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The Impact of House Price Movements on Non-durable Goods Consumption of Older Households*

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Using Health and Retirement Study (HRS) data, we create a new, up-to-date panel dataset to investigate the impact of house price movements on the non-durable goods consumption of older households. We find that older homeowners respond asymmetrically when experiencing house price gains and house price losses. More specifically, they increase total non-durable goods expenditure when house prices appreciate, but fail to reduce consumption when house prices fall.

Key Words: House price fluctuations; Household consumption.
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1. INTRODUCTION

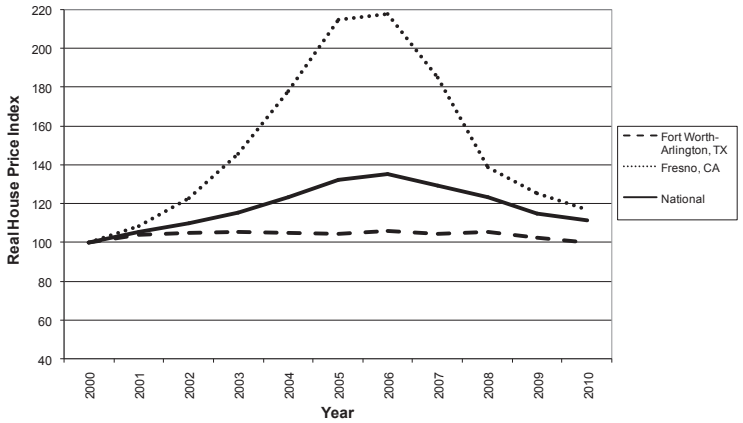
Housing wealth is a major component in households? balance sheet. It is also fundamentally different from other financial assetsdue to its dual-functionality: a store of wealthand a place to live. Thus, the relationship between house price fluctuations and household consumption attracts attentions from many economic researchers and policy makers. A substantial literature has investigated the question. This paper is the first to focus on elderly households. Because of the living functionality of housing wealth, older households rarely downsize their home and finance their consumption using the difference of home equity in retirement, reflecting the desire of older households to "age in place" (Venti and Wise, 2004). However, it does not mean that older households have no channel to consume the additional home equity when house prices increase. They could increase their consumption while continuing to live in the house by taking a second mortgage, a home equity loan, a home equity line of credit or a reverse mortgage, or by decreasing the rate of accumulating financial asset. Given the significant change in the retirement landscape — lower saving rate, lower Social Security replacement rate, shift of pension system from defined benefit to defined contribution and longer life expectancy — older households are harder than ever to maintain their standards of living in their post-retirement life. Housing wealth plays an increasingly important role in financial security of older households. If older households significantly increase their consumption during the housing market boom, they may find themselves worse prepared for retirement in a following housing market downturn. This paper therefore provides important policy implications on the financial preparedness of older households in retirement.

A second contribution of this paper is that we construct an up-to-date panel dataset from 2001 to 2009 by linking the Consumption and Activities Mail Survey (CAMS) and associated waves of the Health and Retirement Study (HRS), a nationally representative panel dataset of older Americans. The CAMS has detailed information on non-durable goods consumption and the HRS providesarich dataset of householddemographic and socioeconomic characteristics. Our dataset covers the housing market boom in early 2000s and the recent dramatic slump. Thus, not only could we examine household consumption decisions when house prices increase, we could also study the behavioral responses of older households regarding house prices fall. The panel featurealso enables us tocapture the change in consumption of a particular household, as well as to control forhousehold-specific demographic and socioeconomic characteristics.

House prices in the United States fluctuate over time, with significant and persistent regional variations. Figure 1 compares real house prices in selected Metropolitan Statistical Areas (MSAs) with national average over

the 2000 - 2010 period. In Fresno, CA, real house prices doubled and then collapsed, whereas prices barely changed in Arlington-Fort Worth, TX. The HRS data, on a restricted basis, provides data on geographic information of the households. This geographic variation allows us to identify the impact of house price movements on household consumption by comparing the change in consumption of households that lived in areas that experienced large changes in house values with the change in consumption of households that lived in areas where house values were relatively stable.

FIG. 1. Movements of real house price indices in the U.S. and selected MSAs



Source: Author's calculation using the FHFA national and regional house price indices. The indices are normalized to year 2000 dollar term and adjusted for inflation using Consumer Price Index from FRED database.

Our baseline regression indicates that house price appreciation significantly increasesthe non-durable goods consumption of older homeowners. The estimated elasticity indicates that a 1percent increase in house price results in 0.420 percent increase in households' total non-durables consumption. However, we find no evidence that older households reduce their consumption when house prices decline.

The remainder of the paper is organized as follows. Section 2 summarizes previous literature. Section 3 specifies our econometric model used to identify the effects. Section 4 describes the dataset. Section 5 presents and interprets our results, and Section 6 concludes.

2. PREVIOUS LITERATURE

Economic theory is ambivalent about the behavioral response to house price fluctuationsdue to the special feature of housing wealth. By focusing

on the consumption feature, Sinai and Souleles (2005) and Buiter (2008) concluded that housing wealth has no real wealth effect if homeownersdo not substitute general consumption for housingconsumption. An increase in the house price simply reflects a higher consumption of housing services. However, the house value actually has two parts: the present value of the future flow of imputed rent and a residual value, the present value of the eventual sale proceeds when households move out of their house. When house prices increase, homeowners who do not substitute general consumption for housing consumption do not benefit from the increase in the first part. But the increase in residual valueleads to an increase in household wealth and the raise in wealth should in turn increase their consumption (Muellbauer and Murphy, 1997; Campbell and Coco, 2004; Carroll, Otsuka and Slacalek, 2006). In addition, borrowing capacity of households is usually constrained by the value of their housing wealth. Thus, the credit-constrained households should increase their consumption as the increase in house prices may relax their borrowing constraint.

Most previous studies examined the relationship between house prices and consumption using aggregate data. Elliot (1980) found no relationship between consumption and real house prices. Later studies, such as Bhatia (1987); Benjamin, et al. (2004); Case, et al. (2005); Carroll, et al. (2006); and Skinner (1989) showed evidence that house price movements have a significant positive effect on aggregate consumer spending.

More recent studies take advantage of micro-datasets to study household behavior. Campbell and Cocco (2007) used the United Kingdom Family Expenditure Survey (FES) to create a pseudo-panel dataset by region, age, and homeownership status to investigate the response of household non-durables consumption to house prices. They estimated the largest effect for older homeowners, but found little effect for younger renters. Gan (2010) used a large panel dataset that tracks credit card expenditures of 12,793 Hong Kong individuals to examine the relationship between house price movements and household consumption. She concluded that both a wealth effect and the relaxation of borrowing constraints cause households to adjust their consumption when house prices appreciate. Bostic, et al.(2009) compared the effects of changes in housing and financial wealth on household consumption using a matched micro-dataset from the Survey of Consumer Finances (SCF) and Consumer Expenditure Survey (CES) covering 1989 to 2001. They estimated the elasticities of household total consumption to housing and financial wealth at 0.06 and 0.02 respectively. They found no difference between the sensitivity to house prices of the credit-constrained and unconstrained. Engelhardt (1996) used household asset and debt data from the 1984 and 1989 waves of the Panel Study of Income Dynamics (PSID) to form a sample of homeowners under age 65. He estimated the effect of house price movements on household savings.

He concluded that house price fluctuations affect active saving, defined as the excess of current income over current consumption, but not total saving. In addition, he found households increase active saving in response to house price declines, but do not cut active saving in response to house price increases.Finally, using the 2004 SCF, Munnell and Soto (2008) investigated the impact of the recent housing boom on household balance sheets. They concluded that about 30 percent of older households were worse prepared for retirement after the housing market booms in the early 2000s because those households now have higher mortgage debt, but with no corresponding increase in financial assets.

Although numerous papers have investigated on this subject, we are the first to investigate the effects of older households. The housing effect of older households deserves special attention for three reasons. First, most elderly households own their home with little remaining mortgage debt. Coile and Milligan (2006) found that more than 80 percent of households ages 55 to 74 are homeowners. Dushi, et al. (2010) showed that the average loan to value ratio of households ages 57 to 62 is only 25 percent. Venti and Wise (2002; 2004) reported that the home ownership rate of older households remains steady until advanced ages. Second, housing value comprises the largest portion of the family non-pension wealth for these households. Munnell and Soto (2008) estimated that for a typical household around the retirement age, housing accounts for 21 percent of total wealth, the largest portion after the expected present value of Social Security. Third, older homeowners could be the most vulnerable group of housing market downturn or the largest beneficiaries of house price appreciation. Sun, et al. (2008) showed that the house value can be decomposed into two parts: the present values of the flow of housing services and the eventual sale proceeds. The former provides valuable insurance against increases in future rents. The latter is potentially available for non-housing consumption through reverse mortgages. As the expected duration of owner-occupier status declines with age, the expected present value of the eventual sale increases with age at any given house price and discount rate.

3. MODEL

Following Campbell and Cocco (2007) and Gan (2010), we estimate the following model

$$\begin{aligned} \Delta C_{it} &= \beta_0 + \beta_1 \Delta H_{it} + \beta_2 Fall * \Delta H_{it} \\ &\quad + \beta_3 \Delta Inc_{it} + \beta_4 \Delta Mort_{it} + \beta_x X_{it} + \beta_z Z_i + \beta_d D_t + \varepsilon_{it} \end{aligned} \tag{1}$$

The dependent variable ΔC_{it} is the change in log real household consumption for household i between two dates. ΔH_{it}, ΔInc_{it}, $\Delta Mort_{it}$ are the

corresponding changes in log realhouse values, total household income, and mortgage payment, respectively. Fall is a dummy variable that takes value 1 if the house value drops during the differencing period and 0 otherwise. X_{it} is a vector of variables that measures local economic conditions. Z_i is a vector of household demographic variables. D_t is a vector of time dummies.

Fourpotential problems arise with the above model. The first is how to measure household consumption. In contrast to non-durables, which are purchased continuously, durables require a large initial investment and yield a flow of services for a long period after purchase. It is thus difficult to convert the total expenditure to consumption each period. This study therefore follows Campbell and Cocco(2007) and focuses on non-durables consumption. We define total non-durable goods consumption as a summation of six major categories: food and drink; dining and drinking out, including restaurants, cafes, and take-out food; clothing and apparel, including footwear, outerwear, and products such as watches or jewelry; tickets, including movies, performing arts, and sporting events; trips and vacations, including transportation, accommodations, and recreational expenses; and spending on gasoline.

The second potential problem is how to measure house price movements. Previous research showed that households often misreport their home value. For example, Venti and Wise (2004) analyzed data from several sources, including the HRS usedin our study, and concluded that somehouseholds tend to overvalue their homes. The bias could come from many sources, for example, innovation costs. On average, self-reported house prices are overestimated by 15 to 21 percent based on a comparison of self-estimated home values and actual sale prices. As a result, employing self-reported house values to capture house price movementsresults in substantial measurement error and potential bias. We therefore employ a well established technique in the mortgage finance research — applying local house price indices to capture house price fluctuations instead of relying on self-reported house values. Based on the HRS geographic identifiers, MSA-level house price indices are used to capture the house price movements experienced by each eligible household in the dataset. We use the Federal Housing Finance Agency (FHFA) as the source of national and MSA-level house price indices.The indices are for single-family homes and are based on repeated sales or refinance transactions financed with conforming conventional mortgages purchased or securitized by Fannie Mae and Freddie Mac. This method has two drawbacks. First, we are unable to measure householdspecific house price changes. House price indices measure house price changes without idiosyncratic fluctuations and tend to bias down our results. Thus, using this proxy makes our findings even stronger. Second, fast rising or dropping house prices could encourage households to re-optimize their consumption of housing services by moving to a larger or smaller house.Their

decisions, however, are unobservable when using house price indices to proxy changes in housing wealth.

The third problem is that what factors should be controlled to obtain the desired effect. As reported by Engelhardt (1996), households may respond differently to house price increases and decreases. To address this concern, we create a dummy variable capturing whether households experience house price decreases. We include the interaction term of this dummy variable and the change in real house prices in the model to capture differences in behavior. As in the previous literature, we also include changes in household income and mortgage payments. In addition, Skinner (1989) found that unobserved household heterogeneity could bias the estimation results. To control for it, we include household demographic variables, including age, age squared, gender, race, marital status, and education of the household head. Finally, local economic conditions may affect simultaneously house prices and household consumption. We address this endogeneity by carefully controlling for two variables reflecting local economic conditions: MSA level unemployment rate and per capita income, obtained from the U.S. Bureau of Labor Statistics (BLS) and the U.S. Bureau of Economic Analysis (BEA), respectively.

The fourth and final potential concern is that differencing consumption and wealthrelated variables between two consecutive waves may result in a very noisy measure of changes. To reduce the impact of reporting error that might bias the analysis, we follow Coe and Webb (2010) to difference our data over two waves (four years) rather than from wave to wave. This yields two observations for households observed throughout, the change in consumption from 2001 to 2005, and that from 2005 to 2009.

4. DATA

We create an up-to-datemicro-panel dataset by merging CAMS and associated waves of HRS from 2001 to 2009 to investigate the impact of house price movements on non-durable goods consumption of older households. The data period covers the housing boom and the subsequent slump, making it a perfect dataset for our purpose. The HRS is a nationally representative panel originally comprising more than 7,000 individuals born between 1931 and 1941, and their spouses of any age. The survey started in 1992. Follow-up interviews were conducted every two years, with the latest data collected in 2008. New cohorts were added in 1998 and 2004. The dataset contains detailed information on households' demographics, financial and housing wealth, income, mortgage debt, health,employment status, and many other socioeconomic variables. In 2001, a sub-sample of 5,000 participants in thefifthHRS wave wasrandomly selected to participate in the CAMS.The mailed questionnaire covers expenditures on a range

of non-durable goods. CAMS participants were also re-interviewedthe year after the main HRS survey, the latest available data being for 2009. CAMS added new households in 2005.

TABLE 1.

Descriptive Statistics

	Homeowners						Renters	
	All homeowners		Increase		Decrease			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Annual total non-durables consumption at the prior wave	11908.04	12643.19	11693.60	11904.26	12165.76	13480.27	6519.10	7536.08
Change in annual consumption over four years	−1912.78	12695.04	−1394.36	13230.35	−2535.82	11997.96	−1127.76	7492.26
Percent change in house prices over four years	0.02	0.25	0.19	0.19	−0.19	0.14	0.05	0.28
Income at the prior wave	75419.05	173698.50	78618.59	224066.10	715773.87	78054.15	25051.90	36839.13
Change in income over four years	−10942.05	163650.50	−15964.17	211715.90	−4906.48	71093.90	−521.74	45679.42
Mortgage payment at the prior wave	6041.85	16759.04	5240.47	7159.30	7004.96	23569.64		
Change in mortgage payment over four years	−918.68	21802.10	−288.69	20038.49	−1675.81	23738.89		
Demographics of household head								
Age at the prior wave	64.80	9.30	65.09	8.94	64.45	9.71	66.65	10.52
Single male	0.11	0.32	0.10	0.30	0.13	0.34	0.25	0.43
Single female	0.27	0.45	0.28	0.45	0.26	0.44	0.60	0.49
Less than high school degree	0.13	0.34	0.16	0.37	0.10	0.30	0.31	0.46
Some college eduction	0.56	0.50	0.54	0.50	0.59	0.49	0.33	0.47
Black	0.07	0.25	0.07	0.26	0.06	0.24	0.21	0.41
Hispanic	0.04	0.21	0.05	0.22	0.04	0.19	0.10	0.30
Loan-to-value ratio at the prior wave	0.22	0.38	0.24	0.43	0.20	0.29		
N	1992		1170		822		323	

Note: This table reports summary statistics for the user in regressions. The numbers are adjusted to 2001 dollars using Consumer Price Index from Federak Reserve Economic Data (FRED) database.

The sample used for our baseline regression excludes households who cannot be assigned to a MSA and those who move during the sample period. We further drop households who experience precipitating shocks, such as divorce, marriage, or death of a spouse during the sample period, as these shocks could significantly affect the households? consumption pattern.The

restriction of our analysis to households that do not move in the sample period and do not experience a precipitating shock in general tends to bias the estimates upward. We should be careful to generalize this result to other two groups. We identify such changes from an analysis of the associated wave of HRS data. Table 1 reports summary statistics for the sample used in our main regressions.[1] The first column reports statisticsfor all homeowners. We then divide homeowners into those who experience house price gains and those who experience house price losses. Their statistics are reported in column 2 and column 3 respectively. The statistics for renters, including both who experience house price increases in their living area and who experience house price falls in their living area, are presented in column 4. As expected, the consumption levels are similar across both types of homeowners.Renters have much lower total non-durables consumption. Renters are also more likely to besingle,and have less education and lower income.

5. RESULTS

We first examine the impact of house price fluctuations on total non-durable goods consumption of older homeowners.[2] Our dependent variable is the change in log real total non-durable goods consumption over four years. The results from our baseline regressions are presented in Table 2.

We gradually enrich our explanatory variable set. Column 1shows the result of a regression that includes only the change in real house prices and the interaction term that captures the effect of a decrease in the house price as explanatory variables. The second specification, reported in column 2, adds changes in household income and mortgage paymentsas regressors. Column 3 reports a regression with household characteristics to control for heterogeneity in preferences. The last regression, reported in column 4, includes controls for local economic conditions, addressing concerns about endogeneity. All reported standard errorsare adjusted for serial correlation and heteroskedasticity. We find that house price appreciation significantly affects total non-durables consumption of older households. The coefficients on house price appreciation across all four specifications are statistically significantly different from 0. With a full set of controls, the coefficient is 0.420, indicating older homeowners increase total non-durables consumptionby 0.420 percent when theirhome value increases 1 percent. To further explain the estimated coefficient, we take a typical older household as an example. In 2001, the average house price in the United States was approx-

[1] Analytical weights are applied when calculating the statistics.

[2] As renters' behavior could be significantly different from homeowners, we isolate renters sample and examine the effect for renters separately. The results are presented in the appendix.

TABLE 2.

Baseline Regression Results: Dependent Varible: Change in Consumption of Total Non-Durables

	I		II		III		IV	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.411	0.154	0.409^{***}	0.155	0.430^{***}	0.157	0.420^{***}	0.162
Fall*Change in real house price	-0.406^{**}	0.206	-0.410^{**}	0.205	-0.483^{**}	0.213	-0.448^{*}	0.242
Change in real income			0.014	0.019	0.013	0.018	0.012	0.018
Change in mortgage payment			0.002	0.007	0.002	0.007	0.002	0.007
Age					0.053^{*}	0.028	0.053^{*}	0.028
Age square					0.000^{**}	0.000	0.000^{**}	0.000
Less than high school					−9.094	0.077	−0.096	0.077
Some college					0.002	0.036	0.002	0.036
Single male					0.092	0.075	0.091	0.075
Single female					−0.015	0.040	−0.016	0.040
Black					−0.005	0.071	−0.005	0.071
Hispanic					-0.205^{**}	0.100	-0.203^{**}	0.100
Change in MSA unemployment							0.008	0.017
Change in MSA per cap income							0.295	0.650
Wave dummy	0.049	0.069	0.046	0.068	0.041	0.068	0.014	0.082
Constant	-0.241^{***}	0.055	-0.238^{***}	0055	-1.816^{**}	0.910	-1.813^{**}	0.911
N	1992		1992		1992		1992	

Note: This table reports estimation results for the baseline model, *, **, *** indiates the coefficient is statistically significant at 10%, 5%, and 1% level respectively.

imately $170,000 and the average non-durable goods consumption of older homeowners was about $12,000 per year.[3] Then the estimated elasticity of 0.420 implies that $1,700, 1 percent, increase in house value is associated with an increase in consumption of $50.4 a year, approximately 3.0 percent of the increase in home equity.

Our estimate is smaller than Campbell and Cocco (2007), which estimated the elasticity of total non-durables at 1.22 and concluded that about 8 percent of house equity increase will be spent on non-durables. One explanation is the composition of consumption. As our sample has a total of six types of non-durables, a broader definition of non-durables could result in a larger estimated elasticity.The sample composition may also affect the elasticity. As shown by the literature, i.e., Campbell and Cocco(2007), liquidity-constrained households respond more strongly to increases in house prices. Few of our sample of older homeowners have

[3]The average home value used is the median sales prices of new homes sold in United States in 2001 reported by www.census.gov. The consumption is around the mean of total non-durable goods consumption in 2001 based on Table 1, CAMS data.

substantial mortgages, and the incidence of binding credit constraints is correspondingly low. If a sample has a large portion of credit-constrained households, it will produce a larger estimated elasticity.

The coefficients on the interaction terms across the four specifications have a similar pattern. They all have negative signs, have similar magnitude with the coefficients on change in house prices, and are significantly different from 0. Taking the coefficient on the interaction term for the regression with a full set of controls for example, it has a negative sign with a magnitude of 0.448. Therefore, if house prices decrease 1 percent, the effect on total non-durables spending is not significantly different from 0. It implies that although older homeowners increase their consumption when house prices increase, they are reluctant to reduce their consumption in response to house price declines. The result is opposite to Engelhardt (1996) which found young homeowners decrease their consumption when house prices decline. The lifecycle pattern of housing consumption predicts that most young households plan to increase their housing consumption as they age. Decrease in house prices may eliminate their home equity that could be used for the down payment foranother house.Therefore, young households have to reduce consumption and save more to meet down payment of new houses. But few of our sample of older households are likely to be in this situation.

The estimated coefficients for changes in income andmortgage paymentsare small in magnitude and not statistically significantly different from zero. Previous research has shown that consumption responds to both predictable and unpredictable income changes, and the lack of statistical significance for the income coefficient is at first glance surprising. It could be that income changes at older ages are more predictable, and older households are less subject to binding liquidity constraints that would otherwise result in income shocks that affect consumption.

The coefficients on the changes in MSA level unemployment rate and per capita income are small in magnitude and statistically insignificant, indicating that changes inlocal economic conditions have little impact on changes in the consumption of older households, and that endogeneity may not be a significant problem. This could again reflect oursample. From Table 1, we can see the mean age of the sample at the prior wave is 65 andmost of them have already retired. They are less vulnerable to economic shocks than younger households.

To further explore the asymmetric effect, we run another specification where we separate those who experienced an increase in house prices from those who experienced a decrease. This specification allows all coefficients to differ between the two groups. The resultsare reported in Table 3. The upper panel presents the result for housing wealth gainers and the lower panel presents the result for losers. Of the original sample of 1,992 house-

holds, 1,170 experienced an increase in house price and 822 a decrease. With a full set of controls, the estimated elasticities of consumption to house prices for the two groups are 0.429 and −0.045 respectively, the latter value being insignificantly different from zero, and the two coefficients being significantly different from each other. It confirms that older households are reluctant to decrease their total non-durable goods consumption when house prices decline.

TABLE 3.

Regression Results: House Price Increase vs. House Price Decrease

House Price Increase

	I		II		III		IV	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.431^{***}	0.156	0.413^{***}	0.157	0.427^{***}	0.162	0.429^{***}	0.162
Change in real income			0.038	0.033	0.037	0.032	0.037	0.032
Change in mortgage payment			−0.010	0.009	−0.007	0.008	−0.007	0.008
Age					0.108^{***}	0.041	0.108^{***}	0.042
Age square					-0.001^{***}	0.000	-0.001^{***}	0.000
Less than high school					−0.112	0.099	−0.112	0.100
Some college					−0.001	0.052	−0.001	0.052
Single male					0.001	0.136	0.001	0.136
Single female					−0.023	0.060	−0.023	0.060
Black					-0.166^{*}	0.089	-0.166^{*}	0.090
Hispanic					-0.298^{**}	0.148	-0.299^{**}	0.148
Change in MSA unemployment							−0.002	0.024
Change in MSA per cap income							−0.085	0.967
Wave dummy	0.047	0.086	0.028	0.083	0.047	0.081	0.056	0.102
Constant	-0.249^{***}	0.056	-0.245^{***}	0.056	-3.468^{**}	1.339	-3.474^{**}	1.363
N	1170		1170		1170		1170	

Economic theory provides several plausible explanations for the increase in consumption of homeowners in a booming housing market. House price fluctuations could affect households' consumption through a wealth effect, or appreciation in house prices could relax borrowing constraints. Non-credit-constrained households respond to house price increases because their wealth increases. Credit-constrained households may further increase their consumption by borrowing against the additional home equity. Older homeowners usually have little mortgage on their primary residence. In our sample of older households, the average loan-to-value (LTV) ratio is only 22 percent. In addition, if we classify a household as credit-constrained if its LTV ratio exceeds the 0.8 used in Hurst and Stafford (2004) and

TABLE 3—*Continued*
House Price Decrease

	I		II		III		IV	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.039	0.159	0.019	0.160	−0.025	0.167	−0.045	0.252
Change in real income			−0.011	0.011	−0.015	0.012	−0.016	0.012
Change in mortgage payment			0.015	0.011	0.014	0.011	0.014	0.011
Age					−0.005	0.041	−0.005	0.041
Age square					0.000	0.000	0.000	0.000
Less than high school					−0.058	0.122	−0.056	0.122
Some college					−0.001	0.054	0.003	0.055
Single male					0.174**	0.074	0.171**	0.074
Single female					−0.007	0.061	−0.005	0.063
Black					0.234**	0.114	0.236**	0.113
Hispanic					−0.062	0.133	−0.063	0.133
Change in MSA unemployment							0.010	0.024
Change in MSA per cap income							0.833	0.900
Wave dummy	−0.008	0.222	0.012	0.223	0.005	0.214	−0.073	0.234
Constant	−0.174	0.219	−0.186	0.220	−0.043	1.352	−0.008	1.353
N	822		822		822		822	

Note: *, **, *** indiates the coefficient is statistically significant at 10%, 5% and 1% level respectively.

Caplin, et al. (1997).[4] Only 69 households, 3 percent of thetotal sample, are credit-constrained. Thus, it is tempting to attribute the effect of house price movements on non-durables consumption, in our estimation, to wealth effect due to the small number of credit-constrained homeowners in the sample. To investigate whether our estimates are driven by the 69 credit-constrained households, wedivide our sample into two groups, credit-constrained and non-credit-constrained, and run regressions separately. The results are presented in Table 4.

Column 1 reports the result for non-credit-constrained households and column 2 reports the result using the 69 credit-constrained households. The results confirm our hypothesis. The estimated elasticity for non-credit-constrained group is 0.436, which is statistically significantly different from 0and close in magnitude than the estimated elasticity using the full sample. On the other hand, the coefficients of interest for credit-constrained group are insignificantly different from 0 and imprecisely estimated, reflecting the small sample size.

[4]If LTV ratio exceeds 0.8, the cost of borrowing loans will be much higher because households are required to purchase private mortgage insurance on the whole outstanding mortgage balance.So if the homeowner is not credit constrained, he or she should have borrowed the loans under 80 percent.

TABLE 4.

Regression Results: Non-credit-constrained vs. Credit-constrained

	I		II	
	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.436^{***}	0.167	0.267	0.714
Fall*Change in real house price	-0.536^{**}	0.247	0.687	1.065
Change in real income	-0.003	0.011	0.200^{***}	0.047
Change in mortgage payment	0.002	0.007	-0.025	0.037
Age	0.069^{**}	0.029	-0.058	0.097
Age square	-0.001^{**}	0.000	0.000	0.001
Less than high school	-0.130^{*}	0.075	0.243	0.284
Some college	-0.002	0.037	0.160	0.160
Single male	0.062	0.072	0.292	0.279
Single female	-0.008	0.042	-0.237	0.162
Black	0.027	0.074	-0.198	0.219
Hispanic	-0.203^{**}	0.102	0.132	0.348
Change in MSA unemployment	0.001	0.018	0.020	0.073
Change in MSA per cap income	0.145	0.683	-0.432	1.803
Wave dummy	0.037	0.085	-0.270	0.392
Constant	-2.373^{**}	0.952	2.377	2.846
N	1923		69	

Note: *, **, *** indiates the coefficient is statistically significant at 10%, 5% and 1% level respectively.

Another interesting test is to see how household consumption is affected by predicted house price fluctuations and unpredicted changes. However, the sample panel is not long enough to precisely approximate households? prediction of the future house price trend. We thus apply a rough method to decompose the price fluctuation into the predicted and unpredicted changes and present the resultsin the Appendix.

Finally, we investigate how each of the six sub-categories of non-durables is affected by house price fluctuations. The dependent variables are change in expenditure on food and drink, dining and drinking out, clothing and apparel, tickets, trips and vacation and gasoline respectively. The estimated results are shown in Table 5.

We estimate the largest elasticity for clothing and apparels, 1.386, after controlling for financials, demographics, and local economic conditions. The elasticities for food and drink, diningout, and tickets are also statistically significantly different from 0. They are estimated at 0.485, 0.920, and 1.015, respectively. We observe statistically insignificant effects on the rest of the sub-categories. We find that the corresponding interaction terms of

TABLE 5.

Regression Results: Seven Subcategories of Non-durables

Dependent Variable: Change in Consumption of

	Food and Drink		Dining Out		Clothing	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.485^{*}	0.289	0.920^{***}	0.357	1.386^{***}	0.512
Fall*Change in real house price	-0.798	0.488	-1.199^{**}	0.566	-1.373^{**}	0.689
Change in real income	-0.012	0.021	0.041	0.032	0.100^{*}	0.056
change in mortgage payment	0.023	0.015	-0.012	0.019	0.009	0.022
Age	0.065	0.043	0.133^{*}	0.075	0.151^{*}	0.081
Age square	0.000	0.000	-0.001^{**}	0.001	-0.001^{**}	0.001
Less than high school	-0.236^{*}	0.128	-0.144	0.195	0.154	0.207
Some college	0.036	0.062	0.028	0.088	0.057	0.101
Single male	-0.016	0.146	0.227	0.186	-0.173	0.230
Single female	0.007	0.071	-0.072	0.105	0.070	0.103
Black	-0.058	0.136	-0.063	0.181	0.172	0.213
Hispanic	-0.514	0.340	0.820^{**}	0.320	-0.528	0.388
Change in MSA unemployment	0.038	0.032	-0.021	0.046	0.045	0.062
Change in MSA per cap income	1.403	1.119	-2.334	1.575	-0.956	1.607
Wave dummy	-0.109	0.152	0.094	0.205	0.055	0.230
Constant	-2.295^{*}	1.382	-4.162^{*}	2.481	-5.411^{**}	2.736
N	1992		1992		1992	

dining and drinking out and clothing and apparel show opposite effects and are significantly different from 0. In addition, the signs of interaction terms of the rest subcategories are negative as expected, showing again that older homeowners respond to house price gains, but not losses.

6. CONCLUSION

By linking CAMS and HRS data, weconstruct a new panel dataset to examine the impact of house price fluctuations on non-durable goodsconsumption of households approaching or in retirement. We focus on homeowners who live in the same house during the sample period and do not experience precipitating shocks. We find that house price appreciation increases non-durable goods consumption of older homeowners. However, they are reluctant to reduce their consumption when house prices fall. Although these asymmetric behaviors are difficult to explain by standard rationaleconomic theory, an old proverb provides some insight ?it is easier to go from rags to riches than from riches to rags.The findings in this paper contribute to the understanding of elderly consumption behavior.

TABLE 5—*Continued*

Dependent Variable: Change in Consumption of

	Tickets		Vacation		Gasoline	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Change in real house price	1.015*	0.575	0.943	0.628	0.505	0.311
Fall*Change in real house price	−0.584	0.806	−0.680	0.982	−0.307	0.449
Change in real income	0.012	0.079	−0.035	0.053	−0.005	0.016
change in mortgage payment	−0.008	0.021	0.012	0.025	−0.005	0.009
Age	0.062	0.078	0.215**	0.102	0.116**	0.051
Age square	0.000	0.001	−0.002**	0.001	−0.001**	0.000
Less than high school	−0.072	0.200	0.016	0.262	0.010	0.164
Some college	−0.197	0.134	−0.238	0.165	0.112	0.083
Single male	0.032	0.198	0.041	0.266	−0.109	0.120
Single female	−0.114	0.145	0.009	0.171	−0.225**	0.100
Black	−0.047	0.261	−0.126	0.280	−0.032	0.165
Hispanic	0.017	0.369	−0.736	0.465	−0.460*	0.250
Change in MSA unemployment	0.087	0.065	0.027	0.075	0.040	0.041
Change in MSA per cap income	1.508	2.269	−3.510	2.633	1.341	1.203
Wave dummy	−0.318	0.293	0.111	0.322	−0.442***	0.164
Constant	−2.256	2.628	−6.497*	3.449	−3.485**	1.665
N	1992		1992		1992	

Note: *, **, *** indiates the coefficient is statistically significant at 10%, 5% and 1% level respectively.

Future research is needed to identify the driving force accounting for the asymmetric behavior.

In this study, we do not include renters in our analysis. Renters? behavior could be significantly different from that of homeowners. Although it is unlikely to happen in our sample of older households, if renters plan to purchase a house in the future and are currently saving for the down payment, they may have to cut back consumption in order to meet the increased requirements on down payment when house prices move upward. Under the same scenario, these renters may also forgo the purchasing plan and increase consumption by spending down the accumulated down payment. If renters have no plan to purchase a house in the future, they may need to reduce consumption because they face higher rent after increases in house prices. If they have no plan to purchase a house and are not subject to rent change[5], they may not respond to house price movements. It would be interesting to test on renter sample. However, the data does not contain

[5]A couple of reasons could cause fixed rent, for example, they are protected by the rent control program.

enough observations to produce statistically significant results.Therefore, we leave the tests of renters and several other hypotheses in the appendix.

APPENDIX A

Predicted vs. unpredicted house price movements

According to the permanent income hypothesis, non-credit-constrained households should only respond to unpredicted house price changes. However, the empirical results are mixed. Gan (2010) presented that only unpredicted house price movements affect household consumption, whereas Campbell and Cocco (2007) found that both predicted and unpredicted house price increases stimulate household consumption. We examine whether the theory holds for our older sample in this subsection. The models tested are as follows:

$$\begin{aligned} \Delta C_{it} &= \beta_0 + \beta_1 E(\Delta H_{it}) + \beta_2 Fall * E(\Delta H_{it}) \\ &+ \beta_3 \Delta Inc_{it} + \beta_4 \Delta Mort_{it} + \beta_x X_{it} + \beta_z Z_i + \beta_d D_t + \varepsilon_{it} \end{aligned} \tag{A.1}$$

$$\begin{aligned} \Delta C_{it} &= \beta_0 + \beta_1 (\Delta H_{it} - E(\Delta H_{it})) + \beta_2 Fall * (\Delta H_{it} - E(\Delta H_{it})) \\ &+ \beta_3 \Delta Inc_{it} + \beta_4 \Delta Mort_{it} + \beta_x X_{it} + \beta_z Z_i + \beta_d D_t + \varepsilon_i t \end{aligned} \tag{A.2}$$

We decompose house price movements into two parts: the expected component, $E(\Delta H_{it})$, and an exogenous shock, $\Delta H_{it} - E(\Delta H_{it})$. Due to the unexpected housing market downturn in 2007, the usual method that predicting the house price movement using the second lag term has low predicting power. Therefore, in this paper, we take a rough but relatively realistic approach and consider that the expected house price movement is the lag of house price movements. That is, households believe the current housing market will repeat what happened in the past. We consider the difference between the expected house price change and the actual change an exogenous shock. We separately estimate the effects of the anticipated and unanticipated components of house price movements. If the permanent income hypothesis holds, households should not respond to predicted house price increases and only respond to unpredicted house price movements, controlling for other demographic and socioeconomic variables. The results are reported in Table A1. Column I and column II report the effect of predicted and unpredicted house price movements, respectively. The coefficients on predicted house price change are insignificant, showing that non-credit constrained households don?t respond to predicted house price fluctuations. The coefficient on the unpredicted house price change is 0.371 and statistically significantly different from 0, indicating households respond to unexpected house price appreciations. Again, the interaction term that captures the effect of house price drops is negative and statis-

tically significant, showing that people only respond to unexpected house price gains.

TABLE 1.

Regression Results: Predicted vs. Unpredicted

	I		II	
	Coef.	S.E.	Coef.	S.E.
Change in real house price	0.147	0.132	0.371^{**}	0.183
Fall*Change in real house price	0.790	3.117	-0.406^{**}	0.198
Change in real income	0.014	0.018	0.013	0.018
Change in mortgage payment	0.002	0.007	0.002	0.007
Age	0.054^{*}	0.028	0.054^{*}	0.028
Age square	0.000^{**}	0.000	0.000^{**}	0.000
Less than high school	−0.097	0.077	−0.097	0.077
Some college	0.003	0.036	0.003	0.036
Single male	0.091	0.075	0.093	0.075
Single female	−0.015	0.041	−0.016	0.040
Black	−0.012	0.070	−0.009	0.070
Hispanic	-0.195^{*}	0.101	-0.206^{**}	0.101
Change in MSA unemployment	0.000	0.016	0.006	0.017
Change in MSA per cap income	0.534	0.686	0.461	0.670
Wave dummy	−0.058	0.071	−0.039	0.073
Constant	-1.766^{*}	0.911	-1.791^{**}	0.912
N	1992		1992	

Note: *, **, *** indiates the coefficient is statistically significant at 10%, 5% and 1% level respectively.

Renters

Most renters at older ages are long-time renters who do not have plans to purchase a house. Their consumption should be negatively related to house price movements because their rent is positively related to house prices. However, if they reside in a place for a very long time, perhaps their rent does not fluctuate much. In this case, they do not need to adjust their non-durables consumption because their wealth and cash flow do not change when house prices fluctuate.

In this section, we isolate the renters' sample and test which channel best describes older renters' behaviors. We define a household to be a renter if it does not own a primary residence in either wave. The descriptive statistics for renters, including both who live in house prices increased areas and decreased areas, are presented in Table A2. Column I presents the result without separating house price gains and losses. Column II reports the result with the interaction term testing whether renters also behave

asymmetrically when facing house price gains and losses. Since most of older households own their primary residence, we have a small sample size. In both specifications, we find the coefficients of interests insignificantly differ from 0. The negative sign on coefficients show that some renters may be subject to rent change. However, data limit prevents us from further testing.

TABLE 2.

Regression Results: Renters

	I		II	
	Coef.	S.E.	Coef.	S.E.
Change in real house price	−0.268	0.999	−0.629	1.279
Fall*Change in real house price			1.032	1.965
Change in real income	−0.183	0.118	−0.182	0.116
Change in mortgage payment	0.110	0.136	0.107	0.136
Age	0.110	0.136	0.107	0.136
Age square	−0.001	0.001	−0.001	0.001
Less than high school	0.186	0.312	0.162	0.337
Some college	0.336	0.252	0.334	0.254
Single male	−0.491*	0.279	−0.494*	0.279
Single female	−0.274	0.196	−0.292	0.209
Black	−0.412	0.373	−0.413	0.374
Hispanic	−0.005	0.339	0.056	0.399
Change in MSA unemployment	−0.036	0.101	−0.006	0.114
Change in MSA per cap income	3.158	3.097	3.639	2.942
Wave dummy	0.203	0.525	0.076	0.608
Constant	−4.103	4.697	−3.934	4.701
N	323		323	

Note: *, **, *** indiates the coefficient is statistically significant at 10%, 5% and 1% level respectively.

REFERENCES

Benjamin, John., P. Chinloy, and G. D. Jud, 2004. Real Estate Versus Financial Wealth inConsumption. *Journal of Real Estate Finance and Economics* **29**, 341-354.

Bhatia, Kul. B., 1987. Real Estate Assets and Consumer Spending. *Quarterly Journal ofEconomics* **102**, 437-444.

Bostic, Raphael., S. Gabriel, and G. Painter, 2009. Housing Wealth, Financial Wealth, and Consumption: New Evidence from Micro Data. *Regional Science and UrbanEconomics* **39(1)**, 79-89.

Buiter, Willem H., 2008. Housing Wealth isn?t Wealth. Working Paper 14204. Cambridge, MA: National Bureau of Economic Research.

Campbell, John Y. and J. F. Cocco, 2007. How Do House Prices Affect Consumption? Evidence from Micro Data. *Journal ofMonetary Economics* **54(3)**, 591-621

Caplin, Andrew C. Freeman, and J. Tracey, 1997. Collateral Damage: How Refinancing Constraints Exacerbate Regional Recessions. *Journal of Money, Credit, and Banking* **29**, 499-519.

Carroll, Christopher, M. Otsuka, and J. Slacalek, 2006. How Large Is The Housing WealthEffect? A New Approach. Working Paper 12746. Cambridge, MA: National Bureau of Economic Research.

Case, Karl, J. Quigley, and R. Shiller, 2005. Comparing Wealth Effects: The Stock-Market Versus The Housing Market. *Advances in Macroeconomics, Berkeley Electronic Press* **5(1)**, 1235-1235.

Coe,Norma and A. Webb, 2010. Children and Household Utility: Evidence from Kids-Flying the Coop. Working Paper 2010-16. Chestnut Hill, MA: Center forRetirement Research at Boston College.

Coile, Courtney and K. Milligan, 2006. How Household Portfolios Evolve after Retirement:The Effect of Aging and Health Shocks. Working Paper 12391.Cambridge, MA: National Bureau of Economic Research.

Dushi, Irena, L. Friedberg, and A. Webb, 2010. What is the Impact of Foreclosures on Retirement Security? Working Paper 2010-16. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Elliot, Walter L., 1980. Wealth and Wealth Proxies in a Permanent Income Model. *Quarterly Journal of Economics* **95**, 509-535.

Engelhardt, Gary, 1996. House Prices and Home Owner Saving Behavior. *Regional Science and Urban Economics* **26**, 313-336.

Gan, Jie, 2010. Housing Wealth and Consumer Growth: Evidence from a Large Panel of Households. *Review of Financial Studies* **23**, 2229-2267.

Hurst, Erik and F. Stafford, 2004. Home Is Where the Equity Is: Mortgage Refinancing and Household Consumption. *Journal of Money, Credit and Banking* **36**, 985-1014.

Iacoviello, Matteo, 2004. Consumption, House Prices and Collateral Constraints: a Structural Econometric Analysis. *Journal of Housing Economics* **Vol. 13(4)**, 304-320.

Munnell, Alicia H. and M. Soto, 2008. The Housing Bubble and Retirement Security. Working Paper 2008-13. Chestnut Hill, MA: Center for Retirement Researchat Boston College.

Muellbauer, John, and Murphy, A., 1997. Booms and busts in the UK housing market. *The Economic Journal* **107(445)**, 1701-1727.

Sinai, Todd and N. Souleles, 2005. Owner-occupied Housing as a Hedge Against RentRisk. *Quarterly Journal of Economics* **120**, 763-789.

Skinner, Jonathan, 1989. Housing Wealth and Aggregate Saving. *Regional Science and Urban Economics* **19**, 305-324.

Sun Wei, R. K. Triest and A. Webb, 2008. Optimal Retirement Asset Decumulation Strategies: The Impact of Housing Wealth. *Asia-Pacific Journal of Risk and Insurance* **3(1)**, 112-139.

Venti, Steven F. and D. A. Wise, 2002. Aging and Housing Equity. *Innovations in Retirement Financing*, 254-281.

Venti, Steven F. and D. A. Wise, 2004. Aging and Housing Equity: Another Look. *Perspectives on the Economics of Aging*, 127-180.