or Supply-Push?
(Kurmaş Akdoğan, Neslihan Kaya Ekşi, Ozan Ekşi Working Paper No. 16/15 June 2016)