

T.C.
MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İKTİSAT ANABİLİM DALI
İKTİSAT (İNG.) BİLİM DALI

**THE IMPACT OF HOUSING WEALTH ON CONSUMPTION IN
TURKEY: A PANEL DATA ANALYSIS FOR 2004-2013 PERIOD**

PhD Thesis

ENGİN DURAN

İSTANBUL, 2016

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Danışman: PROF.DR.NESRİN SUNGUR ÇAKMAK

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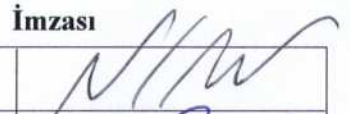
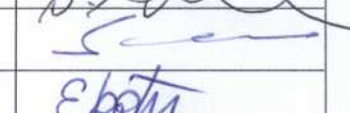
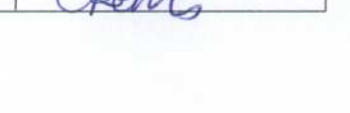
TEZ ONAY BELGESİ

İKTİSAT (İNGİLİZCE) Anabilim Dalı İKTİSAT (İNGİLİZCE) Bilim Dalı
DOKTORA öğrencisi ENGİN DURAN'ınn THE IMPACT OF HOUSING WEALTH ON
CONSUMPTION IN TURKEY: A PANEL DATA ANALYSIS FOR 2004 - 2013 PERIOD
adlı tez çalışması, Enstitümüz Yönetim Kurulunun 15.06.2016 tarih ve 2016-21/24 sayılı
kararıyla oluşturulan jüri tarafından oy birliği / oy çokluğu ile Doktora Tezi olarak kabul edilmiştir.

Tez Savunma Tarihi 25/11/2016

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Tez Türü ve Tarihi	: Doktora - 2016
Anahtar Kelimeler	: Tüketim, Refah Etkisi, Konut Refahı, Finansallaşma

ÖZET

TÜRKİYE’DE KONUT REFAHININ TÜKETİM ÜZERİNDEKİ ETKİSİ: 2004-2013 DÖNEMİ İÇİN PANEL DATA ANALİZİ

Konut refahındaki değişim ile tüketimdeki değişim arasındaki ilişkiyi inceleyen güncel literatür üç ana başlığa odaklanmaktadır. Bunlardan ilki konut refahının artışının tüketimi teşvik ettiği refah etkisidir. Konut refahının artması ile teminat etkisinin artması ikinci açıklama olarak literatürde yer almaktadır. Son ve üçüncü açıklama ise hem konut refahını hem de tüketimi birlikte etkileyen üçüncü bir faktörün olduğu ve bu değişkenlerin birlikte hareket ettiği ortak faktör açıklamasıdır.

Bu tez çalışmasında refah etkisi ve ortak faktör etkisi yaklaşımları analiz edilerek konut refahı ve tüketim arasındaki ilişki anlaşılmaya çalışılmıştır. TÜİK tarafından düzenlenen Hanehalkı Bütçe Anketi (HBS) mikro verileri kullanılarak 2004 ve 2013 yılları arasında konut refahı ve tüketim arasındaki ilişkinin yönü analiz edilmiştir. Bulunan sonuçlar göstermektedir ki bu zaman diliminde Türkiye’de tüketimin değişimi ile konut refahındaki değişim arasındaki ilişkinin tek açıklayıcısı refah etkisi değildir. Ayrıca, farklı yaş aralıkları ve farklı hanehalkları için farklı sonuçlara erişilmiş ve bu nedenle hanehalklarının karakteristik özelliklerinin refah etkisinin analizinde önemli olduğu sonucuna ulaşılmıştır. Ortak faktör etkisi için yapılan tahminlere göre tüketici kredileri ile yurtiçi kredi hacmi konut refahı ve tüketimdeki değişimi açıklamada anlamlı sonuçlar vermektedir.

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Keywords : Consumption, Wealth Effect, Housing Wealth
Financialization

ABSTRACT

THE IMPACT OF HOUSING WEALTH ON CONSUMPTION IN TURKEY: A PANEL DATA ANALYSIS FOR 2004-2013 PERIOD

The contemporary literature that investigates the positive relation between housing wealth change and consumption change focuses on three main explanations. The first is that increasing housing wealth stimulates consumption through the wealth effect. The second explanation is that by the collateral effect that is a housing wealth rise encourages a comparable rise in the consumption level of households. The third is common factor approaches, which claim that both housing wealth and consumption are influenced by common factors.

We analyzed the wealth effect and common factor approaches to understand the relationship between housing wealth and consumption. The trajectory of the relationship between housing wealth and consumption from 2004 to 2013 was analyzed by using Household Budgetary Survey (HBS) micro data published by TURKSTAT. Our results indicate that wealth effect is not the only driver of the relationship between consumption change and housing wealth change in Turkey for this period. Additionally, we obtained different results for different household sub-groups and with different age boundaries. A household's characteristics and properties are crucial in analyzing and understanding the wealth effect's results. The estimation results for common factor approaches indicate that consumer credit and total domestic credits are statistically significant in explaining the link between housing wealth and consumption level of households.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my Ph.D. supervisor Prof. Dr. Nesrin Sungur akmak for her everlasting help and support throughout the study. Her encouragement gave me confidence to successfully finish my dissertation. I really appreciate her patience on my conflicts regarding the topic selection process.

I would like to thank Prof. Dr. Suut Doęruel for his help and guidance, and Prof. Dr. Fatma Doęruel for taking place in my thesis committee and her useful comments.

I would like to express my gratitude to Prof. Dr. İpek İlkkaracan for her comments and guidance during my thesis monitoring sections.

My sincere thanks go to Pınar Deniz for her invaluable supports since the first day of the graduate school at Marmara University.

My special thanks go to my friends who have lifted my spirit during my study. Anıl Aba, from University of Utah, has contributed to my thesis with his worthful comments.

I should mention TÜBİTAK here, as they have made my life easier with their financial support provided throughout the study. I strongly appreciate their contribution for this study.

I have always felt my family’s blessings on my studies from primary school to PhD study. They have, without any hesitation, motivated me to further my education career. I would like to thank my mother and father with all my heart as they have always been perfect role models for me to be an honest, hardworking and humanist person. My older sister, Esin, helped me a lot with her experience from her PhD study. Şebo, my elder sister, helped me with her advice to be more social during the PhD study. They deserve the warmest thanks.

Lastly, I would like to dedicate my dissertation to people who struggle to advocate justice for the oppressed people of the world.

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ABBREVIATION LIST

ADF	Augmented Dickey-Fuller
BAT	The Banks Association of Turkey
BRSA	Banking Regulation and Supervision Agency
CBRT	Central Bank of the Republic of Turkey
FES	Family Expenditure Survey
FED	Federal Reserve
FMOLS	Fully Modified Ordinary Least Squares
GMM	Generalized Methods of Moments
HBS	Household Budgetary Survey
IMF	International Monetary Fund
IPS	Im, Pesaran and Shin
LLC	Levin-Lin-Chu
LTV	Loan to Value
OECD	Organization for Economic and Co-operation and Development
RPI	Rent Price Index
UK	United Kingdom
US	United States
VECM	Vector Error Correction Model
TL	Turkish Lira

1. INTRODUCTION

In the current decade house prices follow volatile movements in many economies, especially after the global financial crisis which started in the second half of 2007 in the US and spread around the world. The global house price index, compiled by the International Monetary Fund (IMF), presents a downward trend in conjunction with the global financial turmoil. However, despite the onset of the global financial crisis, the Turkish housing market experienced a period of expansion, possibly due to incentives from easing monetary policies in developed economies which provided financial sources for the housing market. The legal regulations for the housing market, especially after 2007, encourage households to buy houses with mortgage payments that last up to 10 years. In comparison to the previous decade, house sales have started to increase, with more than 1 million for each year since 2013. In addition, financial conditions and easing regulatory policies rapidly increased the share of mortgage sales for whole house sales. For instance, in 2010, house sales with mortgage made up 40 percent of the total sales and it has remained close to that number, reaching 35% every year since 2014 (Source: TURKSTAT).

Besides house sales, house prices also have been increasing in the last decade; the house price data that is gathered by Central Bank of the Republic of Turkey (CBRT) after 2010 and published monthly follows an increasing trend, in real values. From 2010 to February 2016, real house prices have increased approximately 30 percent in Turkey and 63 percent in Istanbul. (Source: CBRT)

There is strong evidence that house prices and consumption are synchronized in most economies. Similarly, in Turkey there is a high correlation between consumption per household and housing wealth per household since 2002. The correlation coefficient is 0.77 between 2002 and 2014 (Source: TURKSTAT). Consumption per household data is obtained by dividing the consumption expenditure share of GDP to total household number. Housing wealth per household data is calculated by using TURKSTAT statistics regarding the housing stock variables in Turkey.

The contemporary literature which investigates the positive relationship between housing wealth change and consumption change focuses on three main explanations.

The first is that increasing housing wealth stimulates the consumption through the wealth effect. Wealth effect explanation is based on the idea that unexpected positive changes in household wealth adjust the consumption level of households to a higher level. This approach is explained by the life-cycle hypothesis and permanent income hypothesis, and those explanations are substantiated by numerous studies, discussed in theoretical consideration section of this dissertation. The second explanation is the collateral effect, which says that a rise in housing wealth stimulates the consumption level of households through access to additional and cheaper borrowing opportunity by households. A rise in housing wealth is used as extra collateral to obtain consumption loans for longer maturities with cheaper costs. These rises in housing wealth also provide an opportunity to re-finance the actual loans with more appropriate conditions. The last and the third explanation is the common factor approach, which claims that both housing wealth and consumption are influenced by common factors. Financialization and expectations regarding productivity growth are analyzed in the literature as common factors.

We analyze the wealth effect and common factor approaches to understand the relation between housing wealth and consumption. We estimate expected and unexpected housing wealth change and income change to test the wealth effect. We also test the total explanation power of housing wealth on consumption with cross-section data and panel data analysis. The ratio of consumer loans to housing collateral is quite low compared to other consumer loans with different collaterals. The ratio of consumer loans with housing collateral is approximately one percent in the last decade within the total consumer loans (Source: ISBANK). Therefore, we do not analyze the potential collateral effect of housing due to the low ratio and lack of appropriate data. On the other hand, this ratio displays an increasing trend since 2010. It hovers around one percent while, up from almost zero in the first years of the last decade. This increasing trend will, we hope, be followed and analyzed in future studies. Moreover, we analyze the credit expansion in Turkey in the last decade to understand the positive relation between housing wealth change and consumption change. The common factor explanation reveals that the correlation does not reflect a causal relationship between housing wealth and consumption.

In this dissertation, the trajectory of the relationship between housing wealth and consumption from 2004 to 2013 will be analyzed by using Household Budgetary Survey (HBS) micro data published by TURKSTAT. The HBS enables us to divide the households into sub-groups and analyze them separately, in addition to the whole sample analysis. The sub-groups will be constituted according to income level, second house ownership, the birth year of the household's head and region (urban or rural). The potentially different results for sub-groups within the whole sample provides us a chance to document the effects of the increasing trend in housing wealth on household consumption in Turkey.

The rest of the dissertation is organized as follows: Section 2 summarizes theoretical considerations and relevant literature. We briefly explain the life-cycle and permanent income hypothesis, as they are important concepts in understanding the wealth effect explanation of the relationship between housing wealth and consumption. Moreover, we survey the previous applied literature pertaining to the relation between housing wealth and consumption and divide it into three sub-sections: studies with macro data, studies with micro data, and studies in Turkey. Section 3 presents empirical models in which we test the wealth effect through panel data and cross-section data.

In section 3, we first analyze the positive relation through pseudo-panel data that are ensured according to the properties of households in accordance with life-cycle approaches. The settlement area of households (both rural and urban) and income level of households are used to ensure sub-groups from the total to test the possible wealth effect differences on separate households groups. In the pseudo-panel analysis, we study data from homeowners to test the effect of housing wealth on their consumption level. We estimate the explanation power of housing wealth on household consumption levels with a cross-section estimation in addition to pseudo-panel analysis.

In section 4, we reveal the common factor for the link between housing wealth and consumption. In this section, we test the effect of credit expansion in the last decade on housing wealth and consumption level of households. We include renters in this analysis, though we do not in the analysis of the wealth effect. Consumer credit data is separately tested to understand further the housing wealth and consumption for both homeowners and renters. Lastly, in section 5, we summarize the results of the dissertation.

2. THEORETICAL CONSIDERATION AND LITERATURE REVIEW

2.1 THEORETICAL CONSIDERATION

Consumption expenditure, which constitutes approximately two-thirds of the GDP in most countries, commonly used as an indicator of household welfare. At the same time, housing wealth is the highest wealth component of households in most countries. In Turkey, the average homeownership ratio between 2002 and 2013 was 65%. A higher share of consumption and housing wealth in GDP and household wealth and a relatively high correlation between housing wealth and consumption is significant for economic policy makers. For instance, the former Chairman of the FED (Federal Reserve), Ben Bernanke, emphasized the importance of the relationship between housing wealth and consumption as follows:

...The slowing of the housing market may restrain [...]household spending [...]With homeowners no longer experiencing increases in the equity value of their homes at the rapid pace seen in the past few years... household net worth are likely to provide less of a boost to consumer expenditures than they have in the recent past. (The Testimony of Chairman Ben Bernanke before the U.S. Senate, July 19, 2006)

The impact of housing wealth change on consumption may directly relate to current and planned future housing status of individual households. Sinai and Souleles (2005) state that homeowners who expect to remain in their current house for longer durations hedged against fluctuations in rents and housing wealth. For those who stay in their house for a long time, fluctuations in rents and housing wealth have no effect on the household's real wealth. If homeowners plan to trade down their house, then the wealth effect might be positive and encourage a higher level of consumption. However, if homeowners plan to change their house with a better or larger one in the future, then the wealth effect would be ambiguous. The economic environment that facilitates the increase in the value of their current house would also raise the price of any potential house they may purchase in the future.

On the other hand, for renters wishing to buy a house in the future, an increase in prices might require them to save more to afford the down payment. Moreover, long-term

renters who do not wish to buy a new house may also be worse off if rents move parallel to house prices. Ultimately, the overall wealth effect might be negative for renters as housing wealth increases. Differences in types of households and their preferences may differentiate the effect of housing wealth on consumption for individual households. However, the overall wealth effect might be positive to the aggregate consumption.

In the literature, housing wealth effects are measured in macroeconomic models in two ways: the marginal propensity to consume from housing wealth and the elasticity of consumption with respect to wealth. The marginal propensity to consume is the increase in aggregate consumer spending created by an increase in housing wealth. It is generally expressed as the number of cents spent out of each dollar gained in wealth for cross-sectional studies. The elasticity of wealth with respect to consumption is the percentage change in consumer spending arising from each percentage change in housing wealth.

Three explanations regarding the relationship between housing wealth and consumption come to the forefront in the literature. These are the wealth effect, also referred to as direct effect (Atalay et al., 2013), the collateral effect, and the common factors, sometimes referred to as the indirect effect (Atalay et al., 2013). The wealth effect explanation in the relationship between housing wealth and consumption is based on the life-cycle hypothesis of Modigliani and Brumberg (1954) and permanent income hypothesis of Friedman (1957). The second one, collateral effect, is based on the liquidity constrained hypothesis (Aoki et al, 2004, Iacoviello, 2004, Campbell and Cocco, 2007, Aran and Muellbauer, 2007, Leth-Peterson, 2010). The last explanation is the common factor explanation, which is based on the idea that there may be a third factor which affects housing wealth and consumption in the same direction such as productivity growth, financial liberalization, etc. (Attanasio and Weber, 1994, Attanasio et al., 2009, Pagano, 1990, King, 1990).

2.1.1 Wealth Effect Explanation

The wealth effect explanation regarding the relationship between housing wealth and consumption has been analyzed under two theoretical approaches: the life-cycle hypothesis of Modigliani and Brumberg (1954) and the permanent income hypothesis of Friedman (1957). These theoretical approaches and the increasing trend in housing wealth

led to a considerable rise in the literature regarding the relationship between housing wealth and consumption.

In the simplest form, the life-cycle hypothesis claims that household's life-cycle consumption and saving decisions are adjusted in order to keep the marginal utility of consumption constant throughout their life cycle. According to the life-cycle hypothesis, households have lower income and saving rate when they are young; in the middle age period, both income and saving rate are higher while they go down in the older age period.

Friedman's (1957) permanent income theory stresses that a household's consumption behavior depends on permanent income changes. A simple formulation of permanent income theory divides income into two components, one which is transitory and one which is permanent part. The theory claims that changes in the consumption expenditure results solely from changes in the permanent income of the households.

There are some further differences between the life cycle and permanent income hypotheses, most of which are not discussed in this thesis. The most significant difference between them is the formulation of a time-horizon. The life-cycle hypothesis analyzes the consumption of households in a finite horizon, whereas the permanent income hypothesis analyzes the consumption pattern of households in an infinite horizon. Moreover, the life-cycle hypothesis asserts the relationship between consumption, age and saving decisions of households while the permanent income hypothesis asserts a dynamic pattern for consumption (Cilasun et al. 2009).

The life-cycle hypothesis and the permanent income hypothesis share the assumption that an unexpected increase in wealth will enhance the consumption level of households. This means that an unexpected increase in wealth leads consumption-smoothing households to increase their consumption in the remaining parts of their life. In the literature, the wealth of household is divided mainly into two parts: housing wealth and financial wealth (Dvornak and Kohler, 2007; Sierminska and Takhtamanova, 2007). While financial wealth is not available for each income group in Turkey, housing wealth is available for all income groups. Furthermore, changes in housing wealth are perceived to be more permanent than the highly volatile financial markets. On the other hand, with an

appropriate dataset, the wealth effect can be analyzed by dividing household wealth housing and financial wealth.

2.1.2 Collateral Effect Explanation

The collateral effect explanation is mainly based on the idea of liquidity constraint hypothesis. According to the liquidity constraint hypothesis, consumers are unable to smooth their consumption over the life-cycle due to borrowing constraints. In other words, a consumer's expectations may lead to substitute current consumption for the future consumption maximization of intertemporal utility. However, he may be constrained in his current consumption because he does not have sufficient income and cannot obtain sufficient credit to reach the optimal current consumption level implied by his life-cycle optimization. Numerous empirical studies reject the PIH because current consumption has been tied to current income (Hayashi, 1982; Campbell and Mankiw, 1989; Attanasio and Pavoni, 2011). There are several studies which claim that this excess sensitivity of consumption to current income can be explained by liquidity constraint. Limited access to credit markets prevents consumers, who are experiencing temporary income loss shocks, from borrowing against their expected lifetime incomes. (Flavin and Hamilton, 1985; Hubbard et.al, 1986; Jappelli and Pagano, 1989; Scheinkman and Weiss, 1986; Zeldes, 1989). In addition, Carroll and Samwick (1998) explain the contradiction of PIH with precautionary motives whereas Shea (1995) explains with deviations from rational behavior such as myopia or inertia.

According to the collateral effect approaches, an increase in housing wealth increases the collateral value of a house and allows households to obtain credit on terms that are more favorable to enable consumption smoothing. In the previous literature, households are divided into two, constraint and unconstraint, to analyze the collateral effect of housing on consumption. The first are homeowners whose liquidity is constrained; they are not able to borrow their desired loan quantity because they do not have extra collateral beyond their housing collateral. A rise in house price would relax liquidity constraints for these households, allowing them to approach their desired level of borrowing and spending by using their house as collateral. The second are homeowners who are not currently liquidity constrained but for whom an increase in their house price relaxes their budget

constraints. For these households, an increase in house price can lower the cost of their current debt if they decide to restructure. Therefore, a rise in housing wealth influences unconstrained homeowner's consumption decisions. Nevertheless, the collateral effect is likely more pronounced for households that are liquidity constrained than households that are unconstrained. For instance, Iacoviello (2004) divides the households into two types of groups. The first group has perfect foresight and does not face the collateral constraints while the second group is liquidity constrained. Iacoviello (2004) finds strong evidence of housing wealth effect on consumption when borrowing capacity of indebted households is closely linked with the value of their houses. Overall, the identification of constrained and unconstrained households in analyzing the collateral effect is crucial.

2.1.3 Common Factor Explanation

The common factor hypothesis is the third explanation explored in the literature. According to this hypothesis, economic activities drive both housing wealth and consumption simultaneously. Productivity growth and financial liberalization are mainly analyzed as common factors in the literature. Productivity growth affects wages and expected income, which may affect both housing wealth and consumption in the same direction over the life cycle (King, 1990; Pagano, 1990). Financial liberalization eases the credit conditions which may both support the housing wealth and consumption rise by relaxing borrowing constraints for households. Attanasio and Weber (1994) and Muellbauer et al. (2007) explain that in the 1980s and 1990s UK consumption boomed with financial liberalizations. If the common factor hypothesis is the driver of the relationship between housing wealth and consumption, then it would be concluded that the observed co-movement of housing wealth and consumption does not reflect a causal relationship.

In the remaining part of this section, the main explanations of this relationship are expressed with empirical studies through micro data and studies with macro data. Furthermore, an overview of studies which try to estimate the relationship between housing wealth and consumption through aggregate data for Turkey is given in the third sub-section of this section.

2.2 LITERATURE REVIEW

2.2.1 Studies with Micro Data

The study by Campbell and Cocco (2007) is one of the most cited studies on the causal link between house prices and consumption. The study tries to estimate the response of the household consumption to house prices through the UK Family Expenditure Survey from 1988 to the end of 2000. The data set provides an opportunity to distinguish the sample into several sub-samples according to the birth year of household head, homeownership status and region of residence. Furthermore, movements in the house price and consumption data set are separated into predictable and unpredictable to distinguish wealth effects from collateral effects. Regarding homeownership cohorts (sub-group) results, the effects of house prices on consumption are lower for young homeowners and for renters than for old homeowners. In other words, the effects of house price changes on consumption are lowest for young renters followed by old renters and young homeowners while the highest statistically significant effect is on old homeowners.

The study estimates the impact of both predictable and unpredictable effects of house prices. The results are statistically significant for the equations that include both predictable and unpredictable changes in house prices as an additional explanatory variable. An increase in house prices increases the borrowing capacity of households. However, housing is also an asset that can be used as collateral, hence the positive link between predictable house prices and consumption growth being called the collateral effect. In addition to predictable housing prices, the effect of unpredictable housing price changes is also estimated and similar to predictable housing price results. This statistically significant and positive link is obtained by equations that include unpredictable house price as an explanatory variable in estimating the consumption change.

This result shows the wealth channel in the relationship between housing wealth and consumption. The effects of predictable and unpredictable house prices on consumption are estimated for different sub-groups of households and results are somewhat different respectively. For homeownership cohorts (sub-groups) the effect of predictable house prices on the consumption of young homeowners and old homeowners is statistically in the same direction.

Moreover, the effect of predictable house prices on the consumption of young and old renters is not statistically higher than the effects of house prices on the consumption of old homeowners. In line with the life-cycle theory, the effects of unpredictable house price changes are higher for old homeowners than young homeowners, old renters and young renters.

In conclusion, Campbell and Cocco (2007) estimate the largest house price elasticity of consumption for older homeowners and the smallest elasticity, insignificantly different from zero, for younger renters. The estimated elasticity for the older homeowners group is as large as 1.7 controlling for interest rates, household income, and other demographic variables.

Carroll et al (2011) test the wealth effects on consumption through new methodology that is different from cointegrating methods. Their methodology estimates the short (immediate-next quarter) and medium term (eventual wealth) wealth effects on consumption rather than long-term effects. This approach is a critique again of the cointegration method, which assumes a long-run trend in consumption and wealth that implicitly implies that the saving rate should be stationary.

Carroll (2004) emphasizes that the cointegration regression implies that consumption growth depends only its own lags and the lags of wealth while some variables such as interest rate changes and consumer sentiment are omitted in the analysis that also determines the changes in consumption. Carroll et al (2011) conclude that the immediate (next quarter) MPC from a 1-dollar change in housing wealth is about 2 cents. Guler (2012) tests the impact of housing wealth effect on aggregate consumer spending in Turkey with VECM, a cointegration method, and estimates the same sample data with a model based on Carroll (2004) for aggregate consumption data and housing wealth. Guler (2012) concludes that both the VECM and Carroll's method suggest that permanent changes in housing wealth have considerable effects on aggregate consumption in Turkey after 2001.

The studies of Skinner (1994, 1996) try to estimate how the unexpected wealth increase in the 1970s affected both individual portfolios and aggregate saving behavior in the short-run. Skinner (1994) uses micro data from 1969 to 1986 for the US from Survey of Consumer Finances and Skinner (1996) uses micro data from 1984 and 1989 provided in

the Panel Study of Income Dynamics (PSID). Skinner (1996) estimates that a one dollar increase in housing wealth for younger homeowners reduces saving by 1-2 cents, which is consistent with the life-cycle model.

Skinner (1996) implies that the precautionary saving view of the household can explain the effect of housing wealth on saving/consumption for young households. If housing wealth declines, households hold less insurance against future contingencies and will try to save more in order to increase non-housing wealth for future contingencies during older times (retirement). However, in conclusion, Skinner (1994) states that the empirical results are not clear; studies with aggregate data support the notion that unexpected housing wealth is spent while studies with micro data support the notion that unexpected housing wealth is saved.

An increase in borrowing capacity for households through accumulated wealth is defined as the collateral effect. Homeowners use houses as collateral and an increase in house prices helps households to borrow against their houses on a secured basis rather than borrowing against unsecured basis such as credit cards. Mainly, collateral effect is the opportunity for households to borrow more and cheaply in order to finance desired consumption by using the mortgage equity withdrawal via developed and deeper financial markets and products. Aoki et al (2004) is one of the studies that analyzing the impact of house prices on consumption via the role of house prices as collateral for household borrowing. Their study concludes that a rise in house prices causes the homeowners' net worth and consumption to increase because the external finance premium is decreased, which encourages consumers to borrow more. However, the authors note that the deregulations in UK mortgage market make it easier and cheaper for consumers to borrow against housing collateral in order to finance consumption. In conclusion, a given change in house price is related to higher effects on consumption through borrowing capacity with deregulated financial and mortgage markets.

The study of Iacoviello (2004) estimates the effect of house prices on consumption through a general equilibrium model with the quarterly US data for the period from 1986 to 2002. The study distinguishes households into two—one group is labeled as constrained and the other is labeled as unconstrained, and they have a lower discount rate than other

households. In other words, borrowing ability is a parameter which can be used to separate households as constrained and unconstrained.

Iacoviello (2004) suggests that long-run price elasticity of housing demand for the constrained agents is higher than for the unconstrained households. This conclusion supports the idea of collateral effect in the relation of house prices and consumption. However, the study did not estimate the effect of unexpected house price changes, so this result may reflect the wealth effect as collateral effect. To distinguish the wealth and collateral effect the same estimation should be done with expected and unexpected changes of variables.

Leth-Petersen (2010) investigates the effects of the Danish credit market reform (1992) which gave an opportunity to use housing equity as collateral for consumption loans. The sample from 1987 to 1996 includes the credit market reform, which is unexpected for households. The study suggests that the aggregate impact of credit reform to the total expenditure is 0.3 percent, which is small but presents the positive effect of easing in borrowing constraints of households to consumption of households.

Muellbauer et al. (2007) create a consumption model estimated for UK and South Africa countries, which have substantial credit market liberalization with increasing consumption to income ratios. The study tries to estimate the direct effect of credit liberalization in order to measure the housing wealth and collateral effect better. Aron and Muellbauer claim that credit market liberalization increases the average propensity to consume out of income in both countries, while the marginal propensity to spend out of wealth is higher in South Africa than in UK. This result may show the missing confidence factor that is not controlled by income expectations and uncertainty measures.

Attanasio and Weber (1994) try to explain the consumption boom in the UK in 1980s through cohort analysis with data from the 15 years Family Expenditure Survey (FES). Their study analyzes both old and young households' consumption trends. Muellbauer and Murphy (1990) state that the consumption boom in the UK could be

explained by the housing price increment during 1980s, aided by a financial liberalization process which occurred before the 1980s.

In other words, the study of Muellbauer and Murphy (1990) link the consumption boom in UK to capital gains on real estate, which stemmed from housing price increments in the late 1980s. However, the consumption boom via housing price in the UK after 1980s is based on financial liberalization according to the study of Muellbauer and Murphy (1990), which is criticized by King (1990). King (1990) states that the financial liberalization period started at the beginning of the decade while the aggregate demand grew rapidly for a short period from 1987 to 1988. Moreover, King (1990) claims that increase in the housing prices led to a rise in housing services, which could mitigate the positive effect of a housing price increase. On the one hand, the real estate capital gain from the house price increment may incentivize consumption of non-housing goods and services. On the other hand, a young household could decrease their consumption of non-housing goods and services in order to buy a house in the future.

In other words, prospective buyers have to increase their saving rate for several to accumulate the down payment of their potential house, even if they buy their house with long-year mortgages. Briefly, King (1990) states that the housing price increment mainly to the consumption of non-housing goods and services could be small.

Attanasio and Weber (1994) state that consumption surge after 1982 could be explained by the housing price increment; however, this housing price increment cannot explain the processes after 1986. And also the study of Attanasio and Weber (1994) supports the idea that increases in future income expectation explain the decrease in saving rate or increase in consumption in 1980s, because consumption boom periods in the UK are mainly lead by young households. Additionally, the productivity growth in that period also increased 20 percent (from 1980 to 1987), which is one of main indicators of the perceived permanent income and consumption increase in young households that support the positive effect of productivity growth on consumption by transferring future income to the present.

Furthermore, the study of Attanasio and Weber (1994) discusses one of the main explanations in consumption boom, financial liberalization, and its effects on consumption. It concludes that the increase in financial liabilities of households supports the idea that financial liberalization through easing the credit conditions enhanced the consumption in the UK during 1980s by increasing the ratio of liabilities to personal disposable income from 67 % in 1982 to 108% in 1988. They state that capital gains in real estate cannot explain most of the surge in consumption of young households. Empirical results of the study mainly state that the increase in perceived permanent income is the most plausible explanation of consumption boom in the UK during 1980s.

Similar to the study of Attanasio and Weber (1994), Attanasio et al. (2011) also try to identify the link between house price and consumption. Attanasio et al. (2011) builds a life-cycle model that assumes earnings and house prices as two drivers of consumption. By this model, the study tries to test the relative importance of house price shocks and earning shocks in generating fluctuations in consumption growth. Also the model is used in order to check and quantify the idea of life-cycle model, which estimates higher wealth effects for older households who are most likely to have equity in any housing assets and who have a relatively short time horizon over which to enjoy capital gains from a house price increment. Additionally, the model checks and quantifies the idea that young consumers would be more sensitive to earning improvements, which would give them the chance to enjoy the increased earnings for a longer horizon than older households (Attanasio et al., 2011).

The model in the study of Attanasio et al (2011) reflects that younger households tend to respond more to aggregate income shocks while older households tend to respond more to house price shocks. Moreover, Attanasio et al. (2009) conclude that during the consumption and housing cycles (booms and busts) younger households, who are less likely to own a property, have the largest deviations in consumption. This result is opposite to what would have been expected under the wealth hypothesis that anticipates lower capital gain from house prices for younger households.

2.2.2 Studies with Macro Data

There have been studies which use macro data that analyze the possible causality between housing wealth and household consumption for advanced and emerging or newly industrialized economies. Some of the main macro data studies are listed as follows: Case et al. (2005), Ludwig and Slok, (2004), Lettau and Ludvigson (2004), Carroll et al. (2004), Dvornak and Kohler (2003), Catta et al. (2004), Byrne and Davis (2003), De Virman and Duston (2008), Tan and Voss (2003), Fisher and Voss (2004), Slacalek (2009).

Case et al. (2005) examines the link between increases in housing wealth, financial wealth and consumer spending. The study provides empirical evidence on the issue with a panel of annual observations on 14 developed economies by using aggregate consumption, the capitalization of stock market wealth, and aggregate housing wealth from 1975 to 1999. Moreover, an analogous panel of quarterly data on American states from 1982 through 1999 estimating consumption, stock ownership and aggregate housing wealth is used. The study examined the wealth effect with two panels of cross-sectional time-series data with a number of different econometric specifications. The numerical results vary somewhat with different econometric specifications. For instance, according to the results of the model via the least squares method, a ten percent increase in housing wealth leads to a 1.1 percent increase in consumption for the aggregate data, while the increase in financial wealth has no effect on consumption. Additionally, for the panel of American states in the same model, a ten percent increase in housing and financial wealth lead to a 0.4 percent increase in consumption.

In addition to the least square model, the estimation with error correction model also produces similar results, which show a higher and more significant effect for housing wealth than financial wealth. As a result, different econometric specifications present the common result that housing wealth effect on consumption is statistically significant and housing wealth effect is larger than financial wealth in both panels of data.

Ludwig and Slok (2004) analyze the relationship between stock prices, house prices and consumption using a panel of quarterly data from 1960 through 2000 for 16 Organization for Economic and Co-operation and Development (OECD) economies. The

authors of the study distinguish financial systems into two—bank-based financial system and market-based financial system—to separate the role of the financial system through the transmission of changes in asset prices to changes in consumption. The market-based financial system, prevalent in Anglo-Saxon countries (e.g. US, UK, and Canada), is characterized by larger stock markets and higher degree of stock market capitalization, as opposed to bank-based financial system in continental Europe (e.g. Germany, France, and Spain). The study has data limitations that make its results questionable, such as using stock market prices and housing prices as a proxy for the wealth components and using a single equation technique. According to the tentative results, (“tentative” being emphasized by authors), there is a long-run relationship between stock market prices and consumption, as the elasticity of consumption spending to changes in stock prices is larger for economies with market-based financial systems than economies with bank-based financial systems.

Lettau and Ludvigson (2004) focus on the total wealth effect on consumption with quarterly US data from the fourth quarter of 1951 to the first quarter of 2003. The study is crucial in distinguishing the permanent and transitory components in total wealth. The results of the study suggest that up to 88 percent of the post-war variation in household net worth is generated by transitory innovations, primarily related to fluctuations in the stock market component of wealth. In addition, transitory shocks dominated post-war variations, while in wealth variation in aggregate consumption is dominated by permanent shocks. Consequently, permanent changes in wealth do affect consumer spending, however, most changes in wealth are transitory and are uncorrelated with consumption.

Dvornak and Kohler (2003) analyze the wealth effects on consumption change in Australia from 1984 to 2001 with quarterly data. The study estimates a permanent increase in household stock market wealth of one dollar increases the consumption by 6 to 9 cents in the long run, while a permanent increase in housing wealth of one dollar increases the long-run consumption by 3 cents.

Catte et al. (2004) analyze the linkages between housing markets and business cycles in OECD economies. The study estimates that there are two groups in the sample and the effect of wealth on consumption is different for them. One group, consisting of Australia, Canada, the Netherlands, the United Kingdom and the United States, has changes

in housing wealth which have a significant effect on consumption, is higher than financial wealth effect. However, the other group, consisting of France, Germany, Italy, Japan and Spain, has a smaller housing wealth effect. Also, in some cases there have been insignificant results that housing wealth does not help explain changes in consumption. The authors explain that this difference in OECD economies is due to the presence of deeper financial markets in some countries, which provides easy access to mortgage financing and financial products. In addition, a higher rate of owner-occupation implies a wider distribution of housing wealth.

Byrne and Davis (2003) estimate the effects of liquid and illiquid assets on consumption change for G7 economies (the US, the UK, France, Germany, Canada, Italy and Japan) from 1972 to 1998. The study does not test the housing wealth effect separately; however, they find that illiquid financial wealth (e.g. securities, pensions and mortgage debts) is larger than liquid financial wealth effect. The US and Canada have higher MPCs than EU economies; in addition, Japan is an exception in that the MPC from illiquid wealth is indicated to be higher than that from total wealth.

Tan and Voss (2003) estimate the wealth effects on non-durable consumption change for Australia from 1988 to 1999 with quarterly data. The study finds a long-run relationship between non-durables consumption, labor income and aggregate household wealth. According to the result of the study, the marginal propensity of non-durables consumption of wealth is 0.04 cents for every one dollar. In addition, both changes in financial assets and non-financial assets have significant effects on the consumption of non-durables.

Fisher and Voss (2004) estimate the wealth effects on consumption change for Australia and investigate the effects of permanent and transitory fluctuations in household wealth on household consumption in the framework of Lettau and Ludvigson (2004). The study extended the model by separating the wealth into financial wealth and non-financial wealth. The study exhibits that most of the fluctuations in Australian households arise from household (non-financial) wealth. The main result of the study is that the effect of transitory variations in both total and non-financial wealth has little effect on household consumption, analogous to the study of Lettau and Ludvigson (2004).

Slacalek (2009) estimates the wealth effects on consumption change for 16 developed economies, which are listed as a group of market-based, complete mortgage markets, Anglo-Saxon and Euro Area. The study obtained similar results to Byrne and Davis (2003) regarding the effects of institutional differences and market structures on the effects of wealth to the consumption.

According to the estimation of the study, the MPC out of total, financial and housing wealth was restricted across all countries to between 1 and 3 cents. Moreover, there are large, statistically significant differences in MPCs between countries. The MPC in Anglo-Saxon economies (Austria, Canada, the UK, the US, Ireland) is 6 cents. The MPC in complete mortgage markets (Australia, Canada, the UK, the US, Denmark, the Netherlands and Sweden) and market based economies (Australia, Canada, Japan, the UK, the US, Ireland, the Netherlands and Sweden) is averaged at 4 cents. For bank-based economies, countries with incomplete mortgage markets, non-Anglo-Saxon economies and members of the euro area, the MPC is small and restricted to between 0-2 cents.

The literature that analyzes the effect of wealth on consumption change is not extensive for developing economies. The increasing trend of deregulation of financial systems and changes in property prices in developing economies is creating opportunities for new studies; however, there are some earlier studies which analyze the wealth effect in developing economies. Phang (2004) analyzes the wealth effect on consumption change through house price data as a proxy for housing wealth in Singapore. The study tests whether the housing prices and aggregate consumption move together. The sample of the study consists of data from 1981 to 2000 and the results of the study imply that there is not a statistically significant positive relation between housing wealth and consumption. The study explains that the results are contrary to those from developed economies due to institutional factors which do not easily enable credits or new monetary source to the households. Moreover, the study of Edelstein and Lum (2004), which included the public sector housing wealth in the analysis in Singapore, also finds no significant relation between housing wealth and aggregate consumption.

De Virman and Duston (2008) estimate the wealth effects on consumption change for New Zealand from 1982 to 2006 with quarterly data. The study tests the long-run

relationship and short-run dynamics between consumption, income and wealth in the framework of Campbell and Mankiw (1989) and Lettau and Ludvigson (2001). The results of the study suggest that there is a long-run cointegration relation between household consumption, income, housing wealth and net financial wealth. However, the net effect of financial wealth is larger than housing wealth effect, contrary to the study of Lettau and Ludvigson (2004).

2.2.3 Literature for Turkey

The literature about the relationship between wealth and the change of consumption in Turkey is gradually increasing. The literature has been mainly shaped and furthered by deriving housing wealth data and using sophisticated econometric techniques. There have been surging trend in studies related the relationship of wealth and consumption in the last decade. Akkoyunlu (2002) analyzes the consumption function of Turkey from 1962 to 1994 through annual data. The study calculates the housing wealth by using the initial value of the housing price index, determined by the ratio of initial nominal private housing investment and initial real private investment. The study assumes that housing price change is calculated by adding 2-5 percent per annum growth rate over the change in prices of general goods. It also assumes that the depreciation rate is the inverse of the average life of a house and the study used a range of years from 100 to 30 in order to calculate the average life of a house.

Akkoyunlu (2002) found a significant wealth effect on consumption expenditure in Turkey for the period of the study and found a larger wealth effect for financial wealth on consumption expenditure by using the M2/GNP ratio as a proxy for financial wealth. Despite the significant results of the study, the assumptions about measuring wealth actually decrease its power of explanation of the effect of wealth on consumption. The assumption about the house price index does not capture the fluctuation on inflation during the entire period and the assumption about the depreciation rate is not consistent with the 2000 building census, which presents that approximately 80 percent of the building stock in Turkey was below 30 years of age.

Aydede (2008) analyzes the effect of public social security on aggregate consumption in Turkey from 1970 to 2003 through annual data. In contrast to the study of

Akkoyunlu (2002), the study uses rental income from dwellings as a proxy for housing wealth, instead of using total housing wealth, by calculating total dwelling stock. Consequently, Aydede (2008) concludes that housing wealth has positive effect on consumption whereas the financial effect on consumption is negative to the contrary of the model.

The study of Binay and Salman (2008) tries to analyze the extension of observed wealth effect derived from real estate price increase. The study uses the Rent Price Index (RPI), which is published by TURKSTAT as a proxy for housing wealth. The high correlation between house price and rent prices leads the study to use RPI as a proxy for housing wealth. The study captures the period from 1990 to 2005 by using two dummy variables for the 1994 and 2001 financial crises. The study concludes that a one percent increase in real estate wealth would increase total consumption as a percentage disposable income by 0.2 percent.

The study of Ozer and Tang (2009) investigates the financial and housing wealth effects on aggregate private consumption in Turkey from 1987 to 2007. The study differs from Akkoyunlu (2002) and other previous studies by constructing a housing wealth proxy for Turkey. The study first constructs the housing stock series and then constructs the house price series. Finally, it ensures the housing wealth series by multiplying these two series. The annual housing stock data is calculated by dividing total population to the average household size. Using total population in order to calculate housing stock is not a realistic view and decreases the power of explanation of the study. This assumption captures approximately all house stocks in Turkey, however in studies related to housing wealth effect, legal and official house stock is often used because only legal and official houses can be used as collateral in mortgage markets.

The housing price index is calculated by the weighted average of the housing investment deflator and the lagging rental price index. The housing investment deflator is calculated using private sector expenditure on construction of buildings and houses derived from GNP results and the rental price index is obtained from TURKSTAT's CPI dataset. The study concludes that, parallel to the previous studies, the major component of the aggregate private consumption in Turkey is disposable income. In addition, financial

wealth effect has a positive and significant effect on aggregate private consumption with an elasticity of 0.077, which is higher than housing wealth effect, with an elasticity of 0.046. However, the difference between the two is not statistically significant and the lower results of housing wealth could be explained by underdevelopment of housing market in Turkey.

Akin's study (2008) is the first attempt to investigate the effects of stock market, housing and financial wealth on private consumption in Turkey. The study distinguishes itself by using the Vector Error Correction Model (VECM) for quarterly data from 1987 to 2006 and separates consumption into durable goods and non-durable goods, distinct from previous studies. The study develops the calculation of housing wealth data and constructs the housing wealth series using primary data on housing stock and floor-area prices, which were obtained from the 2000 building census and construction and occupancy permits, which were obtained from TURKSTAT.

This study notes the importance of using housing data which are accepted by official authorities and could be used as collateral by households in order to provide extra credits from the financial system in the recent period. Akin (2008) states that the property ownership must be legally documented and the property must possess all the necessary construction and occupancy permits and must meet all technical standards to be eligible for real estate transactions. However, there is a substantial undocumented and unauthorized dwelling stock in Turkey, which is why using total number of households from population census in order to estimate to total housing stock (e.g. Ozer and Tang, 2009) overestimate the housing stock in Turkey which could be used as collateral and allows households to borrow from financial system.

The study calculates the residential floor area costs by using the 2000 building census, which provides the chance to calculate the real price of one square meter at the last quarter of 2000. In addition, to construct the floor area of dwelling stock for each period, residential square meter construction (flow) each quarter is added to the stock of residential floor area, assuming the depreciation is 4 percent for a year. The depreciation assumption is parallel to the findings of 2000 building census in which 80 percent of the dwelling stock is less than 30 years of age and average age of building in the 5 biggest cities is less than 25 years.

The study concludes that housing wealth has a significant positive effect on non-durables consumption, while it has no effect on durable consumption in the long run. On the contrary, stock market wealth has no effect on non-durables consumption, though it has a positive and significant effect on durables consumption in the long run. However, in the short-run, the stock market wealth effect has positive effects on both non-durables and durables consumption, while the housing wealth effect has no effect on non-durables consumption in the short-run. These results are consistent with the widespread house ownership and limited equity ownership in Turkey. Stock market wealth captures a small portion of the household's effects on durable goods consumption, which is also highly affected by business cycles and economic conditions. However, the housing wealth has significant effect on non-durables consumption, which is not related to short-run economic fluctuations and business cycles, contrary to stock market wealth.

Guler's (2012) dissertation investigates the impact of housing wealth on aggregate consumer spending by using VECM with structural breaks through quarterly data from 1991 to 2011. This study contributes to the literature by using a different proxy for housing prices from the previous study of Akin (2008), which uses the VECM differently than earlier studies.

Guler (2012) chooses to use the Rent Price Index (RPI) instead of using residential floor area costs as a proxy for house prices, similar to the study of Akin (2008). The high correlation between rent and house prices encourages Guler (2012) to use the rent price index as a proxy for house prices. According to the study of Binay and Salman (2008), there is a high correlation between rent and price data in Ankara for the period of 2000-2005. In addition, the correlation coefficient between the percentage change of the rent and house price data is 0.89, which is obtained by the international REIDIN consultant and research company. Finally, the study calculates the housing wealth data by multiplying the rent price index, which is used as a proxy for housing price with the housing stock. It is obtained in a similar method to Akin's (2008) study, by using legal new dwelling occupancy permits added to housing stock obtained from the building census.

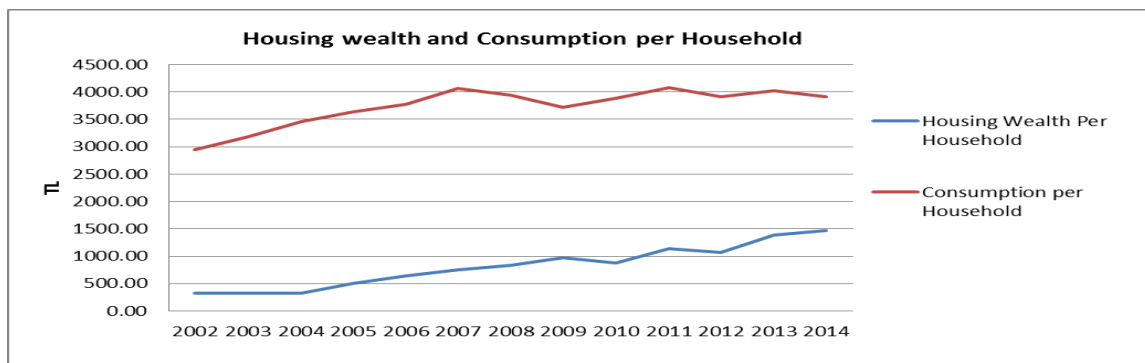
The study concludes that before 2001, disposable income was the major determinant of Turkey's consumption in the long run. However, the income effect started to decrease

after the 2001 crisis and the income elasticity of the consumption ratio decreased from 0.83 to 0.30. Guler (2012) explained this decline in income effect by the increasing trend in consumer credits after the 2001 crisis. The increasing trend in consumer credits makes consumers less sensitive to their income. The housing wealth effect then became significant after the 2001 crisis with the elasticity of 0.28. This result is consistent with the collateral effect of housing in Turkey because, especially in the recent period, mortgage credits are increasing and have continued to increase during the entire period considered in this study. However, the study concludes that financial wealth effect is not significant even after the 2001 crisis. This conclusion was explained by the decreasing trend in interest rates after 2001. Furthermore, this study also uses an alternative econometric technique, which is used in Carroll et al. (2004), to distinguish immediate (next quarter) and eventual wealth effects. The results of this method conclude that one Turkish Lira increase in income leads to 32-kurus (100 kurus=1 Turkish Lira) short run increase in consumption and leads to 47-kurus increase in consumption in the medium term.

3. HOUSING WEALTH EFFECT ANALYSIS

The previous literature builds a consensus that there is a high correlation between housing wealth and consumption. However, there is no consensus on the explanation of the correlation or even the causal link. For Turkey, figures 3.1 and 3.2 present the synchronization between housing wealth and consumption. Both figures display that there is an expressive increasing trend in real terms for both variables from 2002 to 2014.

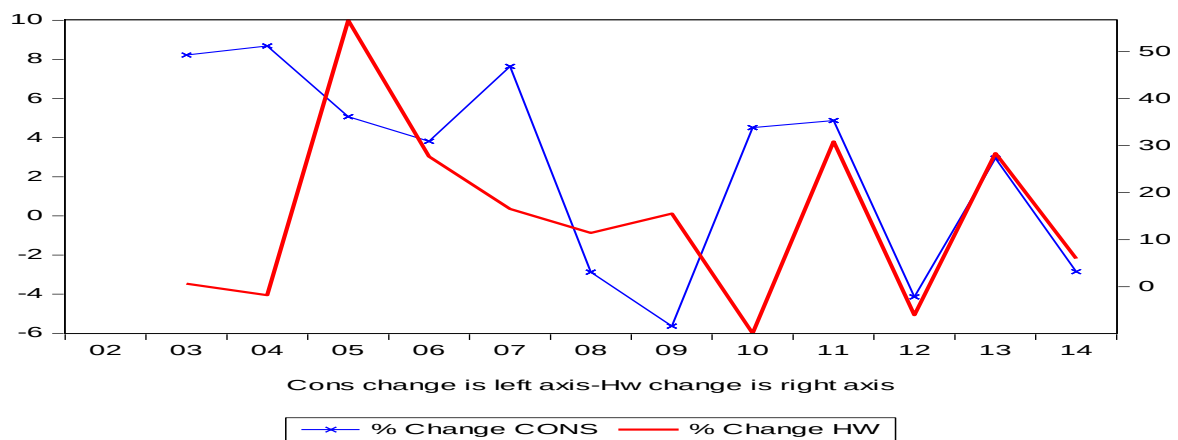
Figure 3.1: Real Housing Wealth and Consumption per Household



Source: TURKSTAT, CBRT

Figure 3.1 shows that real Turkish Lira (TL) value of housing wealth and consumption per household follow similar trend in the last decade. In addition, figure 3.2 displays the high synchronization of both variables' change in the same period.

Figure 3.2: Changes in Housing Wealth and Consumption per Household



Source: TURKSTAT, CBRT

3.1. HOUSING WEALTH EFFECT ANALYSIS WITH PSEUDO-PANEL DATA

In this section, the high correlation for Turkish households is scrutinized using the methodology of Campbell and Cocco (2007) and Browning et al. (2013). We examine the relationship between housing wealth and consumption change. To test this relationship, we create different households divided according to their homeownership, settlement of region, income groups and age of the household's head. Such a separation enables us to understand the possible effects originating from diverse household characteristics. Similar to the previous studies, the prediction of the life-cycle hypothesis and the permanent income hypothesis is tested by distinguishing the wealth into two parts: expected wealth and unexpected wealth. An unexpected rise in wealth allows a consumption smoothing household to increase consumption at all points in his/her life cycle. Under the assumptions of perfect capital markets and no credit market constraints, a change in expected wealth does not affect the consumption level of the households. A household that expects wealth to change tomorrow can borrow or save today in order to smooth his/her consumption path. Therefore, the critical point is the unexpected wealth change and its effects on household consumption change. We use the distinction between expected and unexpected wealth effect to find out the wealth effect on consumption.

Nevertheless, a distinction between expected and unexpected housing wealth change does not allow us to separate the wealth effects from other effects, such as collateral effects and common factors effect. These effects are not mutually exclusive; an unexpected increase in housing wealth may have a positive wealth effect and at the same time relax borrowing constraints, which is labeled as collateral effect. Additionally, precautionary savings may conduce consumption to respond to expected housing wealth changes. (Campbell and Cocco, 2007)

Different sub-groups of households (old households, young households, etc.) provide us the opportunity to evaluate the effects of common factors such as productivity or economic growth on consumption. For instance, the difference between young and old households regarding the effects of housing wealth on consumption highlights the effects of common factors on the relationship between housing wealth and consumption. The

argument behind this proposal is that common factors, such as productivity growth, raise both housing wealth and consumption together. Additionally young households have more time to enjoy this productivity growth. In other words, positive results which favor young households may contain both housing wealth effect and productivity growth effect. Furthermore, if the wealth effect is the main driver of the link between housing wealth and consumption, then housing wealth has the biggest impact on consumption for old households. This is because old households, who are most likely to have more housing assets and who have a relatively shorter time than young households, want to enjoy a housing wealth rise.

Our model does not separate these effects individually. Moreover, this dissertation not only distinguishes the wealth change into expected and unexpected parts, but also attempts to estimate the total wealth effect on consumption. We construct the following four hypotheses to test the effects of housing wealth on consumption.

3.1.1 Hypotheses and Empirical Models

3.1.1.2 Hypotheses

Hypothesis 1: If the housing wealth effect drives the high correlation between consumption-housing wealth, then consumption would only respond to unexpected housing wealth change, but not to expected housing wealth change.

The distinction of households according to the age of household head is crucial to understand the life-cycle pattern response of consumption to housing wealth. Households are defined as young households whose head's age is less than 40 years old, while the head of old households has an age greater than or equal to 40 years old. However, we use 45 years old as a threshold to separate young and old households in the analysis. Most studies in the literature used 40 years old as a boundary between young and old in wealth effect analysis. Campbell and Cocco (2007) also test their analysis with using 45 years old as a boundary and obtained similar results.

There are different approaches and results about the effect of housing wealth change on consumption for young and old households. One argument is that young homeowners are less willing to convert a housing wealth increase for non-housing consumption. Sinai

and Souleles (2005) claim that the increase in house price also triggers the rise in the price of future housing needs, such as durable goods. According to the life-cycle model and permanent income hypothesis framework, an expected and permanent increase in wealth leads to approximately an equal rise in consumption in every future period that households expect to live. In other words, the marginal propensity to consume out of wealth is positively increasing with age. Therefore, old homeowners are expected to react stronger to unexpected housing wealth rise than young homeowners do.

On the other hand, there is another claim that if precautionary saving drives the consumption pattern of households, then consumption responses to unexpected housing wealth rise should be stronger for young homeowners. In short, when households feel less need to save, they might increase their consumption. Moreover, thanks to newly introduced mortgage credits, financial instruments promote people to buy houses by borrowing with long maturity. Thus, people can buy a house with monthly mortgage payments close to monthly rents if they can afford the down payment of the house total sale price. A properly working mortgage market and lower interest rate can lead households to pay lower down payments compared to the economic climate with no mortgage market and higher interest rates. Financial conditions are crucial in determining the down payment borrowing amount. Legal regulations give permission to borrow at most 75 percent of the value of house that people want to buy. The ratio of loan to value (LTV) is essential to figure out the effects of housing wealth on consumption. Financial conditions that make the borrowing cost and maturity cheaper and easier for households enhance the housing wealth effect on consumption.

Muellbauer et al.(2007) states that most studies in the literature do not take into consideration the common drivers both of housing wealth and consumption, such as financial liberalization, income expectations and uncertainties. The credit conditions cause an overestimation of the effect of housing wealth on consumption. In Turkey, only forty percent of houses are purchased with mortgage credits. Legal regulations to mortgage credits were arranged in 2007, and with this development the mortgage credits to GDP ratio started to increase from 1 percent in 2005 to 8 percent in 2015.

To summarize, the increasing trend in mortgage credits leads young households, especially, to save less even before they buy a house. Mortgage credits shorten the period of households that they pay rent and save to buy house in the future. Since mortgage payments are close to rent prices mortgage credits decrease overall saving motivation and households should increase consumption. Thus, higher consumption responses are expected for a housing wealth increase among young households than old. Hence, we construct the following hypothesis testing:

Hypothesis 2: If a reduction of precautionary saving drives the high correlation between consumption-housing wealth, then the response of consumption to housing wealth change would be higher for young households than old.

Young households' stronger response to housing wealth changes should not be explained only by precautionary saving hypothesis. The high correlation between housing wealth and consumption are also explained by common factors in the literature (Attanasio and Weber 1994, Attanasio et al, 2009). King (1990) states that expectations about productivity growth affect wages and expected income over the life-cycle. As become optimistic about the future of the economy, house prices and consumption expenditure increase together. The argument is that if productivity is the driver of the high correlation between housing wealth and consumption, then young households have more years to enjoy the benefit of that productivity increase. This argument puts a limitation on the precautionary saving hypothesis. In the context of this section, the effect of productivity growth is neither tested nor included in the model. Yet, we will test the effects of credit expansion on housing wealth and consumption of household's in the following section. The analysis of housing wealth and the consumption relationship, including productivity growth, and expectations for the future of the economy would be a good topic for future research.

Another important distinction is the settlement of region of households. Though is not crucial to understand or classify the importance of housing wealth effect on consumption change, it is important to see the possible differences among Turkey's different regions. Since there are substantial regional differences in Turkey, an analysis of housing wealth effect on consumption change across regions is crucial.

Unfortunately, HBS does not provide housing wealth and consumption data at a regional level. HBS splits households into two: urban areas and rural areas. As the urban population is increasing faster than rural population, the housing market in urban areas is expanding quite rapidly. Moreover, migration process from rural areas to urban areas is still ongoing in Turkey. This continuing trend in migration increases housing wealth of urban households more than rural households.

However, the difference between urban and rural areas regarding the effect of housing wealth on consumption is highly debatable due to regional differences. HBS distinguishes between urban and rural areas using the population size as the only criteria—20,000 people is the threshold. For instance, HBS data set does not differentiate Istanbul, the largest and the most developed city, from Bayburt, the smallest and the one of the least developed cities. In conclusion, since the distinction of households according to the settlement of region is very debatable we can test the following hypothesis:

Hypothesis 3: If the housing wealth effect drives the high correlation between consumption-housing wealth, then the response of consumption to housing wealth change would be higher for households living in urban areas than households living in rural areas.

The last distinction is the income level of households in the analysis of housing wealth and consumption. In the literature, there are not many studies on this issue. One of the motivations in this section is to test the effect of housing wealth change on consumption change across different income groups. Khalifa et al. (2013) estimates the effect of changes in housing wealth on the consumption behavior of households, which are grouped according to their income level. This study found that the housing wealth effect on poor households is different from rich households. Moreover, Carroll (2000) analyzes this issue with a developing model, which comprises “Capitalist Spirit” via including wealth to the consumer’s utility function directly. Carroll (2000) concludes that the marginal propensity to save for rich households is higher than poor households are. This trend is also observed in our data set HBS from 2004 to 2013. Households that have lower income save less than households that have higher income. Additionally, households in lowest income groups generally have an attitude against saving. Their consumption expenditure is higher than their disposable income. As stated, the heterogeneity of a household’s characteristic,

preferences and abilities may determine their saving and consumption decisions. Therefore, the housing wealth effect may be differentiated within the heterogeneous household groups. In order to overcome this biased effect in analyzing the housing wealth effect on consumption, the data set in this section is divided into different household groups according to properties of households. Income level is the crucial property of household groups that make households more homogenous than overall sample.

3.1.1.3 Empirical Model

In this section, we test the effect of housing wealth change on consumption change with the following empirical model. An empirical model is investigated in which changes in log consumption are regressed on expected and unexpected changes in housing wealth and expected and unexpected changes in disposable income.

$$[3.1] \quad \Delta c_{it} = \pi_0 + \pi_1 E(\Delta y_{it}) + \pi_2 \theta_{it}^y + \pi_3 E(\Delta hw_{it}) + \pi_4 \theta_{it}^{hw} + \mu_{it}$$

c_{it} is log total household consumption expenditure for household i at time t . $E(\Delta y_{it})$ is the household's expected change in disposable income between $t-1$ and t . $\theta_{it}^y = \Delta y_{it} - E(\Delta y_{it})$ is the unexpected income changes in period t , which is the difference between expectations formed at $t-1$ about income changes in period t and the realized income changes in period t . $E(\Delta hw_{it})$ is the household expectation for their housing wealth between $t-1$ and t . $\theta_{it}^{hw} = \Delta hw_{it} - E(\Delta hw_{it})$ is the unexpected housing wealth changes in period t , which is the difference between expectations formed at $t-1$ about housing wealth and the realized housing wealth change in period t . μ_{it} is the independent error term.

3.1.1.3.1 The Housing Wealth Estimation Process

Housing wealth data used in this section is the TL market value of the dwelling where the household lives. For the households who own the dwelling in which they reside, housing wealth is the assessment of the potential sale price of the homeowners.

The housing wealth estimation process provides a chance to distinguish between expected and unexpected housing wealth changes. The separation of housing wealth into expected and unexpected housing wealth changes is based on the methodology of the study

of Browning et al (2013). A household's expectations of their house price are based on information about their house properties. Similar to the study of Browning et al (2013), the size of the house and the number of the rooms are used in order to estimate the housing wealth for each cohort. The following regression is used in order to estimate housing wealth.

$$[3.2] \quad hw_{it} = \alpha hw_{it-1} + \beta x_{it} + v_{it}$$

hw_{it} is the natural log of the average housing wealth in the cohort (for instance; young-homeowner) that household i belongs to, x_{it} is the information set about the average observed characteristics of houses in the cohort where household i belongs to (the average area of houses and the average number of rooms). Yet, the correlation between the average area and the average room number of houses is high. This high correlation may cause biased results in the estimation process of housing wealth. In order to overcome this caveat, the multiplied value of average area and average room number is included to the model. Lastly, v_{it} is the independent error term.

Household expectations of the housing wealth of their cohort is formed as the following: $E(\Delta hw_{it}) = E(hw_{it}) - hw_{i,t-1}$.

In addition, the unexpected housing wealth to the cohort is the following $\hat{\theta}_{it}^{hw} = \Delta hw_{it} - E(\Delta hw_{it}) = hw_{it} - hw_{i,t-1} - (E(hw_{it}) - hw_{i,t-1}) = hw_{it} - E(hw_{it})$ for the household i in time period t .

3.1.1.3.2 The Household Disposable Income Estimation Process

The main regression used in order to estimate the relationship between housing wealth and consumption change contains disposable income variable of households. Similar to the housing wealth process, disposable income is distinguished into two parts, expected and unexpected. The method used in the study of Browning et al. (2013) is adapted to the household's income process estimation in this dissertation.

However, the main purpose of this dissertation is to estimate the relationship between housing wealth change and consumption change. Therefore, a comparably simple

equation is used to estimate the disposable income process for households in the same cohort. Similar to the housing wealth estimation process lagged log value of disposable income with some households characteristics related to income, earning ability is used in estimation of the disposable income. We use the following equation to estimate and distinguish the expected and unexpected income process.

$$[3.3] \quad y_{it} = \lambda y_{it-1} + \rho z_{it} + v_{it}$$

y_{it} is the natural log value of average disposable income in the cohort that households i belongs to, z_{it} is the information set of household head characteristics related to income earning ability (average education level and age). Lastly, v_{it} is the independent error term.

Households expectations to the disposable income of their cohort is formed as the following: $E(\Delta y_{it}) = \hat{y}_{it} - y_{it-1}$. In addition, the unexpected housing wealth to the cohort is the following for the household i in time period t :

$$\hat{\theta}_{it}^y = \Delta y_{it} - E(\Delta y_{it}) = y_{it} - E(y_{it}) = y_{it} - \hat{y}_{it}$$

3.1.2 Methodology

3.1.2.1 Panel Unit Root

Im et al. (2003) tests to examine the existence of unit roots in panels suggesting heterogeneous autoregressive coefficient. The test has the presence of unit root in all individuals in the null hypothesis. In the alternative hypothesis a fraction of the series in the panel are assumed to be stationary. The test is based on averaging t-statistics for each cross sectional unit using Augmented Dickey-Fuller (1981) unit root test.

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{m=1}^M \Delta y_{i,t-m} + \mu_{i,t}$$

where $i = 1, \dots, N$ and $t = 1, \dots, T$

3.1.2.2 Generalized Method of Moments

The Arellano and Bond (1991) dynamic panel GMM technique is suggested to estimate the dynamic model. The technique is based on first differentiating the estimating equation (hence, this technique is referred as difference GMM) to capture the unobserved heterogeneity (fixed effect) and employing the lagged values of the regressor in level form as instrumental variables. The inclusion of instrumental variables eliminates the endogeneity problem; however, weak correlation between current differences of the explanatory variables and the lagged values of the instrumental variables in levels creates an estimation problem in the difference GMM technique. Arellano and Bover (1995) propose a system GMM technique alternative technique to overcome this issue. Roodman (2006, p.104) explains the system GMM as “instead of subtracting the previous observation from the contemporaneous one, it subtracts the average of all future available observations of a variable”. Both techniques—difference GMM and system GMM— are designed for panel data with a small period and large cross section unit.

3.1.3 Construction of the Data Set

The data used in this dissertation are obtained from the Household Budget Surveys (HBS) which comprise surveys between 2004 and 2013. Turkish Statistical Institute (TURKSTAT) organizes the survey. This survey provides valuable information regarding household structures and overviews their socioeconomic status and demographic changes in recent period. This survey is very crucial to understanding the socioeconomic transformation of Turkey as a developing country, especially as many changes occurred in the 2000s.

The HBS collects information from households which live in Turkey. It separates households into rural and urban, with a population level of 20,000 being the criterion. The HBS also contains information about household consumption expenditure, income, and household living conditions. HBS provides us information such as age, sex, occupation, education, number of children, which gives a great opportunity to follow the changes in the sociological structure of family and even to analyze the content and trend of migration from

rural area to urban. Though the HBS is quite extensive, institutionalized population such as persons living in elderly houses, rest homes, correction facilities, military barracks, and hospitals with special characteristics, nurseries, and immigrant population are excluded from the data.

HBS is the contemporary version of household surveys, which was first conducted first in 1987 in order to generate an overview of all of Turkey. This first survey was named the Household Income and Consumption Survey, with information regarding income and consumption for regions, population groups, rural and urban areas. The information was obtained from 2.200 households from urban and rural areas. This first survey was important because results of the survey were used to ensure Consumer Price Index with base year prices in 1987. Similarly, the Household Income and Consumption Expenditure Survey conducted in 1994 was used to determine base year prices and weights of 1994 based Consumer Price Indexes.

In 2002, TURKSTAT decided to conduct small-scale, regular annual Household Income and Consumption Expenditure Surveys. In 2002, the Household Income and Consumption Expenditure Survey was conducted on 800 sample households per month with approximately 650 different households from urban areas and 150 from rural areas. The current name of HBS was firstly used in 2003. The sample size of survey in 2003 was increased to 25,920 households and re-organized in order to comply with NUTS regions. The number of households surveyed was increased by two-folds in order to compass three year combined surveys. However, surveys after 2003 were conducted with approximately 9000 households.

The HBS consist of three types of data sets; individual, household and consumption. The “Individual data set” contains information on variables related to individuals such as age, education, employment and income. The “Household data set” contains information on variables related to socioeconomic conditions of the households and the “consumption data set” contains variables related to the expenditures on goods and services.

In this thesis, we use both individual and household data sets. Total income and information about age and education is obtained from the individual data set. Information about the household heads are obtained from the individual data set and then these data are linked to data obtained from the household data set using the bulten number, which is unique for each household. The household data set provides information regarding the total value of household consumption during the survey month. Total disposable income of household and properties of houses obtained from household data set.

Household level data from the HBS is used in order to estimate the effects of housing wealth change on consumption change from 2004 to 2013. For this decade, housing wealth and consumption per household in Turkey follow similar trend with high correlation. The main purpose is to estimate the direction of the relation between housing wealth and consumption in this period. However, HBS is not a continuous survey of households, which means that each household is interviewed only once. The changes of households do not allow for following the household's life-cycle patterns of housing wealth and consumption. Therefore, the methodology used in Browning et al. (2013) and Deaton (1985) is applied in order to construct panel data from a times series of cross sections which is labeled as a pseudo-panel. In this technique, the average behavior of households included in the same group is followed and used to estimate the effects of housing wealth change on consumption change for those households.

Household groups are defined according to the year of birth of the household head in many studies in order to follow the life-cycle patterns of households (Browning, Deaton and Irish (1985), Campbell and Cocco (2007)). However, in this dissertation, groups of households, which are named as "cohorts" are not only based on the birth year of the household head. The settlement region of households, the homeownership status of households, the household head's age and the disposable income level of households are used to construct cohorts. The settlement region of households is divided into two groups, urban and rural. The homeownership status of households is divided into two, as homeowner and renter. Households are divided into young and old according to household head's age. Household head's age is lower than 40 and 45 is grouped as young households while households head's age is higher than or equal to 40 and 45 is grouped as old

households.¹ The disposable income level of households is divided into five groups. Households are sorted from highest disposable income to lowest income. Then, the total number of households is divided into five.

Cohorts are constructed by intersecting more than one category such as homeownership status, household head's age, etc. Therefore, twenty cohorts are constructed by using these categories in HBS. The number of observation is not same for each cohort because there are different observations for urban and rural regions. Moreover, the homeownership status is not equally distributed in the society between homeowner and renter. The number of homeowner households are higher than number of renter households.

Cohorts which are mainly grouped by homeownership status of households are separated sub-groups according to other categories used in constructing all cohorts such as settlement region, age, etc. Homeownership status is crucial to understand the relationship between housing wealth and consumption change. In addition, households who have one or more house is included to the analysis in this section. In other words, all households in each cohort are homeowner. Renters are excluded from data set to make households homogenous according to homeownership status, as that is the main criterion with which to test the housing wealth effect. On the other hand, renters are included to the analysis in the following section, which try to analyze the effects of credit conditions to housing wealth and consumption.

The relationship between housing wealth change and consumption change of households is estimated with the set of the following cohorts. First, the set of cohorts for homeowners are constructed according to the household head's age for homeowners. These cohorts are young-homeowner and old-homeowner. Second, the set of cohorts for homeowners are constructed according to the settlement region of household, urban-homeowner and rural-homeowner. Finally, the last set of cohorts for homeowners is constructed according to disposable income level of household. These cohorts are listed as following; 1st income group-homeowner, 2nd income group-homeowner, 3rd income group-

¹ Household head's age is equal to 40 is included into old households group. 40 years old is used in the literature as a boundary to separate households as young and old. (For instance; Campbell and Cocco, 2007; Atalay et al., 2014; Gourinchas and Parker, 2002; Gan, 2010)

homeowner, 4th income group-homeowner, 5th income group-homeowner. Each cohorts mean is calculated for each year in the sample to all indicators (housing wealth, disposable income, consumption, etc.).

First, the main cohort is constructed with households, which are grouped according to the household head's age. All data is divided into two as young households and old households (age boundary used in constructed is 40 and 45 years old, separately). These two households contain sub-cohorts, which are constructed according to other categories such as the settlement region of households and disposable income level of households. This sample, constructed according to the household head's age, contains 200 observations with 100 young household and 100 old households.

The second main cohort is constructed with households which are grouped according to settlement, urban and rural. These two household groups contain sub-cohorts, which are constructed according to other categories: disposable income level of households and the household head's age. This sample, constructed according to settlement region of households, contains 200 observations with 100 urban households and rural 100 households.

The third main cohort is constructed with households which are grouped according to disposable income level of households. As explained above, all disposable income data is ranked and divided into five. These five household groups contain sub-cohorts, which are constructed according to other categories such as settlement region of households and the household head's age. This sample, constructed according to disposable income level of households, contains 200 observations with 40 households which are in the 1st disposable income group, 40 households which are in the 2nd disposable income group, 40 households which are 3rd disposable income group, 40 households which are 4th disposable income group and 40 households which are 5th disposable income group. The following table summarizes the number of observations used in the analysis for each cohort with period.

Table 3.1: Pseudo-Panel Observation Numbers

Household Groups	Number Of Sub-groups	Number Of Observations Per Sub-groups	Period
Age-Homeowner	2(*)	100	2004-2013
Region-Homeowner	2(**)	100	2004-2013
Income-Homeowner	5(***)	40	2004-2013

(*) Young and Old Homeowner

(**) Urban and Rural Homeowner

(***) 1st income, 2nd income, 3rd income, 4th income and 5th income groups. (Income1 labels the highest income level.)

In addition to all these cohorts, we combine the first set of cohorts that are constructed according to the household head's age for homeowners. In other words, we use the sample to estimate the effect of housing wealth change on consumption change, which contains young-homeowner and old-homeowner cohorts. The sample contains 200 observations with 100 young households and 100 old households. By this integration, we try to estimate the whole effect in the housing wealth analysis instead of testing the age status of the household head's age in accordance with the previous literature. This sample contains households which live in urban and rural areas with all income groups. Therefore, the results of the estimation display the overall consideration for the housing wealth effect on consumption for Turkey from 2004 to 2013. These results are discussed in the following section after the assessment of the sub-cohort results.

3.1.4 Empirical Results and Discussion

The impetus of the link between housing wealth change and consumption change depends on household characteristics and life-cycle trends. In order to test the hypotheses listed in the previous section, different household group's consumption changes are estimated with equation 3.1. Three main indicators used to separate households as a group are as follows: household head's age, income level and settlement location. The equation 3.1 includes variables that are not obtained from HBS or other surveys. Those are unexpected and expected housing wealth and income change data. Equations 3.2 and 3.3 are used to estimate both expected and unexpected component of housing wealth and income. The estimation results for those equations listed in appendix table A1.1-18 and A2.1-18. Mainly, the results of the equation 3.1 are crucial to test the wealth effect on

consumption change. All household groups' results with an age boundary 40 for equation 3.1 are listed in the following.

Table 3.2: Pseudo-Panel Estimation Results (Age Boundary is 40)

Dependent Variable: Consumption Change	Expected Housing Wealth Change	Unexpected Housing Wealth Change	Expected Income Change	Unexpected Income Change
Young Homeowner	0.416***	0.154***	0.164.	0.337***
Old Homeowner	0.029	0.149	0.655	0.324**
Rural Homeowner	0.186*	0.225*	0.458*	0.361***
Urban Homeowner	0.284***	0.248***	0.076	0.227**
Income 1- Homeowner	0.183	0.228**	0.470***	0.372***
Income 2- Homeowner	-0.096	0.082	0.859	0.899**
Income 3- Homeowner	0.110	-0.110	4.527***	0.649*
Income 4- Homeowner	-0.060.	0.239	1.512	-0.018
Income 5- Homeowner	-0.040	-0.272	0.396	0.165

Note: Significance at the 1%, 5%, and 10% is indicated by ***, **, and *, respectively. Results are tabulated in Appendix A4 in detail.

The equation 3.1 is estimated for the same household's groups with age boundary 45 in order to check the results compare to age boundary 40. This estimation's results are listed in the following.

Table 3.3: Pseudo-Panel Estimation Results (Age Boundary is 45)

Dependent Variable: Consumption Change	Expected Housing Wealth Change	Unexpected Housing Wealth Change	Expected Income Change	Unexpected Income Change
Young Homeowner	0.287*	0.165**	0.508*	0.284***
Old Homeowner	-0.218	0.089	2.202**	0.378***
Rural Homeowner	0.148	0.207**	0.466*	0.389***
Urban Homeowner	0.227***	0.214***	-0.474	0.255**
Income 1- Homeowner	-0.265	0.069	0.508**	0.344**
Income 2- Homeowner	0.139	0.183*	0.414	0.391
Income 3- Homeowner	0.008	-0.062	0.008	1.049***
Income 4- Homeowner	0.142	0.213	-0.745	-0.011
Income 5- Homeowner	0.360	0.094	0.023	-0.022

Note: Significance at the 1%, 5%, and 10% is indicated by ***, **, and *, respectively. Results are tabulated in Appendix A4 in detail.

Estimations indicate analogous results for different age boundary 40 and 45. The effects of expected and unexpected components of housing wealth and income change on consumption change should be assessed separately for main household groups.

The first separation parameter is the age of the household head. This separation accepted as important in the literature to reveal the wealth effect. Details regarding the importance of age separation are discussed in the previous section, in hypotheses 1 and 2. Both estimation results indicate that young-homeowner's consumption change is more

sensitive than old-homeowner's consumption change to housing wealth change, even in expected and unexpected conditions. Expected and unexpected housing wealth changes are not statistically significant to explain the consumption change of old-homeowners for both equations with the different age boundaries. Nevertheless, expected and unexpected housing wealth changes are statistically significant to explain the young-homeowner's consumption change. This result is the contradiction of hypothesis 1, which implies that only unexpected housing wealth change should explain the consumption change of households. This result displays that wealth effect is not the only driver of the link between consumption change and housing wealth change for young-homeowners, even with different age boundary groups.

Furthermore, the statistically significant results for expected and unexpected housing wealth change confirm the idea of the precautionary saving hypothesis, which is emphasized in hypothesis 2. A housing wealth rise encourages young-homeowners to consume more by relaxing their buffer saving inclination toward future uncertainties. In addition, the difference between young and old homeowner's results indicate the common factor explanation for the link between housing wealth and consumption. As stated, young-homeowners have more time to enjoy the positive effects of the common factor for both housing wealth and consumption. The wealth effect should be higher for old households, who may have had more years to accumulate higher wealth than young households. This tendency points to a higher wealth effect for old households than young households. However, the results obtained from equation 3.1 do not verify the importance of housing wealth to explain the consumption change of old homeowners. Overall, the results signal the importance of the common factor and precautionary saving hypothesis, along with wealth effect regarding the link between housing wealth change and consumption change for household groups classified according to the household head's age.

In the estimation of equation 3.1, the second separation parameter is the region of household where they live. Analogous to the results presented above, both expected and unexpected housing wealth changes are statistically significant to explain the consumption changes of the urban- dwelling homeowners group. Results are the same for the different age boundary household groups. These similar results for the different age groups limit the strength of the results of the urban homeowners. Nevertheless, the statistically significant

results in expected and unexpected housing wealth change are contrary to the explanation of wealth effect, which states that housing wealth change is the only link to understand the positive correlation between housing wealth and consumption change. In regards to rural homeowners, the results are approximately similar, but the different age boundaries seems critical to evaluate the results. For the equation with the age boundary of 40, both expected and unexpected housing wealth changes are statistically significant, with a 10% significance level (this level is 1% for urban homeowners). In addition, for the equation with the age boundary of 45, the unexpected housing wealth change is significant while expected housing wealth change did not explain the consumption change significantly. This implies that the wealth effect is the main driver to the link between housing wealth change and consumption change for rural homeowners. However, the sensitive results for age boundary and the different significance level in the statistics weakens the wealth effect findings for rural homeowners. It is not possible to conclude, without any doubt, that the wealth effect is the main driver of the link between housing wealth and consumption for rural areas.

Moreover, both significant results for expected and unexpected housing wealth change signals the importance of the common factor for the link, as the results are similar to the results obtained in young and old homeowners. Furthermore, housing wealth and consumption data for households living in rural areas may contain more measurement errors than other household groups because the construction of survey puts a high responsibility on households to record their consumption expenditure correctly. In addition, housing wealth data is constituted by the household's valuation regarding their house, which can include a higher bias from real value for rural areas, where the house sale volume and transaction is not high as urban areas. Consequently, measurement errors and data obtaining biases may increase the role of housing wealth in the explanation of the link between housing wealth and consumption for household in rural areas.

Income level is the third main separation parameter in analyzing the cause of the link between housing wealth and consumption. For homeowners who are sorted according to their income level, results obtained from equation 3.1 are not statistically significant or consistent enough to conclude that wealth effect is the main driver of the link between housing wealth and consumption change. Unexpected housing wealth is significant for

income1 and income2 households in the different age boundary equations. For income1, the highest income level, unexpected housing wealth is significant, but the results when the age boundary is 40 are not the same when recalculated with an age boundary of 45. Similarly, different results are obtained for the income2 household groups. This deviation regarding the results prevents us from concluding that wealth effect is the one and the only explanation for the positive relation between housing wealth change and consumption change. Nonetheless, for households in income1 with the age boundary of 40 and for income2 with an age boundary of 45, we cannot completely reject the possibility that a housing wealth change statistically explains the consumption change. For income3 homeowners, the results imply that housing wealth is not statistically significant in explaining the consumption change, even for both age boundary household groups. Contrary to the results for income1 and income2 homeowners, housing wealth and income are not statistically significant in explaining the consumption change for income4 and income5 homeowners. This result is surprising, especially the insignificance of income in explaining household's consumption change. The study of Khalifa (2013) also finds different results for the effect of housing wealth on consumption for different income groups, similar to our equation's results. Carroll (2000) concludes, "A variety of evidence, strongly suggests that people at the top end of the wealth and income distributions behave in ways that are substantially different from the behavior of the most of the rest of the population". Those studies' notes are parallel to different results obtained in equation 3.1 for different income level groups.

Nevertheless, for the income level homeowner group's estimation, the data is less than other homeowner groups and it may cause biased results. A longer time period sample will give chance to ensure a data set with more observations. In addition, income level may not be a good parameter to make heterogeneous households more homogenous in order to analyze the wealth effect with the concept of life-cycle hypothesis. Studies in the literature that analyze the wealth effect's role regarding the relation between housing wealth and consumption change mainly use age as a parameter to make households more homogenous to observe the life-cycle trends of households. Overall, surprising results regarding the lower income level groups and the sensitivity of the age boundary in higher income level

group make difficult to conclude that wealth effect is the main driver of the link for households sorted by income level.

Different results for different household groups signal that the housing wealth effect may vary within household groups. These results make difficult to conclude that in the period from 2004 and 2013 for Turkey the wealth effect is the main determinant of the link between housing wealth change and consumption change. Even though the statistically significant results for unexpected housing wealth change for some of the groups, it is not consistent. On the other hand, all of these results do not entitle us to disregard the importance of wealth effect in explaining the consumption change of households. We obtained empirical results that display considerable outcomes for wealth effect on consumption change. By themselves, the results do not verify that wealth effect is the only explanation for the positive link between housing wealth and consumption. In addition, we obtained the results with pseudo-panel data that classify households according to their properties. Therefore, in order to obtain more results and outcomes that are comprehensive regarding the positive link, we have to see the importance of wealth in explaining the consumption change in Turkey for whole households without separating them. Thus, we combine the first main cohorts and try to estimate the whole household groups without excluding any. We estimate the equation 3.1 for the combined sample, which contains 200 observations that compass all household groups. This sample allows us to test the effect of housing wealth change on consumption change for households in Turkey between 2004 and 2013. The following table listed the combined sample results.

Table 3.4: Pseudo-Panel Estimation Results

Dependent Variable: Consumption Change	Expected Housing Wealth Change	Unexpected Housing Wealth Change	Expected Income Change	Unexpected Income Change
Young + Old Homeowner(*)	0.406***	0.155***	0.119	0.331***
Young + Old Homeowner(**)	0.185*	0.126***	0.637***	0.337***

(*) This sample indicates the household group's integration which households head's age boundary is 40 years old.

(**) This sample indicates the household group's integration which households head's age boundary is 45 years old.

Note: Significance at the 1%, 5%, and 10% is indicated by ***, **, and *, respectively.

Results are tabulated in Appendix A5.1 and 5.2 in detail.

The estimation results signal that both expected and unexpected housing wealth changes are statistically significant in the two combined samples. This result is similar to the results of the young-homeowner sample, which indicates the precautionary saving

hypothesis and the common factor. This combined sample strengthens the effect of the precautionary saving and common factor approaches. In addition, this result also signals the importance of housing wealth change on consumption change of homeowners. In the permanent income hypothesis and life-cycle approaches, if the wealth effect is the main driver of the relation between housing wealth change and consumption change, then consumption should respond to only unexpected wealth change. On the one hand, we do not obtain the results that directly verify those approaches. On the other hand, we estimated that both expected and unexpected housing wealth change significantly affect the consumption change. Therefore, these results for young-homeowners and for the combined sample that contains both young and old homeowners indicate the importance of housing wealth on consumption in Turkey for that period. Furthermore, these results display that wealth is not the only driver of the relation between housing wealth and consumption for that period. The common factor has been often tested in the previous literature and we try to reveal the possible effects of common factors for the relationship. In addition, in the following section we test the housing wealth level effect to explain the consumption level of households with cross-section data. We use both the whole sample and sub-samples that are divided according to the age of household heads, age similar to the pseudo-panel data analysis.

3.2. HOUSING WEALTH EFFECT ANALYSIS WITH CROSS-SECTION DATA

In 3.1 the housing wealth effect was tested for different household groups and the results concluded that the wealth effect is significant enough to explain the link between housing wealth and consumption change. In this section, we estimate the consumption level of households with income and housing wealth from 2004 to 2013 with cross-section data.

The study of Gan (2010) also tests the wealth effect through distinguishing households that own multiple houses from those that own only one house. Sinai and Souleles (2003) argue that housing is a hedge against future rental rise. The study claims that the wealth effect should be stronger if a household owns two or more houses, as they could then cash in on the wealth gain of the other house(s) while living in their current house. To clarify this argument, we test the following hypothesis:

Hypothesis 4: If there is a pure wealth effect, the consumption responses to housing wealth change would be stronger among households that own more than one house.

3.2.1 Construction of the Data Set

In this section, homeowners are analyzed from 2004 to 2013 using HBS variables. We attempt to explain the consumption level by examining housing wealth and income level data. All variables are deflated with a GDP deflator and obtained real values. We divide the groups into homeowners who only own one house and are living in that house and homeowners who have more than one house and earn a rental income. The two data sets are surveyed for each year from 2004 to 2013. Consumption, housing wealth, income and rent data are used in the following equations to test the explanatory power of housing wealth and rent in that period. In addition, we analyze the effect of housing wealth, income and rent level on consumption level by dividing homeowners as young and old based with an age boundary of 40. Homeowners who are less than 40 years old are labeled as young and homeowners older than or equal 40 years old labeled as old. The number of homeowners who have only one house is higher than those who have more than one house. The numbers of observations used in the analysis in this section are tabulated in the following table for each homeowner group.

Table 3.5: Number of Observations used in Cross-section Analysis

Whole Sample	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
With one House	5450	5210	5177	5289	4952	5511	5470	5259	5181	5364
With many Houses	622	595	695	613	683	774	793	805	741	789
Young Homeowners	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
With one House	1591	1443	2013	1988	1754	1732	1665	1194	1040	1186
With many Houses	90	74	164	110	147	136	147	94	75	78
Old Homeowners	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
With one House	3859	3767	3164	3301	3198	3779	3805	4065	4141	4178
With many houses	532	521	531	503	536	638	646	711	666	711

3.2.2 Empirical Models

In this section, we analyze cross-section data for each year with the following equations. The consumption expenditure values of household who have one house are

regressed on housing wealth and income for each year. All real variables are included in the model in logarithmic form. For homeowners who have one house and live in that house the following equation is estimated for each year from 2004 and 2013. The coefficients of each estimation result are used to follow the housing wealth and income's role in the explanation of consumption role of homeowners.

$$[3.4] \quad \log cons_i = a_0 + a_1 \log hw_i + a_2 \log income_i + \mu_i$$

$\log cons$ is the total consumption expenditure of household's, $\log hw$ is the value of house where the household lives and $\log income$ is the household's disposable income for a year. Lastly, μ_i is the error term.

Regarding homeowners who have more than one house, the estimation equation becomes different from 3.4 due to the inclusion of rental income. In this estimation, the possible effect of rent and the housing wealth with income will be analyzed in order to observe the pure wealth effect in that period. Housing wealth does not comprise all house values of homeowners for each household. This data is not shared in HBS for homeowners who have many houses. In order to overcome this data constraint, rental income is calculated for each homeowner for each year. Rental income is used to test the pure wealth effect. This argument is based on the assumption that rent value follows similar trend with housing wealth in last decade in Turkey.

Consequently, we include rental income to the equation 3.4 and obtain the following equation.

$$[3.5] \quad \log cons_i = a_0 + a_1 \log hw_i + a_2 \log income_i + a_3 \log rent_i + \mu_i$$

$\log cons$ is the total consumption expenditure of household's, $\log hw$ is the value of house where the household lives and $\log income$ is the household's disposable income and $\log rent$ is the total rental income that homeowner's earn from their additional houses. Income data does not include rental income. Lastly, μ_i is the error term.

3.2.3 Empirical Results

We estimate equation 3.4 and 3.5 for all homeowners, young homeowners and old homeowners separately with cross-section data for each year from 2004 to 2013. Housing wealth and income's share in explaining consumption level of households do not largely change in this period. Coefficients tend to follow a smooth path which reflects a stability of housing wealth and income in explaining the consumption level of households. Equation 3.4 estimates the consumption level of homeowners who own only one house where they live. Both housing wealth and income level data for each year are statistically significant. The average coefficients for all three sample groups are tabulated following for the period from 2004 to 2013.

Table 3.6: Consumption Level Estimation Coefficients for Homeowner with One House

LOGCONS = C(1) + C(2) *LOGHW + C(3) *LOGINCOME	
WHOLE SAMPLE	LOGCONS = 2.23 + 0.20 *LOGHW + 0.53 *LOGINCOME
YOUNG HOMEOWNERS	LOGCONS = 2.63 + 0.21 *LOGHW + 0.48 *LOGINCOME
OLD HOMEOWNERS	LOGCONS = 2.04 + 0.20 *LOGHW + 0.55 *LOGINCOME

The role of income is higher than housing wealth for all three samples. The estimation findings display that a 1% increase in housing wealth leads to approximately a 0.20% increase in consumption level of homeowner households for both young or old. Similar to this results, Binay and Salman (2008) found that a percent increase in real estate wealth increases total consumption by 0.20 percentage by analyzing the total consumption expenditure for Turkey between 1990 and 2005 using quarterly macro data. Akin (2008) found that there is a significant and positive long-run cointegration relationship between real per capita non-durables consumption and housing wealth. The study concludes that a one-percent increase in housing wealth raises the real per capita non-durables consumption by 0.27 percent for the period 1987 and 2006. In addition, the study of Guler (2012) found that in the period after 2001 the housing wealth effect becomes significant with an elasticity of 0.28. Consequently, we obtain approximately similar results with studies that use macro data and analyze aggregate behaviors of households for Turkey regarding the effect of housing wealth on consumption by using micro survey data.

In addition to this result, the estimation findings signal the importance of disposable income in explaining the consumption level of households, which is expected and in accordance with the previous literature. That Estimation results conclude that 1% increase in disposable income level of households leads to approximately a 0.52% increase in the consumption level of households for this period. Guler (2012) found that disposable income is the major factor that determines Turkey's consumption in the long-run before 2001. Surprisingly, this high share of disposable income decreases after the 2001 crisis and the income elasticity to consumption ratio drops from 0.83 to 0.30 according to his VECM estimation. On the other hand, for the period after 2001 using Carroll's (2004) method and we found that income elasticity to consumption ratio is 0.47 which is close to our results with cross-section micro data for Turkey from 2004 to 2013.

We add rental income to the model used to estimate the level of consumption during the period of 2004-2013. Housing wealth, income excluding rental income and rental income were used as explanatory variables in order to explain the consumption level of households who have more than one house and earn rental income. We test the wealth effect in the explanation of consumption with the role of rental income and housing wealth for this period. In this context, the coefficients of rental income and housing wealth during the period are crucial for understanding the importance of the pure wealth effect. It is expected that if there is a pure wealth effect for homeowners, then rental income and housing wealth would explain the consumption level significantly. Analogous to the consumption level estimation of households who have only one house, the consumption level of households who have more than one house with rental income is estimated with equation 3.5 for three different sample data groups. Thus, the average coefficients in equation 3.5 are tabulated in the following for each year estimation from 2004 to 2013.

Table 3.7: Consumption Level Estimation Coefficients for Homeowner with Many Houses

LOGCONS = C(1) + C(2) *LOGINCOME + C(3) *LOGHW + C(4) *LOGRENT	
WHOLE SAMPLE	LOGCONS = 2.40 + 0.24 *LOGHW + 0.36 *LOGINCOME+ 0.15 *LOGRENT
YOUNG HOMEOWNERS	LOGCONS = 1.81 + 0.32 *LOGHW + 0.36 *LOGINCOME+ 0.15 *LOGRENT
OLD HOMEOWNERS	LOGCONS = 2.44 + 0.24 *LOGHW + 0.36 *LOGINCOME+ 0.15 *LOGRENT

The estimation findings display that a 1% increase in housing wealth leads a 0.24% increase in consumption level of households which are classified as old. In addition, we obtain similar results for the whole sample regarding the explanation of housing wealth on consumption. Surprisingly, housing wealth explains the higher share of the consumption of young households than old households. For the young households' sample, in average, a 1% increase in housing wealth leads to a 0.32% increase in consumption level from 2004 to 2013. Additionally, the role of disposable income in explaining the consumption level of households for all three samples is similar and in line with previous literature.

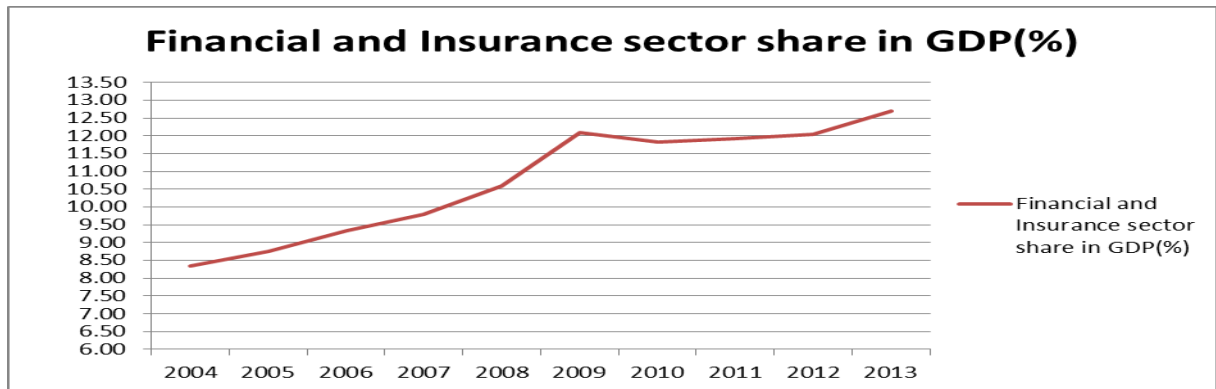
We stated in hypothesis 2 that the consumption responses to housing wealth change would be stronger among households that own more than one house. Our results show that housing wealth explains a higher share of consumption for households who have more than one house. The difference is not high but for all three sub-samples we obtained higher coefficients for housing wealth. Moreover, the role of income is the same for all sub-samples of households. The estimation results show that a 1% increase in income leads to approximately a 0.50% increase in consumption level, even for both the young and old samples groups. The impact of rental income, excluded from the total disposable income, does not raise the role of total income for households who have more than one house. Briefly, the role of income is approximately similar for all households in explaining the consumption level for the studied period.

4. REVEALING THE COMMON FACTOR FOR THE LINK BETWEEN HOUSING WEALTH AND CONSUMPTION

The substantial literature explains the correlation between housing wealth and consumption with wealth effect that we have discussed and analyzed in the previous sections. On the other hand, there are also considerable studies in the literature explaining the co-movement of housing wealth and consumption with common factor approaches, which are discussed in the literature review. (Attanasio et al. 2009). According to the common factor approaches, both housing wealth and consumption are influenced by common factors such as financial conditions, expectations regarding productivity growth, etc. In the previous sections, we have analyzed and revealed how the housing wealth effect explains the high correlation between housing wealth and consumption. We have also obtained results which show that wealth effect is not the only driver of the link between housing wealth and consumption in Turkey from 2004-2013. In this section, we analyze the common factor approaches in order to understand the high correlation between housing wealth and consumption change.

Furthermore, the financialization level in the Turkish economy, which is accepted as one of the main common factor to explain the co-movements of housing wealth and consumption, follows increasing trend in that period. There are numerous indicators in the literature to measure the financialization level of the economy. We use the share of financial and insurance activities in the GDP for this period. Figure 4.1 presents the share of financial and insurance activities in GDP from 2004 to 2013.

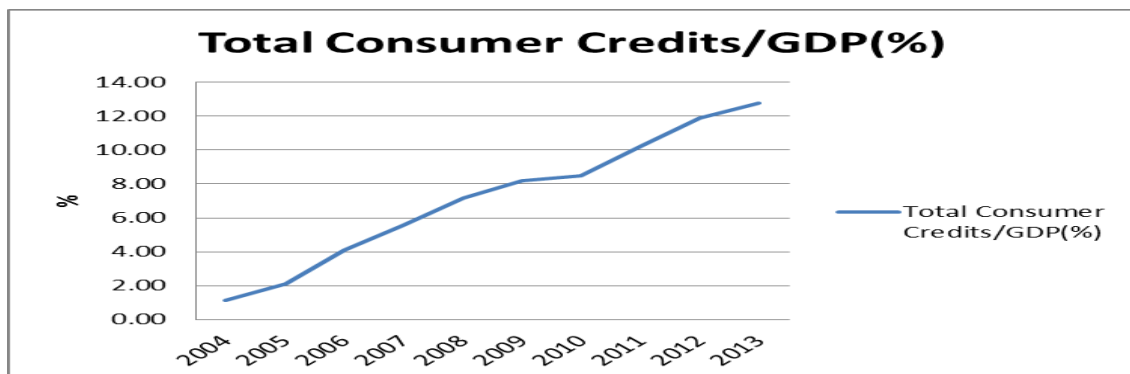
Figure 4.1: Share of Financial and Insurance Activities in GDP (%)



Source: TURKSTAT

Figure 4.1 shows the increasing trend of the percentage of financial and insurance activities in the Turkish economy for the period 2004 and 2013. Figures 3.1, 3.2 and 4.1 display that increasing trends in real values of housing wealth and consumption per household overlaps with the increasing share of financial activities in the GDP. These similar trends encourage us to test the possible relation between housing wealth, consumption and financial activities. The increasing trend in the share of financial activities signals a financial expansionary period in Turkey. In this section, we use consumer credits and total domestic credits to analyze the relationship between consumption, housing wealth and financial conditions with this connection. Figure 4.2 illustrates the impressive rise in the ratio of consumer credits given by banks to GDP from 2004 to 2013.

Figure 4.2: Total Consumer Credits / GDP (%)



Source: CBRT and TURSTAT

4.1 CONSTRUCTION OF THE DATA SET

In this section, we test the relationship between consumption, housing wealth and credit volume which we use as a proxy for the financialization. For housing wealth and consumption data, we use HBS data from 2004 to 2013. In order to analyze the relationship between credits volume and other variables obtained from HBS, we use consumer credits data published by The Banking Regulation and Supervision Agency (BRSA) and total domestic credit published by CBRT. The Banks Association of Turkey (BAT) separates consumer credits, including mortgage credits, according to the income level of the credit user. This classification is organized by information sent from banks and its scope increases regularly. For instance, in 2005 fifty-six percentage of the credits classified were according to income level. However, for the last five years more than ninety percent of the credits were classified according to income level. In order to overcome this problem, we take the average ratio of credits usage for every income level groups for the whole period as an indicator.

BAT separates income groups according to five-income levels. A credit user defined as the lowest income group if the annual income is lower than 12.000 TL for each year. The highest income group consists of credit users whose annual income is higher than 60.000 TL for each year. We illustrate the income classification of BAT in the following table. This classification is based on statistics of consumer and mortgage credits provided by state and private banks for the period. Private and state banks must report their all credits statistics to BRSA regularly; for some types of credits they must report daily. The government and legal backing of BRSA's authority translates into more comprehensive statistics than BAT. Therefore, for the analysis we use the consumer credit data published by BRSA. We use BAT's credit statistics to classify credits according to income level of credit users.

Table 4.1: Classification of Credits According to Income Level Groups

Income Level Interval	2004-2013 Average Usage Ratios (%) (*)
0 – 12.000 TL(**)	25.96
12.001-24.000 TL	25.38
24.001-36.000 TL	17.11
36.001-60.000 TL	13.10
60.001 + TL	18.46

(*) This ratio represents the ratio of credits volume to total credits volume for that income level groups.

(**) This income levels represent annual income earned by credit user. **Source: BAT**

We distribute the consumer credits used in each year according to the income level average ratio obtained by BAT. With this method, we use credit volume data for each income level groups as a proxy for financial activities. We sort households according to annual income level and classify them like BAT. We calculate all average values of consumption, housing wealth and income for each income level intervals and use those average values in the analysis with credit volume which is distributed for each income level interval for each year. With this classification, we obtain 50 data for each variable from 2004 to 2013. We estimate the homeowner's consumption level and housing wealth with credit volume separately. The homeowner's consumption and housing wealth is explained by credits volume data in order to observe the role of financial activities on both variables. In addition, we test the role of credits volume in explaining the consumption level of renters. This estimation allows us to control the possible role of financial activities on both a homeowner's and renter's household consumption.

Furthermore, we test the same relation by using the domestic credit volume data which is published by CBRT for each year. This credit data contains all credit in Turkish Economy and it is a wider indicator with which to observe the level of financial activities in whole economy. We expect to obtain similar results with consumer credits regarding the relationship between consumption, housing wealth and financial activities. We show that the results are similar with the results of the data set with consumer credits to test the relation between consumption, housing wealth and credits volume. This result strengthens our conclusion regarding the role of financial activities in explaining the link between household consumption level and housing wealth.

4.2 METHODOLOGY

Panel data analysis is frequently used in the empirical literature. Besides stationary models, cointegration techniques are available in panel data models similar to time series models. Before examining the existence of cointegration, the integration order of variables is checked using panel unit root tests. In order to continue the cointegration test, all variables are assumed to have the same integration order. We check the order of integration for each series using panel unit root tests of Levin et al. (2002) and Fisher type tests (Choi, 2001).

4.2.1 Panel Unit Root Tests

Levin-Lin-Chu (LLC) test is a panel-based unit root test based on heterogeneous panels with fixed effects. It is designed to evaluate the null hypothesis that each unit in the panel has integrated residuals against the alternative hypothesis that all units have stationary residuals. Thus, the objective is to determine whether this process is integrated. The LLC test forces the autoregressive coefficient to be homogeneous under the alternative hypothesis.

The Fisher-ADF and PP tests which are defined by Maddala and Wu (1999) and Choi (2001) both allow for individual unit root processes so that ρ_i may vary across cross-sections. The tests are all characterized by the combining of individual unit root tests to derive a panel-specific result. The Fisher-type tests use p -values from unit root tests for each cross-section i . The formula of the test looks as follows:

$$[4.1] \quad P = -2 \sum_{i=1}^N \ln p_i$$

4.2.2 Panel Cointegration

Pedroni (1999) tests are residual-based cointegration tests for panel data. Pedroni has created seven tests to check cointegration. This test has the null hypothesis of no cointegration. The tests are grouped as within-dimension and between-dimension. There are four tests in the within-dimension test, namely as panel- v , panel- ρ , semi-parametric panel- t and parametric panel- t . There are three tests in between-dimension tests, namely as

group- p , semi-parametric group- t and parametric group- t . Panel statistics are calculated by summing up the numerator and denominator separately over all cross-sectional units, whereas group statistics are calculated by dividing the numerator and denominator before summing up over all cross sectional units.

The procedures proposed by Pedroni make use of estimated residual from the hypothesized long-run regression of the following form:

$$[4.2] \quad y_{i,t} = \alpha_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \dots + \beta_{Mi} x_{Mi,t} + e_{i,t}$$

$$\text{for } t = 1, \dots, T; i = 1, \dots, N; m = 1, \dots, M,$$

where T is the number of observations over time, N is the number of cross-sectional units in the panel, and M is the number of regressor. In this set-up, α_i is the member specific intercept, or fixed effects parameter, which varies across individual cross-sectional units. The same is true of the slope coefficients and member specific time effects, $\delta_i t$. In the model, it is assumed that the error term, $e_{i,t}$, is cross sectionally and independently identically distributed, e.g., i.i.d. Equation 4.2 is estimated by Ordinary Least Squares (OLS) for each cross sectional unit. Moreover, a second equation in first differences, given in Equation 4.3, is estimated to calculate panel statistics.

$$[4.3] \quad \Delta y_{i,t} = \beta_{1i} \Delta x_{1i,t} + \beta_{2i} \Delta x_{2i,t} + \dots + \beta_{Mi} \Delta x_{Mi,t} + \zeta_{i,t}$$

It is observed that the constant and trend coefficients are removed in the first differenced equation. Using equation 4.3, a long run variance of the residual is calculated with a Newey and West (1987) estimator. The parametric test statistics are estimated using the residual from Equation 4.2 and the residual is regressed to its lagged value and first differenced lagged values up to an optimal lag. On the other hand, semi-parametric test statistics are estimated using the residual from Equation 4.2 and regressing it to its AR (1) process.

The first set of three statistics $Z_{\hat{v},N,T}$, $Z_{\hat{\rho},N,T-1}$ and $Z_{tN,T}$ is based on pooling the residuals along the within-dimension of the panel. The statistics are as follows:

panel- ν ,

$$[4.4] \quad T^2 N^{3/2} Z_{\hat{\nu}, N, T} = T^2 N^{3/2} \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1}$$

panel- ρ ,

$$[4.5] \quad T \sqrt{N} Z_{\hat{\rho}_{NT^{-1}}} = T \sqrt{N} \left(\sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i)$$

semi-parametric panel- t , and parametric panel- t ,

$$[4.6] \quad \begin{aligned} Z_{tN, T} &= \left(\hat{\sigma}_{N, T}^2 \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \\ Z_{tN, T}^* &= \left(\tilde{s}_{N, T}^{*2} \sum_{i=1}^N \sum_{t=1}^T \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^N \sum_{t=1}^T (\hat{L}_{11i}^{-2} \hat{e}_{i,t-1} \Delta \hat{e}_{i,t}) \end{aligned}$$

The second set of statistics is based on pooling the residuals along the between dimension of the panel. It allows for a heterogeneous autocorrelation parameter across members. The statistics are as follows:

$$[4.7] \quad TN^{-1/2} \tilde{Z}_{\hat{\rho}_{NT^{-1}}} = TN^{-1/2} \sum_{i=1}^N \left[\left(\sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \right]$$

$$[4.8] \quad N^{-1/2} \tilde{Z}_{tNT} = N^{-1/2} \sum_{i=1}^N \left[\left(\hat{\sigma}_i^2 \sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i) \right]$$

$$[4.9] \quad N^{-1/2} \tilde{Z}_{tNT}^* = N^{-1/2} \sum_{i=1}^N \left[\left(\hat{s}_i^{*2} \sum_{t=1}^T \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t}) \right]$$

These statistics compute the group mean of the individual conventional time series statistics. The asymptotic distribution of each of those five statistics can be expressed in the following form:

$$[4.10] \quad \frac{X_{N, T} - \mu \sqrt{N}}{\sqrt{V}} \Rightarrow N(0, 1)$$

where $X_{N,T}$ is the corresponding form of the test statistics, while μ and v are the mean and variance of each test respectively.

4.2.3. Fully Modified Ordinary Least Squares (FMOLS)

Fully modified OLS (FMOLS) was first proposed by Phillips and Hansen (1990) to provide optimal estimates for cointegrated regression models. The technique, which is in pooled form, is based on semi-parametric correction to the OLS estimator which helps eliminate the problem of endogeneity. Pedroni (1996) proposes using group mean estimators since the t-statistics for these estimators allow for a more flexible alternative hypothesis as it is based on between dimensions rather than within dimension, which is the case for pooled models. The FMOLS group mean estimator is the average value of the individual FMOLS estimates. Group mean methodology provides a consistent test of a common value for the cointegrating vector.

4.3 EMPIRICAL RESULTS

All variables used in this section are stationary in difference form while they are non-stationary in level form. The panel unit root test results are listed in appendix. According to unit root test results, we can test the possible cointegration of variables for this period. As discussed in the previous sub-section, we use the Pedroni (1999, 2004) panel cointegration test for homeowners and renters, respectively. Both panel tests check the cointegration among these variables. First, we display the results of the relationship between consumer credits with consumption and housing wealth and then we present the results of the relation between total domestic credits with consumption and housing wealth. According to table 4.2, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 significance level among all the three types' tests. Overall, table 4.2 shows the cointegration between consumption and consumer credit data for homeowners in this period.

Table 4.2: Pedroni Panel Cointegration Test Results for Homeowners (Consumption and Credits)

	Consumption-Credit_con		
	None	C	C&T
Panel v-Stat	-1.473 (0.929)	0.252 (0.400)	1.376** (0.084)
Panel rho- Stat	-1.259 (0.103)	-0.124 (0.450)	-0.227 (0.410)
Panel PP- Stat	-3.599*** (0.000)	-1.868*** (0.030)	-4.117*** (0.000)
Panel ADF- Stat	-4.188*** (0.000)	-1.670*** (0.047)	-3.137*** (0.000)
Group rho- Stat	0.504 (0.693)	0.696 (0.757)	0.691 (0.755)
Group PP- Stat	-4.252*** (0.000)	-3.192*** (0.000)	-4.527*** (0.000)
Group ADF- Stat	-5.597*** (0.000)	-2.938*** (0.001)	-3.465*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

According to table 4.3, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 significance level in two of the three types’ tests. Table 4.3 shows the cointegration between housing wealth and consumer credit data for homeowners in this period.

Table 4.3: Pedroni Panel Cointegration Test Results for Homeowners (Housing Wealth and Credits)

	Housing Wealth-Credit_con		
	None	C	C&T
Panel v-Stat	-1.322 (0.907)	-0.323 (0.627)	-1.795 (0.963)
Panel rho- Stat	-1.779*** (0.037)	-0.060 (0.476)	1.307 (0.904)
Panel PP- Stat	-3.087*** (0.001)	-1.954*** (0.025)	-1.931*** (0.026)
Panel ADF- Stat	-3.180*** (0.000)	-2.201*** (0.013)	-1.706*** (0.044)
Group rho- Stat	-0.123 (0.451)	1.214 (0.887)	2.046 (0.979)

Group PP- Stat	-2.816*** (0.002)	-1.802*** (0.036)	-1.646*** (0.049)
Group ADF- Stat	-3.124*** (0.000)	-1.682*** (0.046)	-0.997 (0.159)

Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

Regarding the panel cointegration test’s results for homeowners, we observe that there is a cointegrating relationship between housing wealth and consumer credits while the same relationship exists between consumption and consumer credits for the same household groups. This result supports the idea of common factor analysis in the relationship between housing wealth and consumption. In addition, we use the same panel cointegration test to determine whether a cointegrating relationship exists between consumption and credits for renters. According to table 4.4, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 and 0.05 significance level in two of the three types’ tests. This result concludes that there exists a cointegrating relationship between consumption and consumer credits for renters.

Table 4.4: Pedroni Panel Cointegration Test Results for Renters (Consumption and Credits)

	Consumption-Credit_con		
	None	C	C&T
Panel v-Stat	-1.333 (0.908)	-0.552 (0.709)	1.355** (0.087)
Panel rho- Stat	-1.465** (0.071)	0.420 (0.663)	0.079 (0.531)
Panel PP- Stat	-4.208*** (0.000)	0.296 (0.616)	-3.683*** (0.000)
Panel ADF- Stat	-6.206*** (0.000)	0.060 (0.524)	-5.092*** (0.000)
Group rho- Stat	0.238 (0.594)	1.439 (0.925)	1.111 (0.866)
Group PP- Stat	-5.024*** (0.000)	1.088 (0.861)	-5.297*** (0.000)
Group ADF- Stat	-7.549*** (0.000)	0.846 (0.801)	-6.030*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

The panel cointegration test results tabulated above conclude that there is a cointegrating relationship between consumption, housing wealth and consumer credits for both homeowners and renters. After establishing that there is a linear combination that keeps the pooled variables in proportion to one another in the long-run, then we estimate the individual long run coefficients for variables that are cointegrated. We use the FMOLS estimator to obtain the coefficients in this section. The details of FMOLS are discussed in methodology sub-section above. In this section, we display only the results of the FMOLS estimations. For the period from 2004 and 2013, we add a deterministic regressor, which is labeled as crisis. This regressor mitigates the effect of crisis year, 2009, in the estimation period. In this year, consumption change and consumer credits usage change becomes smaller compared to other years in the sample.

Table 4.5 shows that a long-run equilibrium relationship exists between consumption and consumer credits for homeowners. According to the results in table 4.5, consumer credits for homeowners have positive and statistically significant signs at the 1% level. The FMOLS estimation results conclude that a 1% increase in credits volume leads to a 0.13% increase in consumption level of homeowners. Similar to these results, the study of Akin (2008) concludes that there is a significant and positive long-run cointegrating relationship between bank credit and non-durable consumption. Akin (2008) found that a one percent increase in the availability of bank credits to the private sector increases the non-durables consumption by 0.13%. The study obtains the result with macro data for the period from 1987 to 2006, whereas we obtain the same results with micro data for a later period. Briefly, both our estimation results and the study of Akin (2008) display the contribution of credits to consumption in Turkey.

Table 4.5: Panel FMOLS Results for Homeowners (Consumption and Credits)

Dependent Var: Consumption	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_con	0.131***	0.036	3.585	0.001
R-squared	0.989			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

Table 4.6 shows that along-run equilibrium relationship exists between housing wealth and consumer credit for homeowners. According to the results in table 4.6, credit for homeowners is positive and statistically significant at 1%. The FMOLS estimation results conclude that a 1% increase in consumer credit volume leads to a 0.24% increase in housing wealth of homeowners.

Table 4.6: Panel FMOLS Results for Homeowners (Housing Wealth and Credits)

Dependent Var: Housing Wealth	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_con	0.245***	0.088	2.772	0.009
R-squared	0.989			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

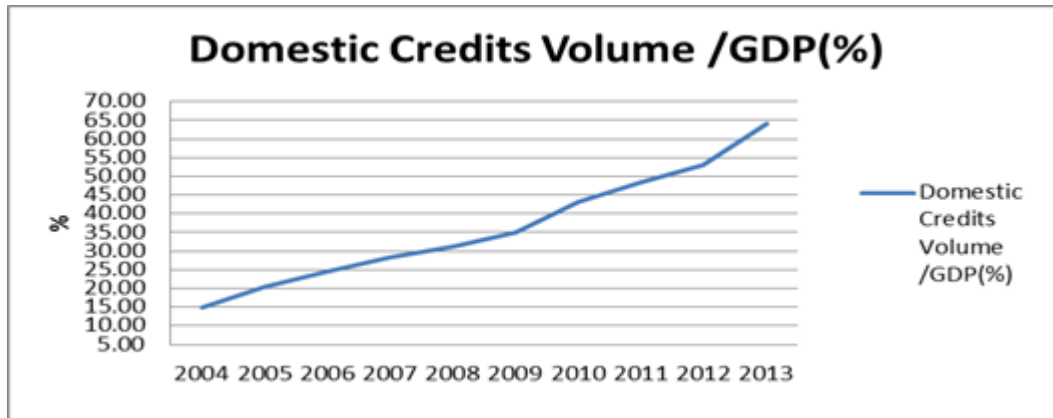
Table 4.7 shows that long-run equilibrium relationship exists between consumption and consumer credit for renters. According to the results in table 4.7, credit for renters is positive and statistically significant at the level of 1%. The FMOLS estimation results conclude that a 1% increase in consumer credits volume leads to a 0.15% increase in consumption level of renters.

Table 4.7: Panel FMOLS Results for Renters (Consumption and Credits)

Dependent Var: Consumption	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_con	0.148***	0.053	2.781	0.008
R-squared	0.989			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

The following results are based on the estimation which includes total domestic credits volume data published by CBRT as a proxy for financialization in Turkey for the same period. This further analysis provides us to check our results that obtained with consumer credits data published by BRSA. The figure 4.3 displays the increasing trend for total domestic credits for the same period similar to the consumer credits.

Figure 4.3: Domestic Credits Volumes / GDP (%)

Source: CBRT and TURSTAT

Table 4.8: Pedroni Panel Cointegration Test Results for Homeowners (Consumption and Credits)

	Consumption-Credit_domestic		
	None	C	C&T
Panel v-Stat	-1.220 (0.888)	-0.707 (0.760)	1.119 (0.131)
Panel rho-Stat	-2.997*** (0.001)	-0.014 (0.494)	-0.113 (0.454)
Panel PP- Stat	-3.593*** (0.000)	-2.426*** (0.007)	-4.57*** (0.000)
Panel ADF-Stat	-3.659*** (0.000)	-2.391*** (0.008)	-3.398*** (0.000)
Group rho-Stat	-1.089 (0.137)	0.890 (0.813)	0.652 (0.742)
Group PP-Stat	-4.805*** (0.000)	-2.827*** (0.002)	-5.075*** (0.000)
Group ADF-Stat	-4.748*** (0.000)	-2.870*** (0.002)	-3.955*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

According to table 4.8, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 significance level among all the three types’ tests. Overall, table 4.8 shows the cointegration between consumption and consumer credits data for homeowners in this period.

Table 4.9: Pedroni Panel Cointegration Test Results for Homeowners (Housing Wealth and Credit)

	Housing Wealth-Credit_domestic		
	None	C	C&T
Panel v-Stat	-0.588 (0.722)	-0.321 (0.626)	-0.193 (0.577)
Panel rho-Stat	-2.311*** (0.010)	0.377 (0.647)	1.033 (0.849)
Panel PP-Stat	-2.708*** (0.003)	-1.514** (0.064)	-1.134 (0.128)
Panel ADF-Stat	-2.812*** (0.002)	-1.243*** (0.107)	-1.500** (0.066)
Group rho-Stat	-0.340 (0.367)	1.397 (0.918)	1.824 (0.966)
Group PP-Stat	-2.589*** (0.004)	-1.570** (0.058)	-0.648 (0.258)
Group ADF-	-2.685***	-4.294***	-1.223

Stat	(0.003)	(0.000)	(0.110)
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Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

According to table 4.9, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 significance level in two of the three types’ tests. Table 4.9 shows the cointegration between housing wealth and total domestic credits data for homeowners in this period.

Table 4.10: Pedroni Panel Cointegration Test Results for Renters (Consumption and Credit)

	Consumption-Credit_domestic		
	None	C	C&T
Panel v-Stat	-0.931 (0.824)	-0.837 (0.798)	2.457*** (0.007)
Panel rho-Stat	-2.251*** (0.012)	0.775 (0.781)	0.361 (0.641)
Panel PP-Stat	-3.717*** (0.000)	0.166 (0.566)	-3.685*** (0.000)
Panel ADF-Stat	-3.697*** (0.000)	0.141 (0.556)	-4.601*** (0.000)
Group rho-Stat	-0.539 (0.294)	1.486 (0.931)	1.203 (0.885)
Group PP-Stat	-5.271*** (0.000)	0.480 (0.684)	-6.335*** (0.000)
Group ADF-Stat	-4.397*** (0.000)	0.480 (0.684)	-5.101*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level. The optimal lag length was selected by SIC. “None” refers ‘No intercept or trend’, “C” refers ‘Individual intercept’ and “C&T” refers ‘Individual intercept and individual trend’ in deterministic trend specification.

According to table 4.10, four of the seven tests indicate that the null hypothesis of no cointegration is rejected at the 0.01 and 0.05 significance level in two of the three types’ tests. This result concludes that there exists a cointegrating relationship between consumption and total domestic credits for renters.

Table 4.11: Panel Estimation Results for Homeowners (Housing Wealth and Credit)

Dependent Var: Housing Wealth	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_domestic	0.292***	0.135	2.161	0.037
R-squared	0.917			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

Table 4.11 shows that a long-run equilibrium relationship exists between housing wealth and total domestic credits for homeowners. According to the results in table 4.11, total domestic credits for homeowners have positive and statistically significant signs at the 5% level. The FMOLS estimation results conclude that a 1% increase in credits volume leads to a 0.29% increase in housing wealth of homeowners.

Table 4.12: Panel Estimation Results for Homeowners (Consumption and Credit)

Dependent Var: Consumption	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_domestic	0.230***	0.047	4.824	0.000
R-squared	0.986			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

Table 4.12 shows that a long-run equilibrium relationship exists between consumption and total domestic credits for homeowners. According to the results in table 4.12, total domestic credits for homeowners have positive and statistically significant signs at the 1% level. The FMOLS estimation results conclude that a 1% increase in credits volume leads to a 0.23% increase in consumption level of homeowners.

Table 4.13: Panel Estimation Results for Renters (Consumption and Credit)

Dependent Var: Consumption	Coefficients	Standard Errors	T-Statistics	Prob.
Credit_domestic	0.341***	0.064	5.287	0.000
R-squared	0.975			
Cointegrating eq. deterministic	Constant & Crisis Dummy			
No. of obs.	45			

Notes: *** (**) denote statistical significance at the 1% (5%) level. Panel Method: Pooled Estimation

Table 4.13 shows that long-run equilibrium relationship exists between consumption and total domestic credits for renters. According to the results in table 4.13, credit for renters is positive and statistically significant at the level of 1%. The FMOLS estimation results conclude that a 1% increase in total domestic credits volume leads to a 0.34% increase in consumption level of renters.

Thus far, we have tested the effect of consumer credits and total domestic credits on the housing wealth and consumption level of households. We obtain positive and statistically significant results which support the idea that the credit expansionary period promoted the increasing trend in consumption level and housing wealth of households in Turkey from 2004 to 2013. In the previous section, we analyze the wealth effect to understand the positive correlation between consumption and housing wealth. In addition, in this section we analyze the effect of consumer credits and total domestic credits that can be labeled as common factor in the relationship between consumption and housing wealth. This section strengthens the effect common factor approaches discussed in the literature on the relationship between consumption and housing wealth. We obtain similar results by using a different credit indicator, the domestic credit volume published by CBRT, for the relationship for the same period both homeowners and renters. In addition, we obtain higher coefficients with total domestic credits rather than consumer credits in explaining the relationship between housing wealth, consumption with credits data. Especially, total domestic credits explain the higher part of the consumption level of homeowners and

renters for the period. The results display that consumption level of households is sensitive to the total domestic credits which reflects higher share of the whole economic activity. The difference between consumer credits and total domestic credits denotes the credits which used by sectors such as production and service. These results present the importance of the economic activity in determining the consumption level of households for this period in Turkey.

Overall, there is no doubt that the credit volume, including consumer credits and domestic credits, support the relationship in a positive and statistically significant way for the study period.



5. CONCLUSION

In this dissertation, we aim to understand and explain the positive relationship between housing wealth and consumption. There is widespread agreement regarding the positive and high correlation between these variables, however, there is not a commonly accepted explanation for this correlation. We began our analysis with theoretical considerations and a literature survey to understand the existing explanations about the relationship between housing wealth and consumption. We explored the three approaches which are frequently cited for explanation of this relationship.

We estimated the possible wealth effect and common factor approaches for the positive relationship, continuing the work of many published studies. We tested whether the housing wealth effect could explain the consumption change of households in Turkey from 2004 to 2013. This period is easily labeled as an expansionary period, particularly due to house sale numbers and house prices. Analyzing this period is crucial to document the possible housing wealth effect in Turkey with micro data. The expansionary housing market is a much-studied topic in the Turkish academic environment. This dissertation, in one part, displays the possible effects of the expansionary housing market on household consumption levels. Housing sales, which have been greater than one million every year since 2010, provide a bountiful topic for analysis. We do not analyze the housing market and price developments directly in this dissertation; rather, we document the positive relationship between housing wealth and consumption change and then try to investigate the expansionary housing market via the consumption channel.

In section 3, we analyzed the possibility of the wealth effect for explaining this relationship. We estimated expected and unexpected changes in income and housing wealth for each household sub-group. Then, we tested the consumption change of households with expected and unexpected income and housing wealth change in accordance with the life-cycle and permanent income hypotheses, in a manner similar to earlier literature. In addition, we tested the housing wealth share in the consumption level of households with cross-section data for each year from 2004 to 2013. We also included rental income to the model to test the pure wealth effect for homeowners who have more than one house.

Our results, in section 3, indicate that the wealth effect is important to determine the consumption level of households but it is not the only driver of the relationship between consumption and housing wealth in Turkey for this period. We obtained different results for different household sub-groups with different age boundaries. A household's characteristics and properties are crucial in analyzing the wealth effect's results in this section. We showed that young-homeowners' consumption is highly sensitive to housing wealth and explained that the consumption change is contrary to the life cycle and permanent income hypotheses, which expect a higher wealth effect for old-homeowners. This result supports the importance of the precautionary saving hypothesis in explaining the positive relation between housing wealth and consumption. Both expected and unexpected housing wealth change are significant to explain the consumption change of young-homeowners, while they are not significant for old-homeowners. The positive and significant results for young homeowners intensify the importance of common factor approaches for the relationship between housing wealth and consumption change because young homeowners have more time to enjoy financialization, productivity growth, etc. Moreover, we did not obtain statistically significant results for different income levels and settlement groups. We could not conclude that income level and settlement differences are crucial to the housing wealth effects of homeowners for consumption change in this period.

Furthermore, in section 3, we combined household groups in order to observe the sensitivity of results to the household head's age. In other words, we combined young homeowner and old homeowner household's pseudo panel data and regressed the consumption change of this combined group on expected and unexpected housing wealth and income change. We found that both expected and unexpected housing wealth change and expected and unexpected income change explain the consumption change of households. This result also did not diversify for different age boundaries. This combined sample contains households that are young, old, from all income level groups and live in urban and rural area. Therefore, these results strengthen the findings that highlight the importance of housing wealth change on consumption change. Similar to the separated pseudo-panel data analysis, this further analysis also proved that the housing wealth effect is not the only driver of the relationship between housing wealth change and consumption change for the period.

In addition to the pseudo-panel data analysis in section 3, we also analyzed the relationship between housing wealth and consumption with cross-section data. For each year from 2004 to 2013, we estimated the effect of housing wealth and income level on household consumption levels. In this cross-section analysis, we divided homeowners into two groups and we estimated the whole group without classifying homeowners. In this analysis, we found that housing wealth positively explains the consumption level of homeowners, even if they are young or old. Moreover, we divided homeowners who have more than one house with rental income and homeowners with only one house. We tested the effect of rental income on consumption level and tried to observe the pure wealth effect on consumption level of homeowners. The estimation results show that rental income is important in explaining the consumption level of homeowners. For young, old, and the whole sample of homeowners with many houses, a 1% increase in rental income leads a 0.15% increase in consumption levels from 2004 to 2013.

Moreover, the results for housing wealth are also similar to the previous results obtained by different studies in Turkey. These cross-section data analyses also strengthen the importance of housing wealth on consumption levels of homeowners in Turkey from 2004 to 2013. Even in the analysis with level data and change data we obtained positive and significant results on the effect of housing wealth, income and rental income. However, our results did not show that the positive relationship between housing wealth and consumption for this period could only be explained by wealth effect. This means the wealth effect positively affects household consumption, but it does not completely explain the relationship. Therefore, in section 4 we try to analyze the common factor approaches for the positive relationship between housing wealth and consumption.

In section 4, we tested the possible effects of the financialization as a common factor for the period in Turkey. As we stated, the financialization period and expansionary housing market overlap in this period. Indicators of both financialization and the expansionary housing market show a strictly increasing trend in the last decade. We use consumer credits and total domestic credits as an indicator to test the financialization effect for both housing wealth and the consumption level of households. We estimated housing wealth and consumption separately using consumer credits and total domestic credits. We divided households into two groups as renter and homeowner to test the common factor

effect. All estimation results indicate that consumer credit and total domestic credits are statistically significant in explaining the housing wealth and consumption level of households. We obtained similar results in the estimation of renter's consumption levels with consumer credits and total domestic credits. In section 4, we found that total domestic credits explain the higher part of the consumption level of renters and homeowners. In addition, we obtained that consumer credits that includes housing credits and total domestic credits explain approximately the same part of the housing wealth of homeowners for the period in Turkey. Moreover, our results present that renter's consumption level is highly affected by consumer credits and total domestic credits rather than homeowner's consumption level. Both credit indicators display that credits are significant in explaining the link between the housing wealth and consumption. These results reveal that common factor, financialization, affects positively housing wealth and consumption level.

Ultimately, in this dissertation, we found that both wealth effect and financial conditions stimulated household consumption for the period between 2004 and 2013. These results imply that a rise in the real consumption level of households in Turkey, at least for homeowners, can be explained by upward trends in financial conditions and housing wealth for that period.

6. RECOMMENDATION FOR FURTHER STUDY

In this dissertation, we try to estimate the possible effects of housing wealth and income on the consumption level of households in Turkey for the period from 2004 to 2013. We conclude that housing wealth is one of the determinants of the consumption level and consumption change of homeowners in Turkey. In addition, financial conditions also stimulate the consumption level for homeowners and renter in this period. Nevertheless, there are a number of additional areas for further study. The following recommendations are offered to improve our understanding of these systems and their effects on the Turkish economy and economies worldwide.

In this dissertation, we use pseudo-panel data to follow the behavior of similar household groups and then analyze the positive relation between housing wealth and consumption. If possible, in the future, this estimation could be done by real panel data to follow the exact households instead of following average value of household groups. This estimation is not possible now but may be with an appropriate data sample. Moreover, it would be better to analyze households also within their regional sample. In this study, due to the data constraints and set classifications, we separated households into only urban and rural. Yet, it would be better to classify households according to their regional settlements, so as to understand better the regional and local factors in the relationship between housing wealth and consumption. Unfortunately, HBS does not contain regional data. In the future, it may be possible to combine regional data and HBS data to observe the regional differences in the relationship between housing wealth and consumption.

In section 3, we analyze the effect of expected and unexpected changes on housing wealth and income in the same equations without including financial indicators for household groups. HBS does not include financial information for households for the whole period, which is why we could not include the financial situation of the households into the equation. However, for the estimation in section 4 we create a financial indicator data set by using a separate data set and trying to match household income levels and financial indicators. This matching does not mean that we put every household's financial information to the equation directly; we distributed total consumer credits to the household groups according to their income level. It would be better to obtain the exact

financial situation of each household and then estimate the relationship between housing wealth and consumption by including the financial situation to the equation.

The relationship between housing wealth and consumption should be analyzed by including a bequest motivation with more sophisticated econometric models that could provide us the chance to follow the generational inclination regarding the housing wealth. This is an important point because older homeowners do not tend to scale down their house with smaller one. If they scale down their bigger house with smaller one, then they may use the distinction value of their house change. However, if they plan to bequest their house upon their death, then they would hesitate to scale down their house. Thus, they do not use the difference between small-scale house and large-scale house for consumption expenditure (Weil and Sheiner, 1992). In other words, they may choose to leave a higher scale house to their children instead of taking the extra consumption expenditure. Therefore, factoring in a bequest motivation should be included in the model for future studies (Venti and Wise, 1989).

APPENDICES

APPENDIX A: Estimation Results of Pseudo-Panel Data

A.1 Housing Wealth Estimation Results of Pseudo-Panel Data

<u>Definition of Variables Used in Housing Wealth Estimation Model</u>
Loghw (logarithmic form of housing wealth): TL market value of the dwelling where the household lives for the households whose ownership status of the dwelling they resided is owner.
Nbr: Number of dwelling rooms. Common places (including the living room) which are surrounded with four walls from ground to the ceiling, which are at least 4 square meters with ground to ceiling distance at least 2 meters long, are included in the number of rooms.
Squr: Size of dwelling. Space inside the outer walls of the dwelling, excluding the outside balconies thereof, and half of the area of the integral balconies are recorded in square meters.

Table A1.1: Housing Wealth Estimation-Young Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.747*** (0.060)
Nbr	0.869** (0.479)
Squr	0.028 (0.022)
Nbr*sqr	-0.006 (0.005)
Observations	90
Sargan-test	P=0.787
Arellano-bond test of AR (2)	P=0.208

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.2: Housing Wealth Estimation-Young Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.788*** (0.058)
Nbr	0.781* (0.470)
Squr	0.019 (0.024)
Nbr*sqr	-0.004 (0.005)
Observations	90
Sargan-test	P=0.800
Arellano-bond test of AR (2)	P=0.000

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.3: Housing Wealth Estimation-Old Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.865*** (0.041)
Nbr	0.365 (0.470)
Squr	0.018 (0.017)
Nbr*sqr	-0.003 (0.003)
Observations	90
Sargan-test	P=0.121
Arellano-bond test of AR (2)	P=0.982

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.4: Housing Wealth Estimation-Old Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.837*** (0.041)
Nbr	0.403 (0.264)
Squr	0.033*** (0.016)
Nbr*sqr	-0.006** (0.003)
Observations	90
Sargan-test	P=0.069
Arellano-bond test of AR (2)	P=0.469

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.5: Housing Wealth Estimation-Urban Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.390*** (0.076)
Nbr	0.793*** (0.298)
Squr	0.011 (0.015)
Nbr*sqr	-0.001 (0.003)
Observations	90
Sargan-test	P=0.235
Arellano-bond test of AR (2)	P=0.400

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.6: Housing Wealth Estimation-Urban Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.413*** (0.076)
Nbr	0.639*** (0.266)
Squr	0.007 (0.013)
Nbr*sqr	-0.005 (0.003)
Observations	90
Sargan-test	P=0.104
Arellano-bond test of AR (2)	P=0.001

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.7: Housing Wealth Estimation-Rural Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.205*** (0.101)
Nbr	0.613 (0.416)
Squr	0.042*** (0.015)
Nbr*sqr	-0.005 (0.004)
Observations	90
Sargan-test	P=0.710
Arellano-bond test of AR (2)	P=0.316

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.8: Housing Wealth Estimation-Rural Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.184*** (0.089)
Nbr	0.302 (0.332)
Squr	0.036*** (0.012)
Nbr*sqr	-0.002 (0.003)
Observations	90
Sargan-test	P=0.954
Arellano-bond test of AR (2)	P=0.553

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.9: Housing Wealth Estimation-Income1 Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.765*** (0.097)
Nbr	2.415 (3.712)
Squr	0.110 (0.132)
Nbr*sqr	-0.024 (0.032)
Observations	36
Sargan-test	P=0.453
Arellano-bond test of AR (2)	P=0.036

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.10: Housing Wealth Estimation-Income1 Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.809*** (0.085)
Nbr	3.276 (4.219)
Squr	0.138 (0.143)
Nbr*sqr	-0.031 (0.035)
Observations	36
Sargan-test	P=0.408
Arellano-bond test of AR (2)	P=0.060

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.11: Housing Wealth Estimation-Income2 Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.748*** (0.165)
Nbr	23.873 (20.070)
Squr	0.838 (0.716)
Nbr*sqr	-0.229 (0.194)
Observations	36
Sargan-test	P=0.165
Arellano-bond test of AR (2)	P=0.592

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.12: Housing Wealth Estimation-Income2 Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.675*** (0.183)
Nbr	52.512*** (25.476)
Squr	1.871*** (0.908)
Nbr*sqr	-0.506*** (0.246)
Observations	36
Sargan-test	P=0.120
Arellano-bond test of AR (2)	P=0.761

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.13: Housing Wealth Estimation-Income3 Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.794*** (0.085)
Nbr	11.417 (12.892)
Squr	0.405 (0.453)
Nbr*sqr	-0.109 (0.128)
Observations	36
Sargan-test	P=0.415
Arellano-bond test of AR (2)	P=0.882

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.14: Housing Wealth Estimation-Income3 Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.804*** (0.077)
Nbr	11.689 (11.642)
Squr	0.416 (0.409)
Nbr*sqr	-0.112 (0.116)
Observations	36
Sargan-test	P=0.344
Arellano-bond test of AR (2)	P=0.960

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.15: Housing Wealth Estimation-Income4 Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.772*** (0.073)
Nbr	0.232 (2.418)
Squr	0.037 (0.082)
Nbr*sqr	-0.004 (0.025)
Observations	36
Sargan-test	P=0.419
Arellano-bond test of AR (2)	P=0.790

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.16: Housing Wealth Estimation-Income4 Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.774*** (0.088)
Nbr	0.141 (2.764)
Squr	0.028 (0.096)
Nbr*sqr	-0.002 (0.028)
Observations	36
Sargan-test	P=0.451
Arellano-bond test of AR (2)	P=0.241

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.17: Housing Wealth Estimation-Income5 Homeowner (Age boundary is 40)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.461*** (0.125)
Nbr	-3.539 (4.777)
Squr	0.128 (0.156)
Nbr*sqr	0.049 (0.053)
Observations	36
Sargan-test	P=0.531
Arellano-bond test of AR (2)	P=0.463

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A1.18: Housing Wealth Estimation-Income5 Homeowner (Age boundary is 45)

Dependent Variable: Loghw	Coefficients
Loghw (-1)	0.614*** (0.122)
Nbr	2.727 (4.676)
Squr	0.067 (0.152)
Nbr*sqr	-0.020 (0.052)
Observations	36
Sargan-test	P=0.418
Arellano-bond test of AR (2)	P=0.440

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

A2.Income Estimation Results of Pseudo-Panel Data

<u>Definition of Variables Used in Income Estimation Model</u>
Logincome (logarithmic form of household total disposable income): Annual disposable income of a household
Age: Completed age of the household's head.
Edu: Education status of household's head. Valued between 1 and 11. 1 refers "Illiterate" and 11 refers "Post Graduate/PhD"

Table A2.1: Income Estimation-Young Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.897*** (0.049)
Age	0.002 (0.008)
Edu	0.043** (0.024)
Observations	90
Sargan-test	P=0.752
Arellano-bond test of AR (2)	P=0.000

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.2: Income Estimation-Young Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.888*** (0.045)
Age	0.013** (0.007)
Edu	0.044*** (0.022)
Observations	90
Sargan-test	P=0.803
Arellano-bond test of AR (2)	P=0.000

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.3: Income Estimation-Old Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.945*** (0.028)
Age	-0.006 (0.007)
Edu	0.018 (0.014)
Observations	90
Sargan-test	P=0.753
Arellano-bond test of AR (2)	P=0.000

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.4: Income Estimation-Old Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.957*** (0.030)
Age	0.001 (0.003)
Edu	0.021 (0.016)
Observations	90
Sargan-test	P=0.484
Arellano-bond test of AR (2)	P=0.950

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.5: Income Estimation-Urban Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.943*** (0.032)
Age	0.001 (0.001)
Edu	0.021 (0.015)
Observations	90
Sargan-test	P=0.488
Arellano-bond test of AR (2)	P=0.852

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.6: Income Estimation-Urban Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	1.002*** (0.022)
Age	-0.001 (0.007)
Edu	-0.004 (0.010)
Observations	90
Sargan-test	P=0.895
Arellano-bond test of AR (2)	P=0.799

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.7: Income Estimation-Rural Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.862*** (0.049)
Age	0.005*** (0.002)
Edu	0.103*** (0.039)
Observations	90
Sargan-test	P=0.618
Arellano-bond test of AR (2)	P=0.224

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.8: Income Estimation-Rural Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.844*** (0.047)
Age	0.006*** (0.002)
Edu	0.128*** (0.040)
Observations	90
Sargan-test	P=0.658
Arellano-bond test of AR (2)	P=0.285

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.9: Income Estimation-Income1 Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.442*** (0.147)
Age	0.008*** (0.002)
Edu	0.104*** (0.028)
Observations	32
Sargan-test	P=0.607
Arellano-bond test of AR (2)	P=0.882

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.10: Income Estimation-Income1 Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.325*** (0.117)
Age	0.010*** (0.002)
Edu	0.129*** (0.022)
Observations	32
Sargan-test	P=0.328
Arellano-bond test of AR (2)	P=0.734

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.11: Income Estimation-Income2 Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.840*** (0.082)
Age	0.003*** (0.001)
Edu	0.043*** (0.020)
Observations	32
Sargan-test	P=0.572
Arellano-bond test of AR (2)	P=0.290

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.12: Income Estimation-Income2 Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.869*** (0.082)
Age	0.002 (0.001)
Edu	0.035 (0.022)
Observations	32
Sargan-test	P=0.560
Arellano-bond test of AR (2)	P=0.379

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.13: Income Estimation-Income3 Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	1.003*** (0.066)
Age	-0.001 (0.001)
Edu	-0.014 (0.024)
Observations	32
Sargan-test	P=0.277
Arellano-bond test of AR (2)	P=0.552

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.14: Income Estimation-Income3 Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.968*** (0.066)
Age	-0.001 (0.001)
Edu	0.002 (0.024)
Observations	32
Sargan-test	P=0.142
Arellano-bond test of AR (2)	P=0.931

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.15: Income Estimation-Income4 Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.966*** (0.066)
Age	0.001 (0.001)
Edu	0.010 (0.030)
Observations	32
Sargan-test	P=0.485
Arellano-bond test of AR (2)	P=0.006

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.16: Income Estimation-Income4 Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.904*** (0.127)
Age	0.001 (0.002)
Edu	0.035 (0.056)
Observations	32
Sargan-test	P=0.547
Arellano-bond test of AR (2)	P=0.005

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.17: Income Estimation-Income5 Homeowner (Age boundary is 40)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.728*** (0.121)
Age	0.006** (0.003)
Edu	0.162** (0.085)
Observations	32
Sargan-test	P=0.416
Arellano-bond test of AR (2)	P=0.955

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A2.18: Income Estimation-Income5 Homeowner (Age boundary is 45)

Dependent Variable: Logincome	Coefficients
Logincome (-1)	0.729*** (0.125)
Age	0.006* (0.004)
Edu	0.178** (0.096)
Observations	32
Sargan-test	P=0.463
Arellano-bond test of AR (2)	P=0.9750

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

A3. Estimated Expected Housing Wealth and Income Figures with Estimated Unexpected Housing Wealth and Income for Pseudo-panels

Figure A3.1: Estimated Expected-Unexpected Housing Wealth and Income for Young-Homeowner-(Age Boundary 40)

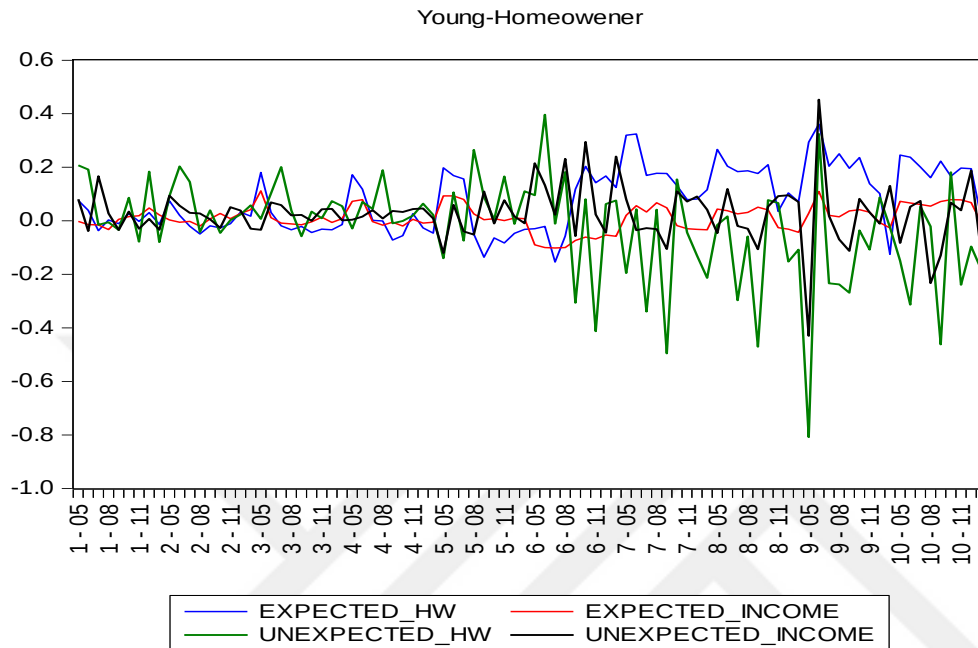


Figure A3.2: Estimated Expected-Unexpected Housing Wealth and Income for Young-Homeowner-(Age Boundary 45)

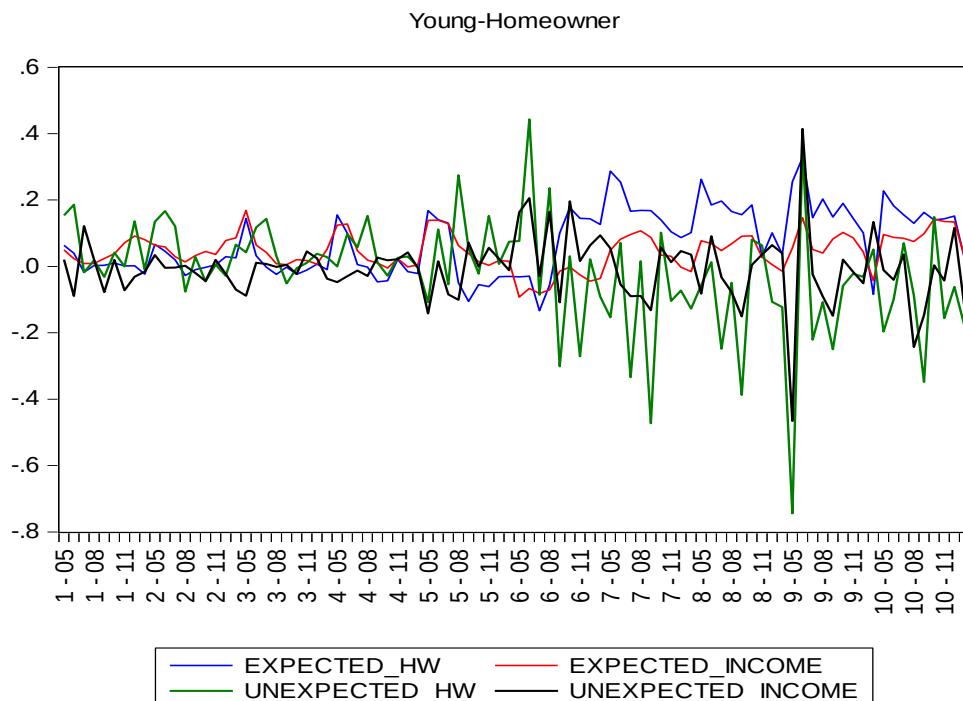


Figure A3.3: Estimated Expected-Unexpected Housing Wealth and Income for Old-Homeowner-(Age Boundary 40)

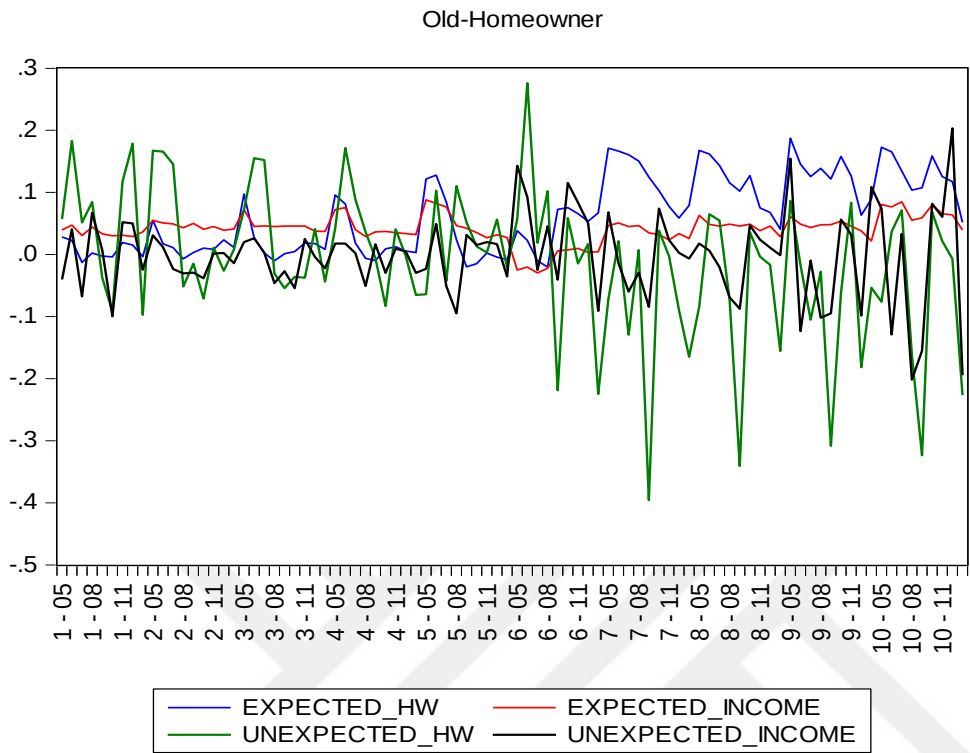


Figure A3.4: Estimated Expected-Unexpected Housing Wealth and Income for Old-Homeowner-(Age Boundary 45)

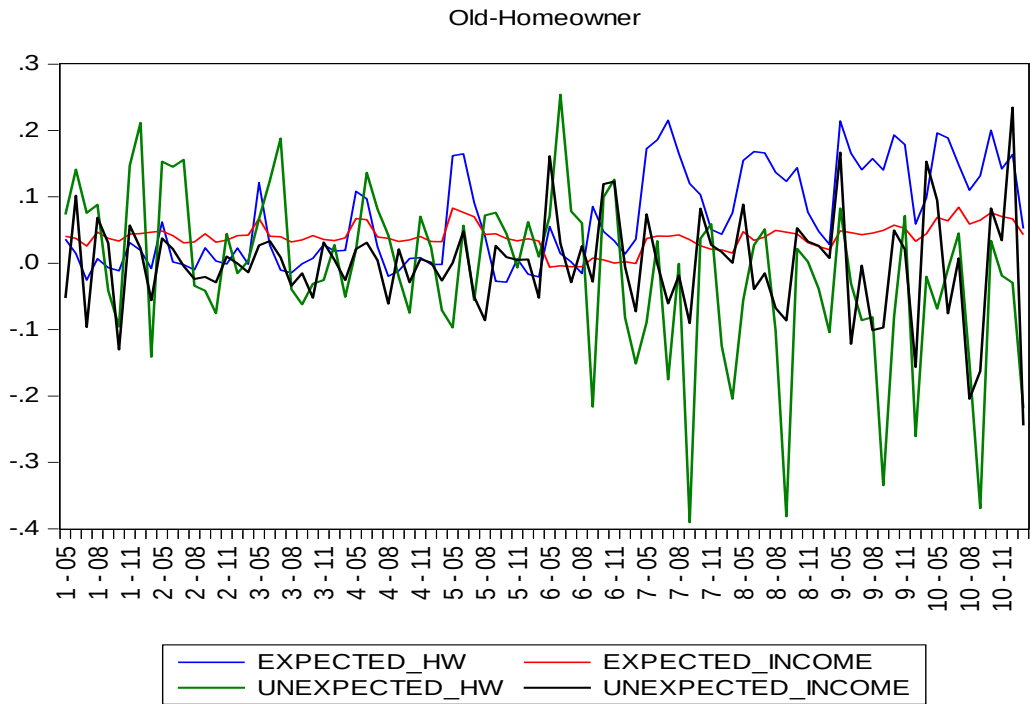


Figure A3.5: Estimated Expected-Unexpected Housing Wealth and Income for Urban-Homeowner-(Age Boundary 40)

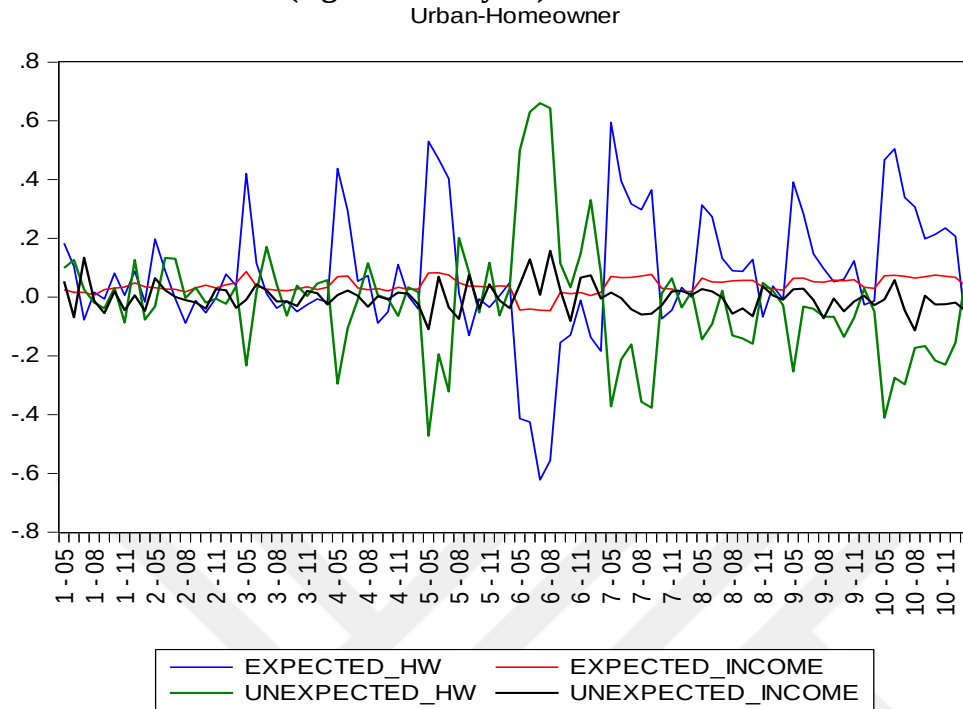


Figure A3.6: Estimated Expected-Unexpected Housing Wealth and Income for Urban-Homeowner-(Age Boundary 45)

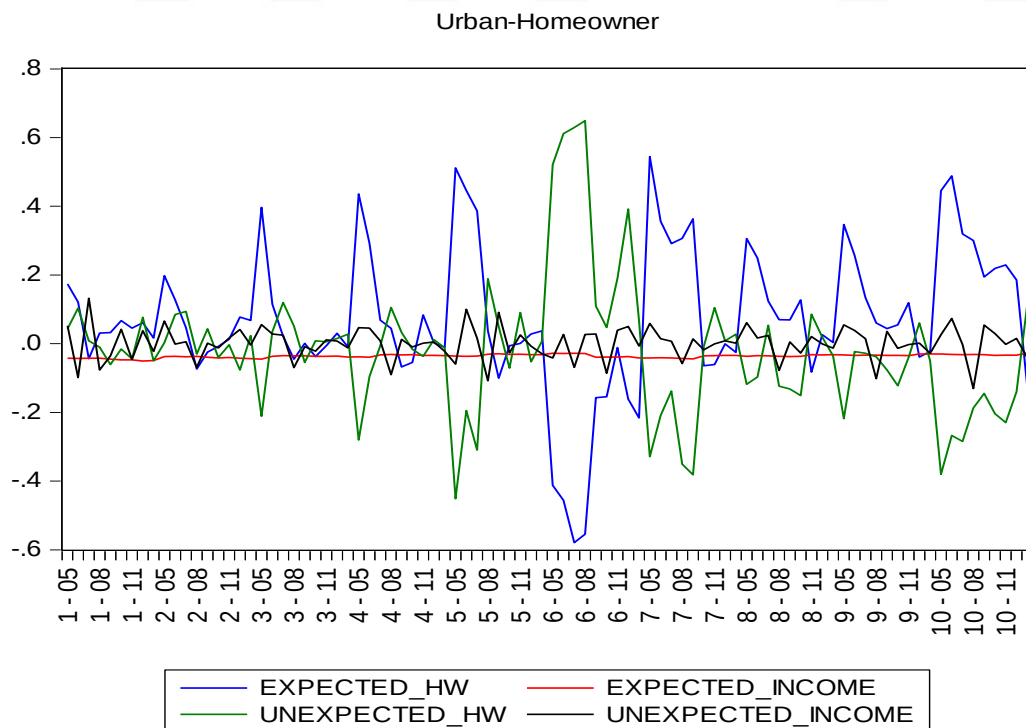


Figure A3.7: Estimated Expected-Unexpected Housing Wealth and Income for Rural-Homeowner-(Age Boundary 40)

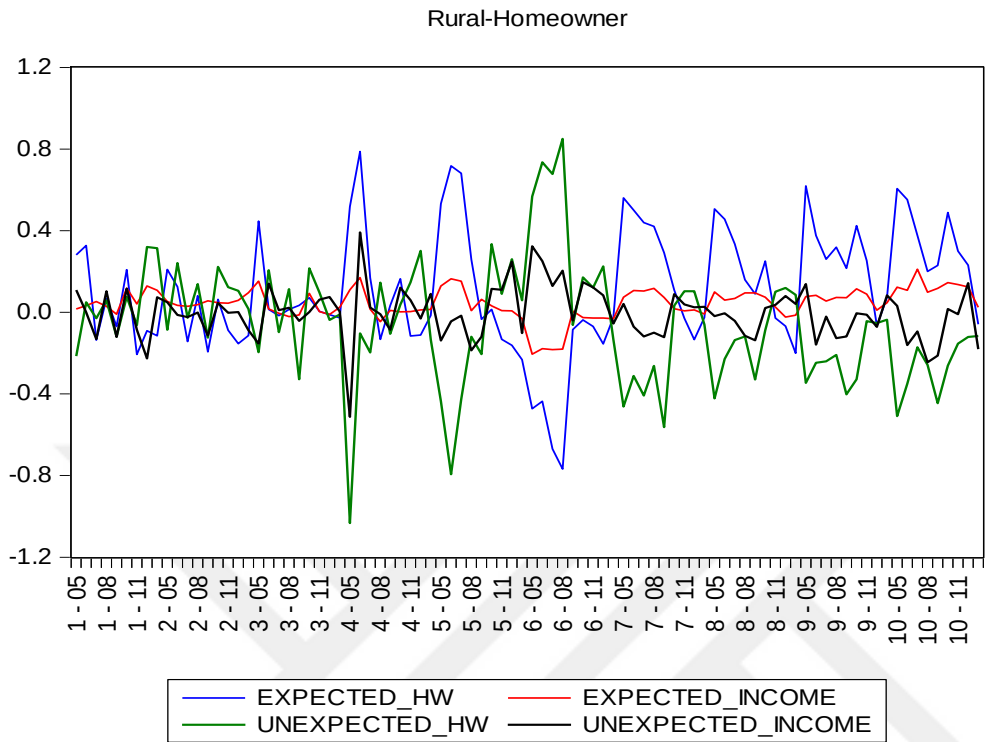


Figure A3.8: Estimated Expected-Unexpected Housing Wealth and Income for Rural-Homeowner-(Age Boundary 45)

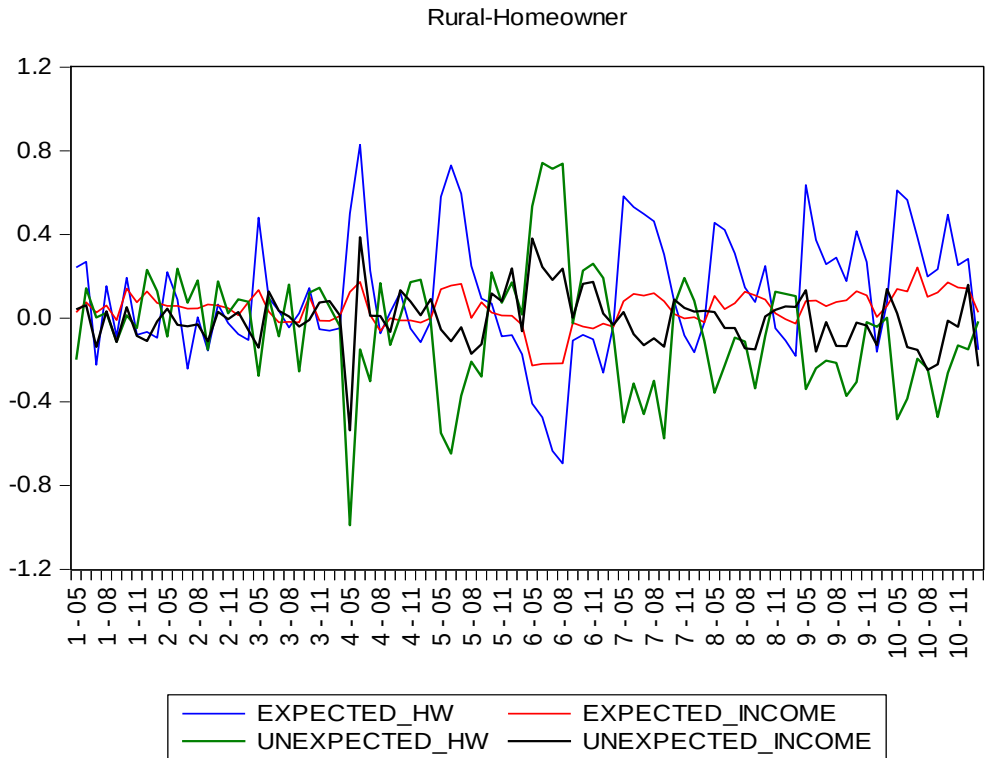


Figure A3.9: Estimated Expected-Unexpected Housing Wealth and Income for Income1 Homeowner-(Age Boundary 40)

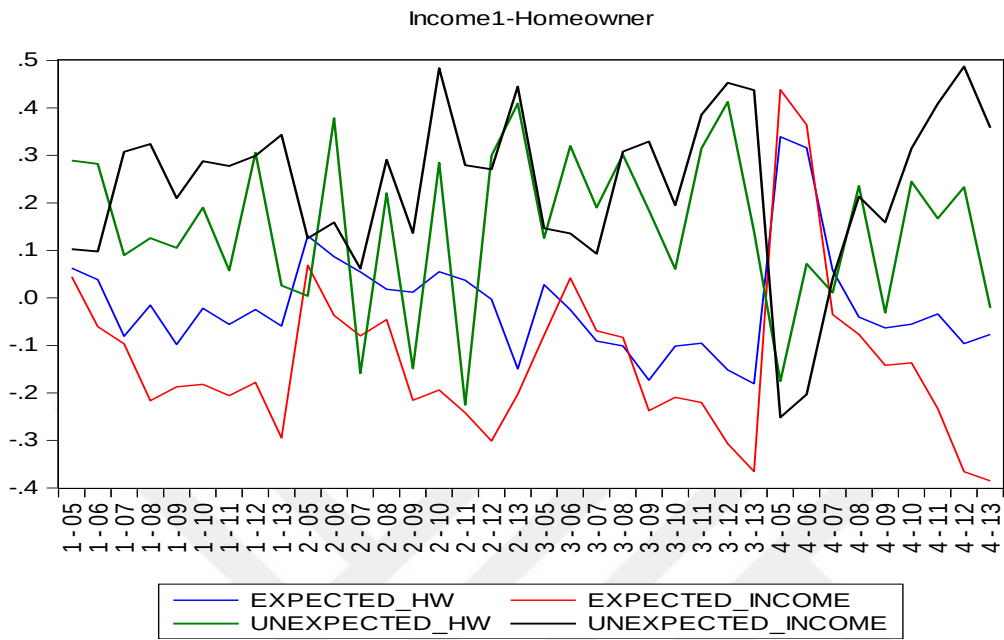


Figure A3.10: Estimated Expected-Unexpected Housing Wealth and Income for Income1 Homeowner-(Age Boundary 45)

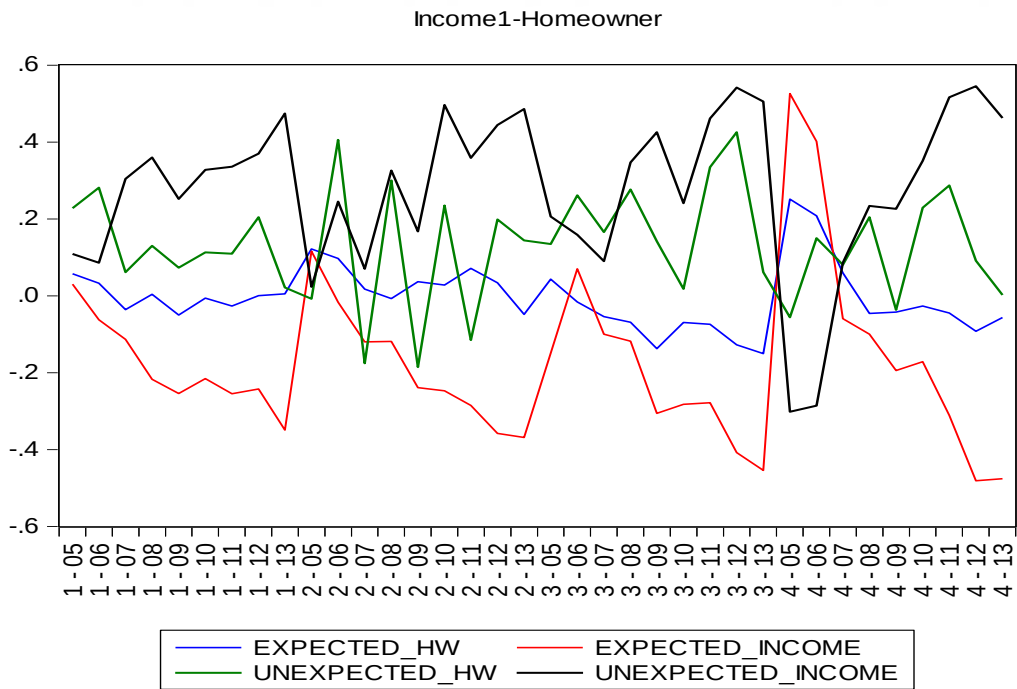


Figure A3.11: Estimated Expected-Unexpected Housing Wealth and Income for Income2 Homeowner-(Age Boundary 40)

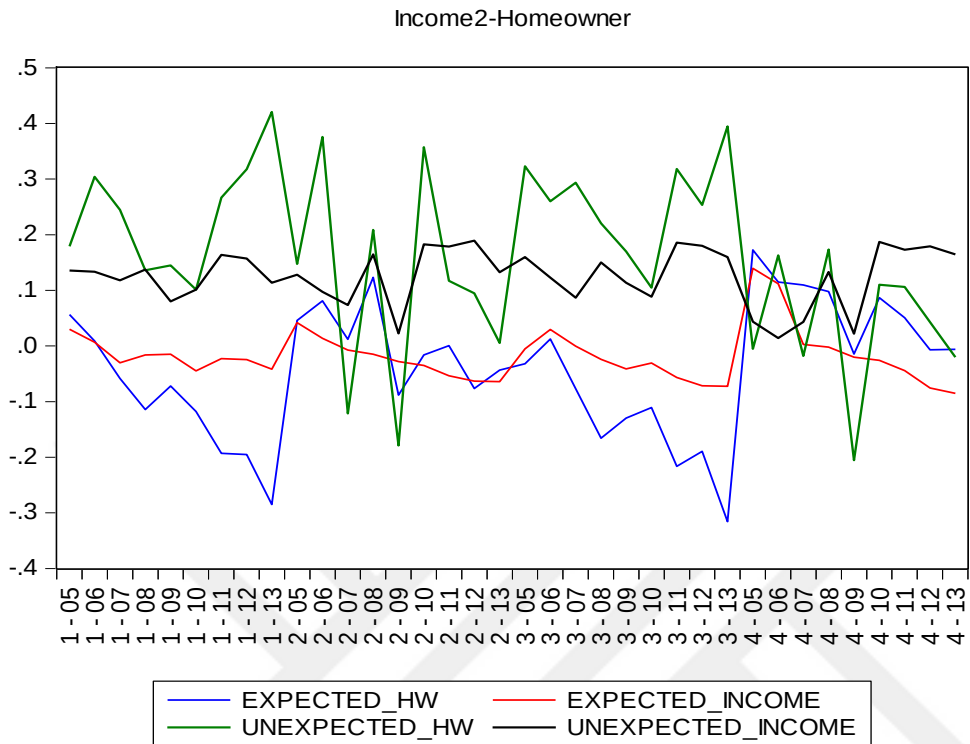


Figure A3.12: Estimated Expected-Unexpected Housing Wealth and Income for Income2 Homeowner-(Age Boundary 45)

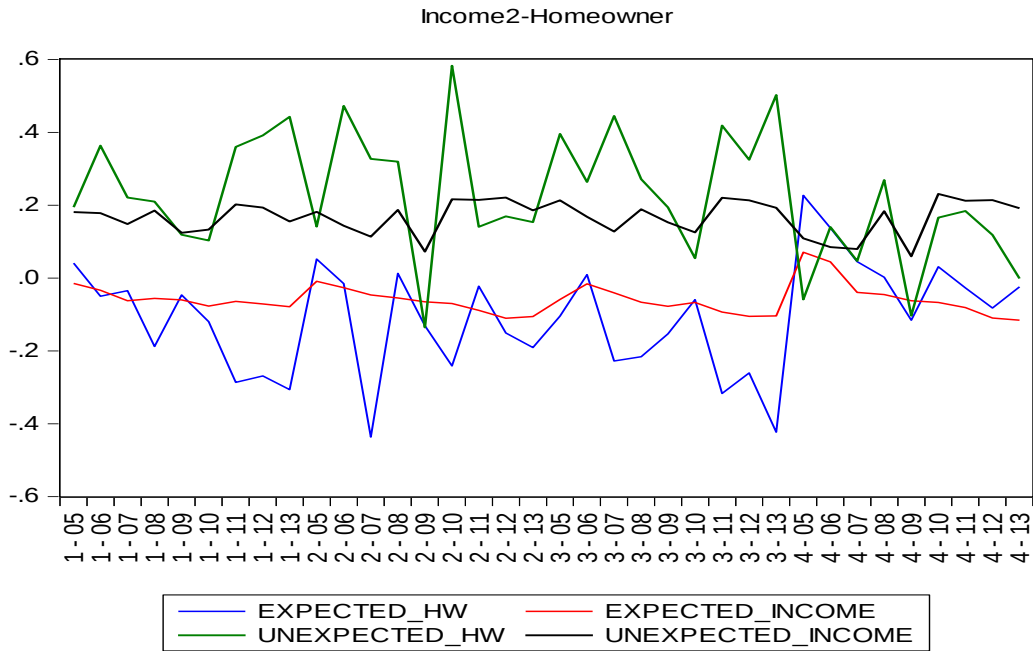


Figure A3.13: Estimated Expected-Unexpected Housing Wealth and Income for Income3 Homeowner-(Age Boundary 40)

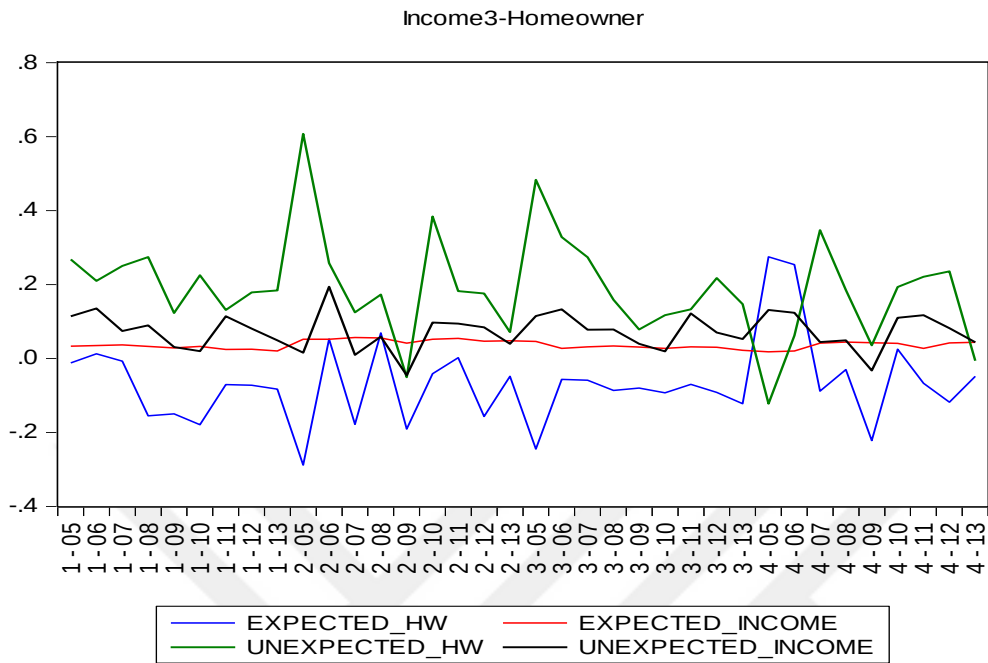


Figure A3.14: Estimated Expected-Unexpected Housing Wealth and Income for Income3 Homeowner-(Age Boundary 45)

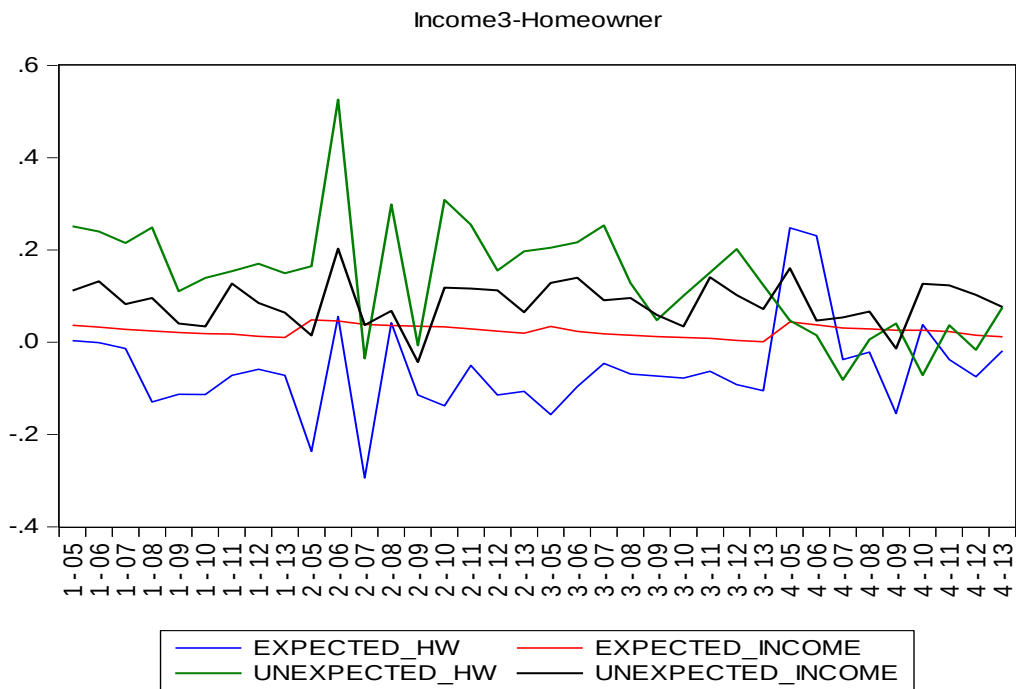


Figure A3.15: Estimated Expected-Unexpected Housing Wealth and Income for Income4 Homeowner-(Age Boundary 45)

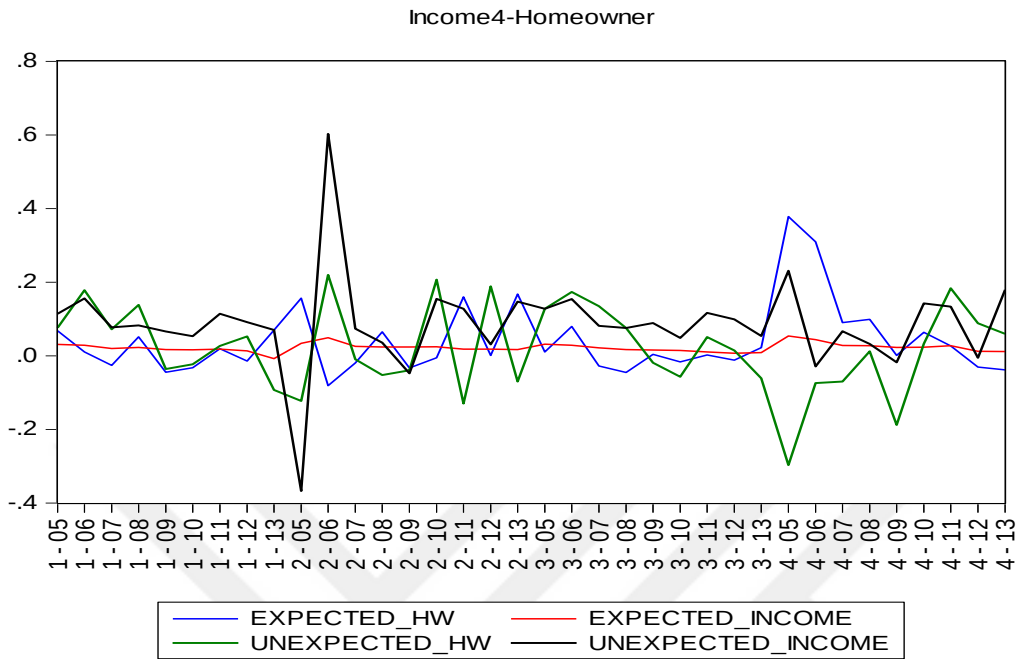


Figure A3.16: Estimated Expected-Unexpected Housing Wealth and Income for Income4 Homeowner-(Age Boundary 45)

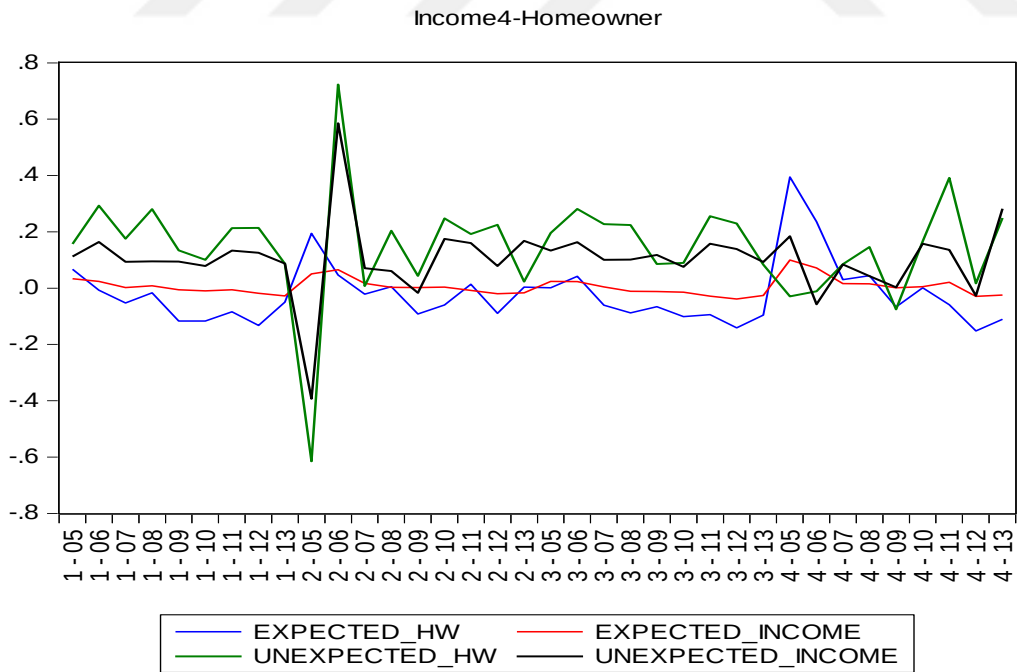


Figure A3.17: Estimated Expected-Unexpected Housing Wealth and Income for Income5 Homeowner-(Age Boundary 40)

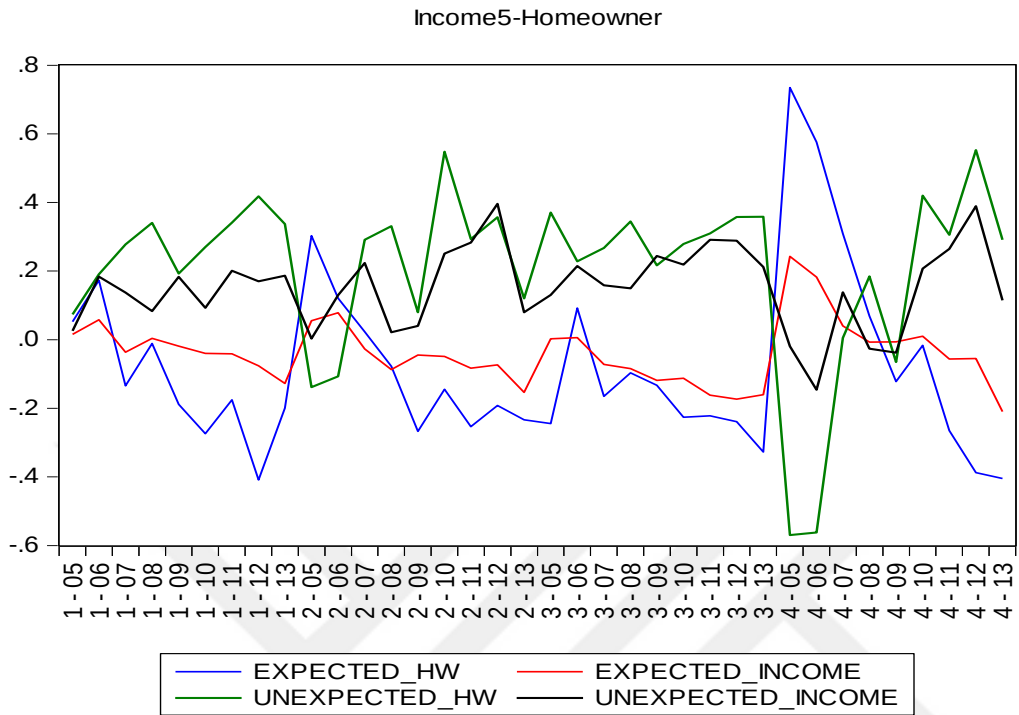
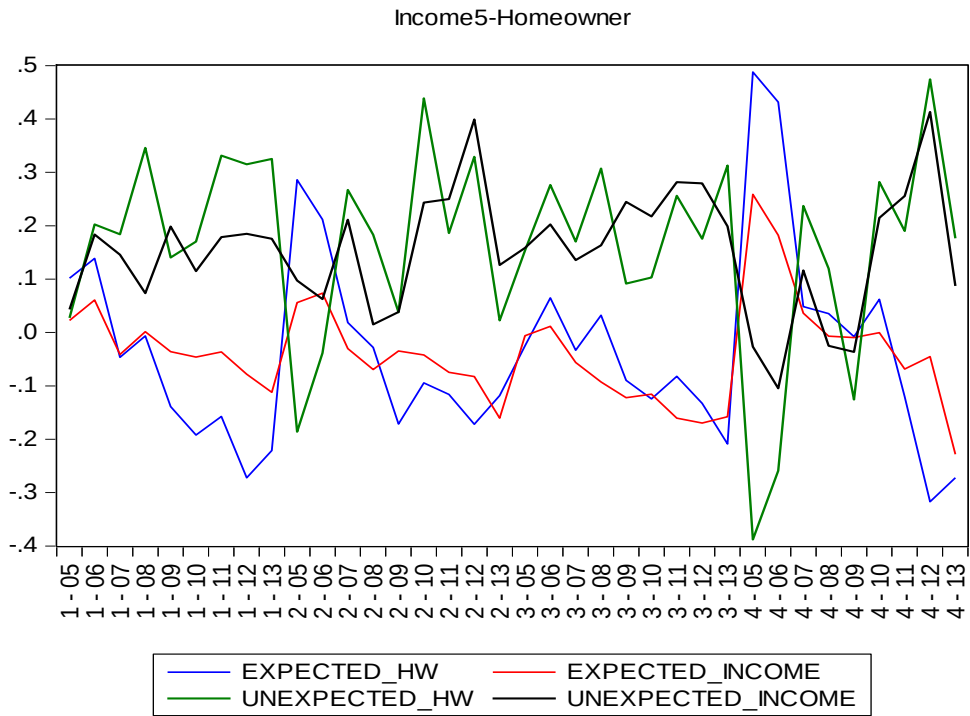


Figure A3.18: Estimated Expected-Unexpected Housing Wealth and Income for Income5 Homeowner-(Age Boundary 45)



A4. Main Regression Results

Table A4.1: Wealth Effects Estimation-Young Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.416*** (0.1387)
Unexpected Housing Wealth Change	0.154*** (0.0572)
Expected Income Change	0.164 (0.3505)
Unexpected Income Change	0.337*** (0.0867)
Observations	80
R-squared	0.617

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.2: Wealth Effects Estimation-Young Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.287* (0.1587)
Unexpected Housing Wealth Change	0.165** (0.0727)
Expected Income Change	0.508* (0.2611)
Unexpected Income Change	0.284*** (0.1024)
Observations	80
R-squared	0.601

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.3: Wealth Effects Estimation-Old Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.029 (0.3491)
Unexpected Housing Wealth Change	0.149 (0.1011)
Expected Income Change	0.655 (0.9343)
Unexpected Income Change	0.324** (0.1361)
Observations	80
R-squared	0.465

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.4: Wealth Effects Estimation-Old Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	-0.218 (0.2156)
Unexpected Housing Wealth Change	0.089 (0.0729)
Expected Income Change	2.202** (0.9081)
Unexpected Income Change	0.3785*** (0.0935)
Observations	80
R-squared	0.599

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.5: Wealth Effects Estimation-Urban Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.284*** (0.077)
Unexpected Housing Wealth Change	0.248*** (0.0585)
Expected Income Change	0.076 (0.5028)
Unexpected Income Change	0.227** (0.1069)
Observations	80
R-squared	0.637

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.6: Wealth Effects Estimation-Urban Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.227*** (0.0844)
Unexpected Housing Wealth Change	0.214*** (0.0668)
Expected Income Change	-0.474 (2.803)
Unexpected Income Change	0.255** (0.1139)
Observations	80
R-squared	0.620

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.7: Wealth Effects Estimation-Rural Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.186* (0.100)
Unexpected Housing Wealth Change	0.225* (0.077)
Expected Income Change	0.458* (0.2725)
Unexpected Income Change	0.361*** (0.1028)
Observations	80
R-squared	0.544

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.8: Wealth Effects Estimation-Rural Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.148 (0.1072)
Unexpected Housing Wealth Change	0.207** (0.0918)
Expected Income Change	0.466* (0.2464)
Unexpected Income Change	0.389*** (0.1074)
Observations	80
R-squared	0.588

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.9: Wealth Effects Estimation-Income1 Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.183 (0.223)
Unexpected Housing Wealth Change	0.228** (0.0909)
Expected Income Change	0.470*** (0.2464)
Unexpected Income Change	0.372*** (0.1279)
Observations	32
R-squared	0.857

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.10: Wealth Effects Estimation-Income1 Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	-0.265 (0.351)
Unexpected Housing Wealth Change	0.069 (0.1091)
Expected Income Change	0.508** (0.1946)
Unexpected Income Change	0.344** (0.1603)
Observations	32
R-squared	0.718

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.11: Wealth Effects Estimation-Income2 Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	-0.096 (0.192)
Unexpected Housing Wealth Change	0.082 (0.0864)
Expected Income Change	0.859 (0.5299)
Unexpected Income Change	0.899** (0.3907)
Observations	32
R-squared	0.733

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.12: Wealth Effects Estimation-Income2 Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.139 (0.099)
Unexpected Housing Wealth Change	0.183* (0.0885)
Expected Income Change	0.414 (0.6106)
Unexpected Income Change	0.391 (0.400)
Observations	32
R-squared	0.720

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.13: Wealth Effects Estimation-Income3 Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.110 (0.1324)
Unexpected Housing Wealth Change	-0.110 (0.1270)
Expected Income Change	4.527*** (1.470)
Unexpected Income Change	0.649* (0.3704)
Observations	32
R-squared	0.769

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.14: Wealth Effects Estimation-Income3 Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.008 (0.0997)
Unexpected Housing Wealth Change	-0.062 (0.0889)
Expected Income Change	0.008 (0.0997)
Unexpected Income Change	1.049*** (0.2340)
Observations	32
R-squared	0.809

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.15: Wealth Effects Estimation-Income4 Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	-0.060 (0.2615)
Unexpected Housing Wealth Change	0.2394 (0.1404)
Expected Income Change	1.512 (2.845)
Unexpected Income Change	-0.018 (0.1706)
Observations	32
R-squared	0.539

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.16: Wealth Effects Estimation-Income4 Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.142 (0.284)
Unexpected Housing Wealth Change	0.213 (0.1847)
Expected Income Change	-0.745 (1.248)
Unexpected Income Change	-0.011 (0.2046)
Observations	32
R-squared	0.388

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.17: Wealth Effects Estimation-Income5 Homeowner (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	-0.040 (0.1842)
Unexpected Housing Wealth Change	-0.2725 (0.2156)
Expected Income Change	0.396 (0.5969)
Unexpected Income Change	0.165 (0.3220)
Observations	32
R-squared	0.548

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A4.18: Wealth Effects Estimation-Income5 Homeowner (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.360 (0.3332)
Unexpected Housing Wealth Change	0.094 (0.2661)
Expected Income Change	0.023 (0.6455)
Unexpected Income Change	-0.022 (0.3688)
Observations	32
R-squared	0.409

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A5.1: Wealth Effects Estimation- (Young + Old Homeowner) (Age boundary is 40)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.406*** (0.1204)
Unexpected Housing Wealth Change	0.155*** (0.0456)
Expected Income Change	0.119 (0.3092)
Unexpected Income Change	0.331*** (0.0679)
Observations	160
R-squared	0.528

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

Table A5.2: Wealth Effects Estimation- (Young + Old Homeowner) (Age boundary is 45)

Dependent Variable: D(Consumption)	Coefficients
Expected Housing Wealth Change	0.185* (0.1142)
Unexpected Housing Wealth Change	0.126*** (0.0493)
Expected Income Change	0.637*** (0.2085)
Unexpected Income Change	0.337*** (0.0679)
Observations	160
R-squared	0.552

Standard errors in parentheses-***p<0.01, **p<0.05, *p<0.1

APPENDIX B: Estimation Results of Cross-Section Data Analysis

Table B.1: Consumption Level Estimation for Homeowner with One House

Dependent Variable: Logcons	Loghw (Housing Wealth)- Coefficients	Logincome (Total Disposable Income)-Coefficients
2004	0.198*** (0.0077)	0.490*** (0.0087)
2005	0.187*** (0.0078)	0.504*** (0.0091)
2006	0.204*** (0.0073)	0.584*** (0.0092)
2007	0.203*** (0.0072)	0.556*** (0.0089)
2008	0.207*** (0.0077)	0.554*** (0.0089)
2009	0.206*** (0.0072)	0.504*** (0.0087)
2010	0.207*** (0.0075)	0.531*** (0.0083)
2011	0.214*** (0.0081)	0.513*** (0.0087)
2012	0.213*** (0.0084)	0.579*** (0.0091)
2013	0.216*** (0.0082)	0.582*** (0.0090)

Notes: *** (**) denote statistical significance at the 1% (5%) level

Table B.2: Consumption Level Estimation for Homeowner with Many Houses

Dependent Variable: Logcons	Loghw (Housing Wealth)- Coefficients	Logincome (Total Disposable Income)- Coefficients	Logrental(Rental Income)-Coefficients
2004	0.218*** (0.0357)	0.368*** (0.0234)	0.154*** (0.0317)
2005	0.297*** (0.0199)	0.276*** (0.0199)	0.209*** (0.0333)
2006	0.229*** (0.0317)	0.428*** (0.0233)	0.159*** (0.0251)
2007	0.185*** (0.0314)	0.428*** (0.0229)	0.171*** (0.0262)
2008	0.269*** (0.0282)	0.344*** (0.0204)	0.118*** (0.0241)
2009	0.240*** (0.0251)	0.370*** (0.0185)	0.139*** (0.0227)
2010	0.278*** (0.0269)	0.319*** (0.0165)	0.167*** (0.0220)
2011	0.247*** (0.0286)	0.336*** (0.0197)	0.177*** (0.0245)
2012	0.282*** (0.0291)	0.385*** (0.0227)	0.125*** (0.0262)
2013	0.241*** (0.0267)	0.362*** (0.0193)	0.112*** (0.0236)

Notes: *** (**) denote statistical significance at the 1% (5%) level

APPENDIX C: Estimation Results of Common Factor Analysis

C.1. Panel Unit Root Results

Variables	Levin, Lin & Chu t		ADF - Fisher Chi-square		PP - Fisher Chi-square	
	Level	First Difference	Level	First Difference	Level	First Difference
Consumption	3.748 (0.999)	-8.788*** (0.000)	0.664 (1.000)	66.044*** (0.000)	0.384 (1.00)	66.139*** (0.000)
Income	3.956 (1.000)	-5.816*** (0.000)	1.510 (0.989)	52.028*** (0.000)	3.334 (0.972)	67.968*** (0.000)
Housing Wealth	0.554 (0.712)	-12.346*** (0.000)	3.141 (0.979)	56.786*** (0.000)	0.817 (0.999)	39.459*** (0.000)
Credit_con	1.811 (0.965)	-6.386*** (0.000)	1.425 (0.999)	44.460*** (0.000)	0.335 (1.000)	51.119*** (0.000)
Credit_domestic	1.087 (0.867)	-8.791*** (0.000)	2.263 (0.993)	62.346*** (0.000)	0.589 (1.000)	79.570*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level

Table C1.2: Panel Unit Root Results-Renters

Variables	Levin, Lin & Chu t		ADF - Fisher Chi-square		PP - Fisher Chi-square	
	Level	First Difference	Level	First Difference	Level	First Difference
Consumption	5.134 (1.000)	-5.321*** (0.000)	1.030 (0.999)	39.581*** (0.000)	1.141 (0.999)	51.848*** (0.000)
Income	2.982 (0.998)	-8.995*** (0.000)	2.208 (0.994)	65.981*** (0.000)	2.273 (0.993)	65.591*** (0.000)

Notes: *** (**) denote statistical significance at the 1% (5%) level

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