BOK Working Paper

House Prices and Household
Consumption in Korea

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2020. 5

BANK OF KOREA

Economic Research Institute
Bank of Korea

Publisher
Juyeol Lee
(Governor of Bank of Korea)

Editor
Woon Shin
(Director General of the Institute)

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We are grateful to Woon Shin, Sok Won Kim, Byoung Ho Bae, Eunjong Jang, Jongwook Park, and anonymous referees for their useful comments and suggestions. The views expressed in this paper are those of authors and do not necessarily reflect the views of Bank of Korea.

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House Prices and Household Consumption in Korea

We measure impact of real estate housing prices on household consumption and investigate channels in operation, making use of panel data from Korea. Our baseline finding is that households expand their consumption by 0.194 percentage points in response to a 1 percentage point increase in the real house price index. This result is driven to a larger extent by home-owning households rather than non home-owning households, and by falling prices rather than rising prices. In an attempt to find clues as to the operation of relevant channels, we further breakdown total households into subgroups based on multi-house ownership, ages of the householders, size of the housing unit, and borrowing constraints that the household may face. In examining these subgroups of homeowners, we find evidence consistent with the operation of the wealth effect channel, but we do not find evidence supporting the operation of the collateral effect channel. Estimates for non home-owning households are broadly consistent with the precautionary saving effect channel, but we also find results that might be interpreted as there being a discouragement effect channel for a subgroup of non home-owning households.

Keywords: House price, Consumption, Wealth effect, Household panel data

JEL Classification: D21, E21

I. Introduction

Changes in house prices could have a substantial impact on household consumption and thus overall business fluctuations. Housing assets account for a significant portion of total household wealth and constitute the single most important asset in household balance sheets. In most advanced countries, housing assets account for half to two-thirds of the wealth of median households, and the share of housing assets is likely to be even higher recently after the strong growth we have observed in housing prices since the global financial crisis. This implies that changes in housing values have the possibility to affect a household's capacity to consume if they consider total wealth they can use in their life time as well as their current income flow in determining their consumption behavior. Changes in housing values could also affect business cycle in the economy as household consumption accounts for almost half of national GDP.

In this paper, we examine how house price fluctuations affect household consumption using household-level panel data from Korea. The difference between our analysis and previous studies is that we consider the impact of house prices on consumption may be asymmetric across households with different homeownership types and across periods of rising and falling housing prices. Previous studies focused mainly on homeowners, investigating the quantitative impact of house asset value on homeowners' consumption, and the channels in operation. A few studies have investigated the impact on renters, more precisely, households that do not own their own homes. Unlike the previous studies, we investigate both homeowners and renters in a unified framework in an attempt to analyze the impact of house prices on consumption. Considering that a significant portion of households do not own their own home, we think it is important to embrace renters as well as homeowners in examining how house prices affect consumption. In addition, we examine asymmetric responses of consumption to rising and falling prices. This is to consider that the responses of household consumption could be different across directions of asset value fluctuations. Then we further breakdown households

based on heterogeneity, such as homeownership and tenure types, householders' age, house size, and borrowing constraints that households face. By examining responses of these sub-groups, we attempt to draw clues as to the channels in operation through which house prices could affect consumption.

A few of the channels through which house price fluctuations might affect household consumption have been suggested. A rise in housing prices increases the asset value of home-owning households and thus can have a boosting impact on their consumption, which is a function of their life-time wealth, the wealth effect. Another explanation of the positive relationship between housing prices and consumption is that the collateral value of home-owning households increases as housing asset value appreciates, thus allowing them to borrow and spend more than before, the collateral effect. For non home-owning households, i.e. renters, an increase in housing prices might force them to lower their consumption spending as they need to save more to afford to buy now-more-expensive housing assets, the precautionary saving effect. If they give up on buying a house due to an appreciation in housing asset prices, they might expand their consumption instead of maintaining or increasing their savings, the discouragement effect.

In this study, we measure the responses of households to changes in housing prices to determine their consumption-saving behavior and the operation of relevant channels by making use of household-level panel data from Korea. The Korean Labor and Income Panel Survey (KLIPS) database from 2011 to 2017 waves is used to construct an annual unbalanced panel dataset of households. In the panel regression equation, we have the growth rate of real household consumption as a dependent variable, and we include the growth rate of house prices matched to each household and other various household-level demographic features, and aggregate-level macroeconomic conditions, as control variables. For a measure of housing prices, we use the house price index in the residential area of the pertinent households. Household-level fixed effects are included to control remaining household features that could possibly affect consumption behavior, and a clustered robust standard error at the household level is adopted in the estimation.

We find that households expand the growth rate of their consumption by about 0.194 percentage points in response to a 1 percentage point increase in real house prices in the region where they reside. This estimate is less than a third in magnitude than that documented in Campbell and Cocco (2007) who investigated the U.K. case using a similar regression model. Looking at possible asymmetric responses across homeownership, we find that homeowners' consumption responds positively (0.257), while non-homeowners' consumption responds negatively (minus 0.280) to housing price fluctuations. This result is consistent with our expectations of the operation of the wealth effect channel for homeowners and the precautionary saving channel for non-homeowners. Examining the responses to the direction of housing price changes, we find that the baseline response is driven to a larger extent by reduced consumption in response to falling house prices (0.552), rather than by any expanded consumption in response to rising house prices (0.151). This implies that households respond to capital losses in asset values to a larger extent than to the same size of the capital gain. These results show that housing price fluctuation brings about asymmetric influences on consumption across homeownership and the direction of housing price changes, though the responses of non-homeowners and those to rising prices are not statistically significant. If we consider asymmetric responses across homeownership and the direction of housing price fluctuation simultaneously, we find that homeowner's consumption is, to a larger extent, affected by rising housing prices rather than rising housing prices. In the case of non home-owning households, their adjustment in consumption is larger in magnitude and less insignificant in response to rising prices rather than to falling prices. A back-of-the-envelope calculation from the estimates suggests that a 1 percentage point increase and decrease in house prices cause aggregate household consumption to increase by 0.03 percent and to decrease by 0.32 percent, respectively.

We further investigate household heterogeneity that might affect households' consumption behavior in response to house price fluctuations. We breakdown total households by several criteria, such as multi-homeownership, age of householders, size of house, and the extent of borrowing constraints that

households face. First, we breakdown home-owning households into three subgroups based on whether or not they own a single house or two or more houses, and if they are living in their own house or if they are living in a rented house. We find that multi-house owners respond to a much larger extent to house price changes compared to single home owners, and this is the case for both rising housing prices and falling housing prices. This result is consistent with the findings for Hong Kong, which Gan (2010) argues is supportive of the pure wealth effect. Second, looking at the age of householders, older non home-owning households increase, instead of decrease, consumption in response to falling house prices. One possible explanation for this result is the discouragement effect (Yoshikawa and Ohtake, 1989; Engelhardt, 1994). Third, we find that consumption in households living in relatively larger houses tends to be more sensitive to house price fluctuations, regardless of their homeownership type. We conjecture that this evidence also supports the pure wealth effect channel, because it is more likely that households possessing larger houses can realize their benefits from rising house prices just as multi-house owners do. Lastly, we classify households based on the extent of borrowing constraints they face. A change of consumption in response to house prices might reflect the collateral effect, a loosening of borrowing constraints, not the wealth effect channel (Iacoviello, 2004). If this borrowing constraints effect is in operation, we would see financially constrained home-owning households increase their consumption to a larger extent than unconstrained households. In our results we do not find evidence supporting this hypothesis of the collateral effect.

The remainder of this paper proceeds as follows. In Section II, we discuss relevant studies. Section III provides a description of the household-level panel data and the aggregate data series. In Section IV we present our core empirical results. In Section V we implement a heterogeneity analysis and suggest evidence for the operation of the relevant channels. We provide the results of the robustness tests in Section VI. Section VII concludes.

II. Relevant Studies

A large body of literature has examined the relationship between housing wealth and household consumption expenditure with a particular reference to homeowners by analyzing household-level micro data.¹⁾ Many studies have used a household level survey from the U.S., the so-called Panel Study of Income Dynamics (PSID). Skinner (1989) finds small but significant impact on household consumption from house price changes based on a pooled cross-section regression (0.0625), but does not find that positive impact when household fixed effects considered. The results imply that households might not consume housing wealth or that there could be various reasons why households may be unable to spend down their housing wealth. Skinner (1996) reports that an appreciation in housing wealth boosted consumption spending in younger households, but not in older households that are more likely to be cautious about spending those gains. Engelhardt (1996) documents the marginal propensity to consume out of housing wealth to be about 0.029 for median home-owning households under 65-years-old. All the savings offset stems from households that have housing capital losses, and households that experience capital gains do not change their saving behavior. Lehnert (2004) finds an overall marginal propensity to consume out of housing wealth gains to be between 0.04 and 0.05. By examining asymmetric responses across ages groups (quintiles) of householders, the youngest group have higher elasticities than the next two age quintiles possibly because they face faster expected income growth and hence borrow more than older households. That of householders on the verge of retirement has the highest responsiveness, and this might be due to the fact that they are the likeliest to realize a capital gain by downsizing their housing wealth. Bostic, Gabriel and Painter (2009) match two sources of household level micro data (CEX and SCF), and find that the

1) There are also a lot of studies examining the relationship between house prices and consumption from national- or state- level aggregate data. For example, see Girouard and Blondal (2001), Church, Smith and Wallis (1994), Benjamin, Chinloy and Jud (2004), Ludwig and Slok (2002), Dvornak and Kohler (2007), Case, Quigley and Shiller (2005).

housing wealth elasticities are estimated to be in the range of 0.06 over the 1989-2001 period for homeowners. This estimate implies that 10 percent decline in housing prices translates into a 1 percentage point decline in GDP growth.

Campbell and Cocco (2007) and Disney, Gatherwood, and Henley (2010) utilize household level data in the U.K. Campbell and Cocco (2007) estimate house price elasticity from Financial Expenditure Survey by categorizing households by age and homeownership, and find that it is as large as about 1.67 for older homeowners, while it is 0.003 for young renters. Elasticities for young-owners and old-renters are estimated at 0.796 and 0.742, respectively. Disney, Gatherwood, and Henley (2010) examine the impact of unanticipated housing capital gains on consumption behavior from British Household Panel Survey (BHPS). They report that there exists little evidence of heterogeneity in the responses of young and old homeowners, but they find differences between owners and renters. Examining asymmetric responses to rising and falling house prices, they also find that households lower/increase their savings in response to surprise housing capital gains/losses. Gan (2010) investigates the relationship between housing wealth and household consumption from household level panel data in Hong Kong. The result that households that have multiple houses have much stronger consumption responses represents evidence supporting for the pure wealth effect.

A few studies focus on the impact of high house prices on the consumption of non-homeowners, and the evidence for the direction of consumption in response to house price increases is mixed. Yoshikawa and Ohtake (1989) find that high land prices in Japan raise the savings rate for non home-owning households that continue to have plans to purchase a house, but lowers it among non home-owning people who abandon such plans. This implies that some prospective home owners may get discouraged by high housing prices and give up on the hope of ever purchasing a home, resulting in raising their consumption; the discouragement effect. Engelhardt (1994) identifies renter households that are saving for a down payment from a membership database in a tax-deferred savings program for prospective first-time home buyers in

Canada, and finds that high house prices (a 5 percent increase in housing prices) lower the probability of saving for a down payment by 1 percentage point, which is consistent with a discouragement effect. In contrast, Sheiner (1995) reports that the effects of an increase in house prices on saving is positive and quite large for 25- to 34- year-old renters in the U.S.

III. Data Description

In this section we introduce the household survey data and aggregate series we use in our analysis, and explain how we construct the household-level and aggregate variables that are used in our empirical analysis.

1. Household Micro Data

1.1. Household Survey Data: KLIPS

We use Korean Labor and Income Panel Survey (KLIPS) database to construct an annual unbalanced panel data of households. The KLIPS is a longitudinal survey that follows up on 5,000 households living in non-rural areas of Korea and reports comprehensive household-level information including assets, liabilities, incomes, consumption, economic activities, education, household membership structure, and various demographic features of the household. Consumption, which measures the entire amount of nominal consumption of the respondent household, is surveyed across 10 sub-items, and we use total consumption in our analysis. Household income includes income from financial assets, housing assets, and transfers other than labor income. We use total income, which is the sum of all incomes. Household assets encompass real estate assets, either for personal residence or for a rental income, and financial assets. Liabilities include any amount of outstanding debt from financial and non-financial institutions and person-to-person loans. In the case of real estate assets, respondents can choose one of a range of asset values given in the questionnaire, instead of reporting an exact value, considering the

fact that they might not know or reasonably evaluate the exact market value of the real estate they possess. For households that report asset values in those ranges, the median value of the range could be used in the analysis, but this could have a non-negligible measurement bias. This is the reason why we use an aggregate housing price index instead of any self-reported real estate values when measuring responses of household consumption to house price changes. Items for flow variables, such as income and consumption, are asked for “the prior year,” while those for stock variables, like assets and liabilities, are compiled as of the date of the survey, and we adjust the timing of the variables. Demographic features surveyed include comprehensive items, such as education, marriage status, occupation and job status for the head of household and for the other members in the household.

1.2. Homeownership–Tenure Status Structure

We classify our total number of households into four categories based on their homeownership and their tenure status. First, we look at whether or not they have housing assets, i.e. homeowner vs. non-homeowner, and, if they do, if they have a single house or more than one house. Second, we look at the current tenure status, i.e. owner-occupied, renting, etc. Based on those two criteria, we can then classify our total number of households into one of the four groups: 1. single house owners living in the housing they own; 2. multiple-home owners living in a house they own; 3. homeowners living in rented housing; and, 4. non-homeowners living in rented housing.

Looking at the classifications and household distribution according to these categories, households that own at least one house make up 63.7 percent of our total number of households. The majority of homeowners are living in their own house, and thus only a very small fraction are renters. The majority of homeowners are a single-house owner. Renters who do not own their own housing asset are about 36.3 percent of the total number of households.

1.3. Descriptive Statistics

Figure 1 illustrates average real income, consumption, liabilities and financial assets by age of householders, and household classifications. We pay attention to age groups as homeownership and tenure status tend to depend on the position of the homeowner in their life-span. Real household income has an inverted-U shape. Average household income rises in accordance with age, and begins to decline in about one's 50s. Incomes of all households except multi-house homeowners adhere to this pattern. For multi-homeowners, income for households with homeowner in their 20s is higher than other age brackets. One explanation for this seemingly odd pattern is that young multi-home owners are likely to have inherited their real estate and the basis for high incomes from family. Thus they record high incomes. The order of income level across all ages is multi-house owners, owner-renters, single homeowners, and renters. Looking at consumption, all groups have a well-behaved inverted-U shape consumption level across ages. The order of consumption levels across household classifications is the same as that for income. We find that average household income and consumption are consistent as expected from life-span patterns. The patterns of real financial liabilities across a homeowner's age is marked by being high for multi-house owners and owner-renter households. It is pronounced that the level of household debt for multi-house owners jumps in their 60s. This perhaps reflects retired householders making loans and investing in real estate in an attempt to receive a rent. It is observed that multi-house owners have the largest financial assets on average after their 40s, followed by owner-renters, single-home owners, and non-homeowners.

2. Aggregate Data

2.1. Measure of House Asset Value

As a measure of house asset value, we use a house price index in the

Figure 1: Descriptive Statistics (By Age and Homeownership Type)

Notes: The figures illustrate income, consumption, debt and financial assets for average households by homeownership types and householder's age. Unit is 100 million KRW.

residential area of the pertinent household. The Korea Appraisal Board compiles an aggregate Housing Sales Price index for 17 regions across Korea by four different residence types. The regional classification covers seven metropolitan areas, nine provinces and one special district, the Sejong Special Autonomous City. The type of residences include "Total," "Apartments," "Row Houses" and "Detached Houses." Thus, it provides 68 aggregate annual times series (17 regions, four types of residences) in total. We match this housing price index to each household reported in the KLIPS, according to region, type of residence, and year. For households whose residential types do not belong to the three categories, such as flats with shops or the other exceptions, a total index is matched.

Figure 2: Distribution in Changes in House Prices

Notes: The figures present distribution in annual changes of real house price index used in the analysis for 17 districts. Panel (a) is from real house sale price index of aggregate 68 series. Panel (b) is from house sale price index matched to household sample.

The use of an aggregate price index at the regional level has several advantages. First, the house price index reflects the average market value of house asset prices in the region in which each household resides, and therefore, presents an objective asset value, ruling out subjective and possibly biased self-evaluated prices.²⁾ Second, this could be used to measure the responses of non-homeowners to changes in market housing prices. This is because non-homeowners, who do not have any housing assets, do not answer the question, “what is the market value of the housing asset they possess.” Third, what matters to households could be real estate prices in the region in which they reside, instead of a national average. House prices across different regions or neighborhoods could have quite different developments due to local economic conditions, supply and demand of houses in the specific areas, and variations in population, and so on. Regional house prices could represent more relevant house asset values for households.

Figure 2 presents the distribution of annual changes in the real house price index used in the analysis for 17 districts. Panel (a) is the real house sale price index of 68 aggregate series, made up of 500 observations. The maximum, minimum, and median are 18.6 percent, minus 9.3 percent, and minus 0.1

2) See Engelhardt (1996), Disney, Gathergood and Henley (2010), and Gan (2010) for discussion on this issue.

percent, respectively. Panel (b) is from the house sale price index, matched to household samples. We find that an increase and a decrease in real house price changes are distributed on balance, overall, and this makes it plausible to analyze asymmetric responses of consumption to rising and falling house prices.

2.2. Other Aggregate Variables

Other aggregate macroeconomic variables used in the analysis include the consumer price index, interest rates, and the regional GDP growth rate. Household-level variables and aggregate house price indexes are deflated by the headline Consumer Price Index (CPI). The interbank overnight call rate is used as an indicator of the nominal interest rate. We set the real interest rate as the difference between the nominal interest rate and the inflation expectation from the Consumer Sentiment Index (CSI). Growth rates of real GDP for 17 districts are used in an attempt to capture overall economic activity conditions in the region.

IV. Estimation Strategies and Estimation Results

This section consists of four sub-sections. We present the estimation model in Section IV.1 and we explain our estimation methodology in Section IV.2. In Section IV.3, we investigate the responsiveness of household consumption to rising and falling house prices across different types of households. Based on these estimates, we infer an overall macroeconomic impact of housing price fluctuation from a back-of-the-envelope calculation in Section IV.4.

1. Estimation Model

We use Equation (1) to measure the responses of household consumption to changes in house prices. Equation (1) represents a baseline regression model in which households are not classified based on their homeownership. The

estimation model we use is close to those used in Campbell and Cocco (2007), Lehnert (2004), and in Gan (2010), among others.

$$\Delta \ln C_{jt} = \mu + \beta \Delta \ln Y_{jt} + \gamma \Delta \ln HP_{Rt} + Z'_{jt} \Phi + h_j + \epsilon_{jt} \quad (1)$$

where, the subscript j denotes each household, R represents the district in which the household resides, and t denotes the year. C_{jt} denotes the real total consumption of household j in year t , and Y_{jt} denotes the real total income of household j in year t . HP_{Rt} denotes the real house purchase price index in district R . Z_{jt} includes demographic features of household j . As explained in Section III.2, we use an aggregate regional house price index instead of a self-evaluated or a self-reported house asset value. This is because self-evaluated housing prices have non-negligible measurement bias, and they cannot be applied to non-homeowners, who constitute a sizable portion of the total number of households. Consumption, income, and house prices are log-differenced, thus they indicate annual growth rates from the preceding year. Consumption, income, and the house prices index are deflated by the consumer price index.

We include several demographic characteristics of householders to control for various features that may affect consumption decisions. Z_{jt} includes the householder's age and its square term, the householder's gender, the householder's employment status, economic activity status, number of kids, number of household members, and any changes from the previous year. There could be remaining unobservable household features, too, which are related to a household's consumption decisions. A fixed effect model is adopted in an attempt to correct for the possible correlation between the unobservable effect and the dependent variables. However, fixed effect regressions could be statistically less powerful than the non-fixed effect regressions, because only within-group variations are used, and potentially useful information from between-group variations are not utilized. For this, in Section VI we also run an alternative random effects model to check robustness.

In this study we construct a household-level panel using the KLIPS database

from 2011 to 2017 waves. We analyze more recent periods after the global financial crisis to exclude any possible biases that might stem from changes in economic structure after the crisis, and any abnormal economic conditions or policy responses during the crisis.³⁾ To eliminate the impact of any abnormal observations, we excluded the highest and lowest 2.5 percent of observations in the distribution of the growth rates of real household consumption, income, asset, and debt. We conjecture that households with extreme changes in those variables are likely to have experienced an abnormal event that could not be controlled by explanatory variables in the regression model, and thus those observations could distort the measurement. We also exclude household-year samples in which the respondents reported that they moved (a change of residential address), or that their homeownership type or tenure status had changed. Again, we think that these events are likely to generate unusual changes in expenditures associated with such moves, such as changes in durable goods, the expense of moving, payment of any taxes, and a household's consumption decision might be different from those in normal periods.

2. Estimation Method

Estimation is implemented by ordinary least squares. It may be the case that the error terms are clustered, not independent and identically distributed, i.e. observations within each household are correlated, but households from different groups are not correlated. With this in mind, we cluster the standard errors at the household-level to have standard errors that are asymptotically robust to both heteroscedasticity and serial correlation. As noted above, we use household-fixed effects to control for household-level heterogeneity not captured in other controls.

3) The KLIPS database has been compiled annually since 1998.

Table 1: Estimation Results: Main Results

	(1)	(2)	(3)	(4)
$\Delta \ln Income$	0.105*** (0.000)	0.105*** (0.000)	0.105*** (0.000)	0.105*** (0.000)
$\Delta \ln HP$	0.194** (0.023)	0.257*** (0.004)	0.552** (0.023)	0.644** (0.013)
$\Delta \ln HP * I^{Nonowner}$		-0.538* (0.060)		-0.682 (0.247)
$\Delta \ln HP * I^{Rise}$			-0.401 (0.193)	-0.446 (0.168)
$\Delta \ln HP * I^{Nonowner} * I^{Rise}$				0.254 (0.754)
Adjusted R^2	0.038	0.040	0.038	0.040
Observations	7816	7816	7816	7816
Wald tests				
Owner, falling (γ)	0.194** (0.023)	0.257*** (0.004)	0.552** (0.023)	0.644** (0.013)
Non-owner, falling ($\gamma + \delta_N$)		-0.280 (0.300)		-0.038 (0.945)
Owner, rising ($\gamma + \theta_R$)			0.151 (0.321)	0.198 (0.205)
Non-owner, rising ($\gamma + \theta_R + \delta_N + \xi_{NR}$)				-0.229 (0.667)

Notes: 1) p-values are in parentheses. ***: significant at 1 percent level, **: significant at 5 percent level, *: significant at 10 percent level, Standard errors are corrected for heteroscedasticity and clustered at household level to control for the effects of residual autocorrelation. 2) Column (1): estimation results of Equation (1), Column (2): estimation results of Equation (2), Column (3): estimation results of Equation (3), Column (4): estimation results of Equation (4).

3. Estimation Results

Here we provide our estimation results. First, in Section IV.3.1, we estimate a standard regression model, Equation (1). Then, in Section IV.3.2, we expand this model to reflect homeownership status, and in Section IV.3.3 we distinguish rising house prices from falling house prices. In Section IV.3.4, we measure asymmetric responses to rising and falling house prices across homeownership.

3.1. Baseline Result

The estimation result of Equation (1) is provided in Column (1) of Table 1. The coefficient on $\Delta \ln HP_{Rt}$ is estimated to 0.194 and is highly significant. This implies that households expand the growth rate of their consumption by about 0.194 percentage points in response to a 1 percentage point increase in

the house price index for the area they reside. The magnitude of the estimate is somewhat smaller than in a previous study from the U.K. that followed a similar methodology. Campbell and Cocco (2007) document that the estimate for the U.K. is 0.651.⁴⁾ The estimated coefficient on income is about 0.105 and is highly significant. This means that a 1 percentage point increase in real household income growth brings about an increase of consumption of about 0.105 percentage points.

3.2. Responses Across Homeownership

Now, we examine possible asymmetric responses of consumption to changes in house price across households with different homeownership statuses. We break the total number of households into two groups: homeowners and non-homeowners. We include a dummy indicator that distinguishes non-homeowners from homeowners, and its interactive term with $\Delta \ln HP_{Rt}$ is put into Equation (1), which measures the marginal influences of changes in housing prices on non-homeowners. $I_{jt}^{Nonowner}$ is the indicator value that is 1 if household j is non-homeowners, and is 0 if household j is a homeowner. Equation (2) describes this specification. The reference group is home-owning households and the estimate of the interaction term $\Delta \ln HP_{Rt} * I_{jt}^{Nonowner}$ measures the marginal impact on consumption for non home-owning households relative to home-owning households. In other words, γ represents the impact of house prices on home-owning households, while $\gamma + \delta_N$ indicates that for non home-owning households.

4) Campbell and Cocco (2007) encompass both home-owning households and renters, and use a regional house price index to measure changes in house asset values, as we do. Campbell and Cocco (2007) classify total households into four groups and document responses of each group's consumption to house price fluctuation: 1.673 (old-owners), 0.796 (young-owners), 0.742 (old-renters), and 0.003 (young-renters). They find that positive responses for renters and they explain this as puzzling. In contrast, we find negative impacts on non home-owning households, as we show in Column (2) in Table 1.

$$\Delta \ln C_{jt} = \mu + \delta I_{jt}^{Nonowner} + \beta \Delta \ln Y_{jt} + \gamma \Delta \ln HP_{Rt} + \delta_N (\Delta \ln HP_{Rt} * I_{jt}^{Nonowner}) + Z'_{jt} \Phi + h_j + \epsilon_{jt}. \quad (2)$$

We present the estimation results of Equation (2) in Column (2) in Table 1. The coefficient on $\Delta \ln HP_{Rt}$ is estimated to be about 0.257 and is statistically significant, which implies that homeowners increase their consumption by 0.257 percent points in response to a 1 percentage point increase in house prices. The coefficient on $\Delta \ln HP_{Rt} * I_{jt}^{Nonowner}$, which measures the marginal impact on non homeowners, is -0.538 and is significant at the 10 percent significance level. The sum of the two coefficients is -0.280, which represents the estimated impact of house prices on non-homeowners households. This means that non homeowners reduce their real consumption by 0.280 percent points when regional housing prices where they reside rise by 1 percentage points.

It is noteworthy that the estimate for non homeowners is greater than that for homeowners in absolute value, though the response of non homeowners is not statistically significant. This implies that a household's decision concerning consumption behavior in response to house asset price changes is asymmetric across heterogeneous households based on homeownership types, and thus it is important to consider these to precisely estimate the aggregate impact of house prices on consumption. Considering the sizable estimated impact of house price on non-homeowners' consumption and their share among the total number of households, it is important to examine both homeowners and non-homeowners when analyzing any influence that house prices may have on total consumption.

3.3. Responses to Rising and Falling Housing Prices

We now consider the possibility that households respond differently to rising house prices and falling house prices. We include an additional dummy variable indicating an increase in house prices, I_{jt}^{Rise} in Equation (1). I_{jt}^{Rise} is a binary

dummy variable which we assign to 1 if $\Delta \ln HP_{Rt}$ corresponding to the household-year sample is positive, and to 0 otherwise. This allows us to measure asymmetric responses of household consumption to rising and falling house prices. Equation (3) describes this:

$$\Delta \ln C_{jt} = \mu + \theta I_{jt}^{Rise} + \beta \Delta \ln Y_{jt} + \gamma \Delta \ln HP_{Rt} + \theta_R (\Delta \ln HP_{Rt} * I_{jt}^{Rise}) + Z'_{jt} \Phi + h_j + \epsilon_{jt}. \quad (3)$$

We present estimation results of Equation (3) in Column (3) in Table 1. The reference group includes the household-year sample when regional housing prices are falling compared to the previous year. The coefficient on house prices is 0.552 and this implies that households cut their consumption growth rates by 0.552 percentage points in response to a 1 percent point decline in housing prices, and the estimate is statistically significant at the 5 percent significance level. In contrast, households expand their consumption by only 0.151 percentage points in face of a 1 percentage point rise in housing prices. This result implies that the average impact when we do not distinguish rising and falling house prices – 0.194 in Column (1) of Table 1 – is driven to a large extent by the contractionary impact of falling house prices rather than a boosting impact of rising house prices on consumption.

3.4. Responses to Rising and Falling Housing Prices Across Homeownership

We now consider whether or not households could respond differently to rising house prices and falling house prices, and that this asymmetric response might depend on whether households are homeowners or non-homeowners. To measure the marginal effects of house price fluctuations on consumption from these two dimensions, we introduce both of the two indicative variables I_{jt}^{Rise} and $I_{jt}^{Nonowner}$ into Equation (1). As discussed above, the former indicates an increase in house prices, and the latter indicates non-homeowners. This allows us to measure the asymmetric responses of household

consumption to rising and falling house prices across homeownership type. The reference household-year sample is for the homeowners and for the years of house price falls. Equation (4) describes this specification:

$$\begin{aligned}\Delta \ln C'_{jt} = & \mu + \delta I_{jt}^{Nonowner} + \theta I_{jt}^{Rise} + \xi (I_{jt}^{Nonowner} * I_{jt}^{Rise}) + \beta \Delta \ln Y_{jt} \\ & + \gamma \Delta \ln HP_{Rt} + \delta_N (\Delta \ln HP_{Rt} * I_{jt}^{Nonowner}) + \theta_R (\Delta \ln HP_{Rt} * I_{jt}^{Rise}) \\ & + \xi_{NR} (\Delta \ln HP_{Rt} * I_{jt}^{Nonowner} * I_{jt}^{Rise}) + Z'_{jt} \Phi + h_j + \epsilon_{jt}.\end{aligned}\quad (4)$$

Estimation results are shown in Column (4) in Table 1. First, home-owning households have shown greater reduction in consumption when house prices decline. The estimated sum of relevant coefficients is 0.644, which means that homeowners cut their consumption by 0.644 percentage points in response to a 1 percentage point decline in house prices. In contrast, the magnitude by which they increase their consumption in response to rising house prices is estimated at 0.198, only a third in magnitude of their response to falling house prices.

Looking at non-homeowners, we find that they respond greater to rising house prices than to falling house prices. It is estimated that non-homeowners lower their consumption growth rate by 0.229 percentage points in response to a 1 percentage point rise in house prices, though the estimate is not statistically significant. This is qualitatively consistent with our expectation that when house prices increase, the consumption of non-homeowners falls as they need to save more to purchase houses. In contrast, we do not find evidence that non homeowners increase their consumption when house prices are falling. It is estimated that they increase consumption by 0.038 percent points, which we think is not economically meaningful, and the estimate is highly insignificant.

4. Impact on Aggregate Household Consumption

We calculate the impact of house price changes on aggregate consumption from a back-of-the-envelope partial equilibrium computation. We utilize

information on the share of homeowners and non-homeowners in the total number of households, their average consumption expenditure, and the estimates for their responses to house price changes. As we discussed, any adjustment in household consumption is asymmetric between the periods of rising and falling house prices, and, thus, we apply the corresponding estimates in Column (4) in Table 1.

We find that changes of aggregate consumption induced from a 1 percentage increase or decrease in real house prices are +206 billion KRW and -2,453 billion KRW respectively. These figures are 0.03 percent and 0.32 percent of the total amount of household consumption in the GDP account, respectively. It is noteworthy that the boosting impact of an appreciation in house assets is quantitatively small compared to the contractionary impact of falling house prices on aggregate household consumption.

V. Heterogeneous Households and Channels in Operation

In Section V we investigate household heterogeneity that might affect a household's consumption behavior in response to house price fluctuations. We examine whether or not the responses of consumption to house price changes are asymmetric across homeownership for multiple houses, tenure status of homeowners, ages of householders, size of houses, and debt level that households have. We categorize the total household-year sample into relevant sub-groups and measure how consumption of each group responds to changes in house prices. The purpose of the exercise is two-fold: we expect to see the baseline results to be driven by which segment the household falls into. We also expect to draw some clues as to which, from among the several channels suggested, are the ones through which house price fluctuation affects household consumption and which are in operation.

1. Homeownership and Tenure Status

We divide homeowners into three sub-groups based on the number of houses they own and their tenure status, as described in Section III.1.2: single house owners, multi-house owners, and home-owners living in a rented house. This breakdown of homeowners is to test whether or not the impact of house prices on consumption is different among those homeowners. For example, households that own two or more housing assets might find it easier to sell parts of their housing assets, and thus realize the benefits of a house price boom, compared to those who own only a single home in which they live.

The estimation result is provided in Panel A in Table 2. To save space, only the coefficients from the Wald tests are presented. Responses of single home owners to falling house prices are larger than those to rising prices and statistically significant. This result is similar to the estimate for homeowners in Table 1 and this is because single home owners accounts for the majority of total home-owning households. Multi-house owners respond to a much larger extent to house price changes compared to single home owners, and this is the case for both rising house prices (0.445 vs 0.183) and falling house prices (1.267 vs 0.685). This result is consistent with the findings of Gan (2010) that shows that the elasticity of multi-house owners is much larger than that of single-house owners in Hong Kong. Gan (2010) argues that this supports the operation of the wealth effect channel. Owner-renters who lease out the house they own and live in a rented house reduce their consumption growth by 0.509 in both rising and falling house price periods, though those results are statistically insignificant. They might reveal a two-sided characteristic that these households have as owner-renters: they react to an increase in house prices as a renter, while they react to a decrease in house prices as a homeowner. The responses of non home-owning households are effectively the same as the results provided in Table 1.

Table 2: Estimation Results: Heterogeneous Households

Panel A. By Homeownership					
		Multi-house owners	Single-house owners	Owner- renters	Non- homeowners
Rise		0.445 (0.233)	0.183 (0.291)	-0.509 (0.527)	-0.231 (0.665)
Fall		1.267* (0.055)	0.685** (0.020)	-0.509 (0.439)	-0.041 (0.940)
Panel B. By Age Groups					
		Young	Middle	Old	
Rise	Homeowner	0.702** (0.016)	0.022 (0.911)	0.229 (0.572)	
	Non-homeowner	-0.261 (0.677)	-1.146 (0.102)	3.447*** (0.004)	
Fall	Homeowner	0.392 (0.411)	0.364 (0.267)	1.933*** (0.002)	
	Non-homeowner	-0.271 (0.733)	-0.079 (0.906)	0.831 (0.696)	
Panel C. By House Size					
		Small	Large		
Rise	Homeowner	0.129 (0.552)	0.284 (0.177)		
	Non-homeowner	-0.044 (0.949)	-0.619 (0.419)		
Fall	Homeowner	0.627* (0.069)	0.675* (0.066)		
	Non-homeowner	0.116 (0.857)	-0.247 (0.798)		
Panel D. By Borrowing Constraints					
		Unconstrained	Constrained	Tightly- Constrained	
Rise	Homeowner	0.075 (0.837)	0.216 (0.217)	0.064 (0.886)	
	Non-homeowner	0.667 (0.548)	0.164 (0.762)	-2.695** (0.023)	
Fall	Homeowner	0.788 (0.282)	0.68** (0.017)	0.067 (0.915)	
	Non-homeowner	-0.305 (0.788)	0.433 (0.419)	-0.921 (0.447)	

Notes: 1) p-values are in parentheses. ***: significant at 1 percent level, **: significant at 5 percent level, *: significant at 10 percent level, Standard errors are corrected for heteroscedasticity and clustered at household level to control for the effects of residual autocorrelation.

2. Householder's Age

We now investigate the possible asymmetric impact of house price changes across householder ages. Households positioned at different stages in their life-span could respond differently in response to changes in house prices. We classify households into three subgroups by the householders' age: households with householders aged below 39 are classified as youth,

and those with householders aged between 40 and 59 are middle, and those with householders aged above 60 are old. We present the estimation results in Panel B in Table 2. (Homeowner and Rise) All age groups increase their consumption in response to house price changes, though the magnitudes are quite different across age groups. In young households, the estimated elasticity is large and significant, while that for old households is about a third of that for young households, and that for middle households is close to zero. (Non-Homeowner and Rise) The households of young and middle-aged non home-owning householders cut their consumption in response to rising house prices. The responses of middle-aged households are large and only marginally insignificant, and this might be due to the fact that these households likely plan to purchase their own home in the future, considering their place in the life cycle, and would decide to save more as house prices rise. In contrast, old non home-owning households increase, instead of decrease, consumption in response to falling house prices. This is puzzling, in that any downward adjustment of house prices would be good news to non home-owning households. Two possible explanations exist for this. The first is the discouragement effect. These households give up on purchasing a house in the future and raise their expenditure on consumption by reducing their precautionary saving (Yoshikawa and Ohtake, 1989; Sheiner, 1995). Another possible explanation is that an increase in housing expenditure, i.e. rents, that accompanies rising house prices might put upward pressure on total consumption expenditure. If non home-owning households find they cannot reduce their consumption expenditure on items other than rental costs as much as the increase in rental costs, then their total consumption inevitably increases.

(Homeowner and Fall) In response to falling house prices, we observe a decline in consumption across all home-owning household groups. It is noteworthy that the magnitude of consumption shrinkage is large and statistically significant in old households. We conjecture that old people who do not have a regular income could be more sensitive to a decline in the value of the house asset they own, in that they regard house assets as sources, i.e.

precautionary saving, from which they can withdraw in case of unexpected misfortune, such as unexpected medical expenses, retirement, and death of a spouse. In this sense, they are likely to reduce their consumption in an attempt to keep their total savings unchanged when they observe the value of their house asset depreciate. (Non-Homeowner and Fall) Young and middle-aged non home-owning households increase their consumption when house prices fall, though the estimates are highly insignificant. This might be due to the fact that the amount of savings they need to build up to purchase their own house is reduced as house prices fall. In contrast, we find that old households cut their consumption in response to falling house prices, though that is highly insignificant. This is seemingly at odds. One possible explanation for this puzzling result is that old non home-owning households, which are likely to be in the most inadequate economic situation compared to other home-owning households, will have an indirect impact from falling house prices. If a decline in regional house prices is accompanied by an economic recession in the region, the old non homeowners might suffer from economic deterioration and thus might have to cut their consumption spending.

3. Size of House

Next, we investigate the asymmetric responses of consumption of households based on the size of the house in which they live. We conjecture that consumption of households living in relatively larger houses tends to be more sensitive to house price fluctuations. The effects of changes in house prices on total house assets would be proportional to the size of the house, if changes in house prices per unit size were the same. Likewise, the impact on non-homeowners of house price changes could be proportional to the size of the house in which they are living in since changes in house prices would affect the amount of precautionary savings necessary for them to buy home in the future, or their housing expenditure is likely to be proportional to the size of a rented house. We use a relative measure of house size, which is the size of the house divided by the number of official residents.

The estimation results are presented in Panel C in Table 2. We find that homeowners living in relatively larger houses adjust their consumption to a larger extent compared to those living in smaller houses.⁵⁾ This result is consistent with our results in Section V.2 documenting that responses of multi-house owners respond to a larger extent to house price changes than single house homeowners. We interpreted the results as supporting the operation of the wealth effect channel, as did Gan (2010). We also find that responses of non-homeowners to house prices are greater among those living in relatively large houses compared to those living in smaller houses.

4. Borrowing Constraints

We categorize households based the extent of borrowing constraints they face. A change of consumption in response to house prices might reflect the collateral effect, a loosening of borrowing constraints, not the wealth effect channel (Iacoviello, 2004). A change in the collateral value of a house asset may enable the extent to which households can additionally borrow from financial intermediaries, and thus affect household consumption. If the tightly-constrained households adjust their consumption to a larger extent in response to house price fluctuations, we regard this as evidence supporting the operation of the collateral effect channel. To examine the operation of this channel, we classify households based on debt level they owe, which proxies the degree of borrowing constraints they face. To be specific, we classify households as “unconstrained,” “constrained,” and “tightly-constrained” according to the debt amount that households have. The debt is a relative ratio to total assets for homeowners, and to income for non-homeowners. In the case of homeowners, “unconstrained” households are those that do not have any debt outstanding, and “constrained” are those whose debt is above zero and below 60 percent of

5) As multi-house owners are more likely to reside in larger houses, it might be the case that large responses of home-owning households living in larger houses stem from the multi-house owners living in larger houses. To exclude this possibility, we also repeat the same experiments excluding multi-house owners and we find the results remain intact.

their total assets. The “tightly-constrained” are those with debt 60 percent or above relative to their total assets.⁶⁾ The threshold distinguishing “constrained” and “tightly-constrained” non home-owing households is set to 200 percent of debt outstanding to annual income. These criteria are structured so that about 10 percent of observations belong to the “tightly-constrained” group.

The estimation results are presented in Panel D in Table 2. We find the response of the “tightly-constrained” homeowners to be very small and highly insignificant compared to those of the “constrained” households. If the collateral effect is in operation, we could expect that these constrained households would increase their consumption to a larger extent. This group also reduces its consumption very marginally in response to falling house prices. These results do not support the hypothesis that the positive impact of house prices on consumption of homeowners is driven by the collateral effect. Looking at non-homeowner, we find that households that have excessive debt relative to their income respond to a much larger extent compared to other groups that have moderate or no debt especially in rising house price periods.

VI. Robustness Test

In this section we re-run our main regression from Section IV, using alternative model specifications. Table 3 presents the regression results of our robustness tests. Column (1) is the baseline regression results as shown in Table 1.

First, we replace the dependent variable, total real household consumption, with alternative coverage of household consumption. In Column (2), consumption expenditure for nondurable goods is used as the dependent variable instead of total consumption in the baseline regression. The consumption of durable goods might not coincide with any expenditure on

6) Bostic, Gabriel and Painter (2009) classify home-owning households whose LTV exceeds 90 percent as “constrained” households, and they document that they do not find evidence supportive of the operation of the collateral effect.

non-durable goods or services in that the durable goods are usually consumed over a long-run horizon. For this reason, some studies use non-durable goods as a dependent variable. In Column (3), we exclude housing expenses from total consumption expenditure used in the dependent variable. When housing prices change, housing expenses, i.e., rental costs, that non-homeowners pay also change. If total consumption is affected due to these rental fees, the estimated impact of house prices change on total consumption could be misleading. Renters could unavoidably increase their consumption expenditure if they cannot reduce non-housing expenses. Then the results could imply that non-homeowners increase, not decrease, their consumption in response to rising house prices. In Column (4), we exclude medical expenses from total consumption expenditure used in the dependent variable. This is because medical expenses, which could be very unpredictable and volatile components of consumption, could distort the relationship between household wealth and decisions concerning consumption. Second, we include additional explanatory variables which might affect households' decision on consumption. Column (5) includes a change in real interest rates as an explanatory variable. This is to control for the possible impact of interest rates on consumption decisions through a change in the price of consumption today relative to that in the future, i.e., the intertemporal substitution effect. The real interest rate is defined as an annual interbank overnight call rate minus inflation expectations. In Column (6), we include growth rates of real regional GDP as an explanatory variable. Overall economic conditions measured in regional GDP might be related to housing prices in the region. At the same time, household's decisions concerning consumption may be affected by business sentiment in the region. By including growth rates of regional GDP, we attempt to control the possible indirect impact of aggregate economic condition on household consumption through changes in housing prices. In Column (7) we control for any possible impact of a household's debt on its consumption behavior. We include two binary dummy variables, each of which indicates an increase and a decrease in household debt compared to the previous year, respectively. Finally we adopt alternative estimators for the baseline regression model. In Column (8), we

estimate the regression models from a random effect estimator instead of a fixed effect estimator.

The results for the robustness tests are presented in Table 3. Each panel in Table 3 corresponds to the specifications we adopt in each column in Table 1, and Column (1) in Table 3 presents the baseline results as suggested in Table 1. We find the results from the baseline regression remain robust across alternative specifications in Columns (2) to (8) in terms of their sign, magnitude and statistical significance.

Table 3: Estimation Results: Robustness Tests (for the main results in Table 1)

	Baseline	Consumption			Additional control			Estimator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A.</i>								
$\Delta \ln HP$	0.194** (0.023)	0.151* (0.072)	0.172* (0.058)	0.174** (0.048)	0.252** (0.011)	0.231** (0.012)	0.192** (0.024)	0.143** (0.023)
<i>Panel B.</i>								
$\Delta \ln HP$	0.257*** (0.004)	0.199** (0.024)	0.262*** (0.006)	0.237** (0.010)	0.31*** (0.002)	0.292*** (0.002)	0.257*** (0.004)	0.225*** (0.001)
$\Delta \ln HP * I^{Nonowner}$	-0.538* (0.060)	-0.411 (0.144)	-0.758** (0.014)	-0.534* (0.068)	-0.528* (0.065)	-0.532* (0.063)	-0.549* (0.055)	-0.488*** (0.004)
<i>Panel C.</i>								
$\Delta \ln HP$	0.552** (0.023)	0.409* (0.085)	0.514** (0.047)	0.637** (0.011)	0.603** (0.013)	0.643** (0.01)	0.543** (0.025)	0.524*** (0.001)
$\Delta \ln HP * I^{Rise}$	-0.401 (0.193)	-0.238 (0.431)	-0.350 (0.288)	-0.485 (0.129)	-0.420 (0.170)	-0.477 (0.127)	-0.390 (0.206)	-0.562*** (0.004)
<i>Panel D.</i>								
$\Delta \ln HP$	0.644** (0.013)	0.485* (0.056)	0.602** (0.028)	0.703*** (0.009)	0.69*** (0.008)	0.736*** (0.006)	0.64** (0.014)	0.601*** (0.001)
$\Delta \ln HP * I^{Nonowner}$	-0.682 (0.247)	-0.574 (0.335)	-0.675 (0.307)	-0.49 (0.439)	-0.677 (0.250)	-0.708 (0.229)	-0.707 (0.229)	-0.549 (0.187)
$\Delta \ln HP * I^{Rise}$	-0.446 (0.168)	-0.28 (0.375)	-0.368 (0.283)	-0.502 (0.135)	-0.464 (0.149)	-0.524 (0.110)	-0.441 (0.173)	-0.582*** (0.007)
$\Delta \ln HP * I^{Nonowner} * I^{Rise}$	0.254 (0.754)	0.269 (0.741)	-0.002 (0.998)	0.014 (0.987)	0.264 (0.745)	0.286 (0.725)	0.286 (0.724)	0.147 (0.775)

Notes: 1) p-values are in parentheses. ***: significant at 1 percent level, **: significant at 5 percent level, *: significant at 10 percent level, Standard errors are corrected for heteroscedasticity and clustered at household level to control for the effects of residual autocorrelation. 2) Column (1): baseline regression results as presented in column (1) in Table 1, Column (2): the dependent variable is consumption expenditure excluding that on durable goods, Column (3): the dependent variable is consumption expenditure excluding that on housing expenses, Column (4): the dependent variable is consumption expenditure excluding that on medical expenses, Column (5): includes a change of real interest rate (nominal interest rate - inflation expectation) as a control variable, Column (6): includes a change of regional GDP as a control variable, Column (7): includes binary variables indicative of a change of household debts compared to the previous year as a control variable, Column (8): adopts a random effects estimator instead of a fixed effects estimator.

VII. Conclusion

In this paper, we document the impact of house price fluctuation on household consumption by making use of household-level panel data in Korea that embraces renters as well as homeowners in a unified framework. This enables us to infer the overall impact of house price fluctuations on total household consumption and to investigate the operation of relevant channels suggested for both home-owning and non home-owning households. Our findings can be summarized in three ways. First, we find a positive impact of house prices on consumption that is statistically significant, but only a third in magnitude of that documented in a previous study in the U.K. Second, by examining possible asymmetric responses, we find opposite responses across homeownership and between rising prices and falling prices. The adjustment of household consumption is driven to a larger extent by that of homeowners and by that in response to falling house prices. Finally, our results support the operation of the wealth effect rather than the collateral effect in the case of home-owning households. The responses of non home-owning households are consistent with the expectation of the precautionary saving effect in overall, but evidence supportive of the discouragement effect for a subgroup of non home-owning households are also found.

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<Abstract in Korean>

주택가격 변동이 소비에 미치는 영향

이승윤*

본 연구는 우리나라의 주택가격 변동이 가계 소비에 미치는 영향을 2011-2017년 중 가구 수준의 패널자료(한국노동패널)를 이용하여 분석하였다. 전가구 기준으로 가계 소비의 주택가격 변동에 대한 탄력성은 0.194로 추정되었는데 이는 실질 주택가격이 1 퍼센트 변화 시 가계 소비는 0.194 퍼센트 변화하는 것을 의미한다. 이러한 결과는 무주택가구보다는 주택보유가구에서, 주택가격 상승기보다 하락기에서 주도되는 것으로 나타났다. 주택가격 변동이 소비에 영향을 미치는 경로를 살펴보면 주택보유가구에서는 자산효과 경로와 부합하는 결과가 나타났지만 유동성 제약 완화 효과와 부합하는 결과는 나타나지 않았다. 무주택가구는 주택가격 상승시 소비를 줄이는 것으로 나타났는데 이는 예비적저축 경로와 부합한다.

핵심 주제어: 주택가격, 가계 소비, 자산효과, 가구패널자료

JEL Classification: D21, E21

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한국은행 경제연구원에서는 Working Paper인 『BOK 경제연구』를 수시로 발간하고 있습니다. 『BOK 경제연구』는 주요 경제 현상 및 정책 효과에 대한 직관적 설명 뿐 아니라 깊이 있는 이론 또는 실증 분석을 제공함으로써 엄밀한 논증에 초점을 두는 학술논문 형태의 연구이며 한국은행 직원 및 한국은행 연구용역사업의 연구 결과물이 수록되고 있습니다. 『BOK 경제연구』는 한국은행 경제연구원 홈페이지(<http://imer.bok.or.kr>)에서 다운로드하여 보실 수 있습니다.

제2017-1	가계부채가 소비와 경제성장에 미치는 영향 - 유량효과와 저장효과 분석 -	강종구
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6	차주별 패널자료를 이용한 주택담보대출의 연체요인에 대한 연구	정호성
7	국면전환 확산과정모형을 이용한 콜금리행태 분석	최승문 · 김병국
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12	종합적 상환여건을 반영한 과다부채 가계의 리스크 요인 분석	이동진 · 한진현
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