



Housing wealth, financial wealth, and consumption: New evidence from micro data [☆]

Raphael Bostic ^{a,*}, Stuart Gabriel ^b, Gary Painter ^a

^a Lusk Center for Real Estate, School of Policy, Planning and Development, University of Southern California, 331 Lewis Hall, Los Angeles, California 90089-0626

^b Anderson School of Management and Ziman Center for Real Estate, University of California, Los Angeles, 110 Westwood Plaza, Suite C412, Box 951481, Los Angeles, California, 90095-1481

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ABSTRACT

Fluctuations in the stock market and in house values over the course of recent years have led to renewed macroeconomic policy debate as regards the effects of financial and housing wealth in the determination of consumer spending. This research assembles a unique matched sample of household data from the Survey of Consumer Finance and the Consumer Expenditure Survey to estimate the consumption effects of financial and housing wealth. The micro-data permit numerous innovations in the assessment of wealth effects, including an analysis of the impact of wealth on both durable and non-durable consumption and a comparison of wealth effects as derive from gross versus after-debt measures of financial and housing wealth. Further, the research seeks to assess robustness of those estimates to deviations from trend and volatility in financial and housing wealth and among credit constrained and non-credit constrained households.

Overall, research findings indicate relatively large housing wealth effects. Among homeowners, the housing wealth elasticities are estimated in the range of .06 over the 1989–2001 period. In marked contrast, the estimated elasticities of consumption spending with respect to financial wealth are smaller in magnitude and are in the range of .02. Further, the estimated wealth elasticities appear robust to deviations from trend and volatility in the wealth measures. Research findings support the hypothesized behavioral distinction in household consumption spending across durable versus non-durable categories. Consumption propensities also diverge sharply across the credit constrained and non-credit constrained households. Finally, there is little difference in wealth elasticities derived from measures of home equity versus house values.

Research findings suggest the possibility of sizable reverse wealth effects. For example, a 10 percent decline in housing wealth from 2005 levels translates into a 1 percentage point decline in real GDP growth, a sizable reduction relative to the approximate 4 percent real GDP growth evidenced in prior years. Results of the analysis point to the sizable economy-wide risks associated with the recent retrenchment in house values.

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1. Introduction

Recent years have witnessed widespread media attention and economic policy debate regarding the consumption effects of fluctuations in household financial and housing wealth. As is well-appreciated, stock prices evidenced pronounced volatility over the course of the 1990s, running up by 450 percent before falling back by a full one-third during 2000–2001. The stock market collapse destroyed more than \$8 trillion in paper wealth and was arguably a cause of the 2001 recession. In contrast, U.S. house prices approximately doubled over the decade of the 1990s and then doubled again during 2000–

2005 in many metropolitan areas. In 2005, those gains were widespread as 25 U.S. states recorded double-digit house price increases. Indeed, home equity grew by about \$9.6 trillion during 2001–2004 to comprise more than one-half of the wealth of the typical U.S. household (Belsky & Prakken, 2004).¹ In a recent paper, Greenspan and Kennedy (2005) estimated home equity extraction at \$383 billion in 2001 and \$552 billion in 2002, of which \$174 and \$214 billion, respectively, consisted of gross cash out refinance activity. According to Greenspan and Kennedy (2005), homeowners extracted an additional \$300 billion in home equity through cash-out refinancings in 2003. The refinance boom of recent years was supported by generational lows in mortgage interest rates and innovations in financial and mortgage markets that enabled households to access

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* Corresponding author.

E-mail addresses: bostic@usc.edu (R. Bostic), stuart.gabriel@anderson.ucla.edu (S. Gabriel), gpainter@usc.edu (G. Painter).

¹ By 2003, the value of home equity on household balance sheets exceeded the value of stocks directly owned by households by \$2.6 trillion (Belsky and Prakken, 2004). According to the 1998 Survey of Consumer Finances, financial wealth is concentrated in restricted accounts. Further, 84 percent of total stock market wealth in the U.S. is held by the top income quintile.

their wealth in cheaper, faster ways.² More recently, in the wake of the 2006–2007 bursting of speculative bubbles both in housing and in the capital markets, house prices have recorded substantial declines. Similar retrenchment was evidenced in mortgage re-finance activity, in the wake of marked reductions in home equity and in related withdrawal or re-pricing of home equity lines of credit and related mortgage products. Those dramatic trends led analysts at the Federal Reserve and on Wall St. to ascribe a critical role to housing wealth in the determination of cyclical swings in consumption activity.^{3,4}

A well developed literature in finance has established a link between consumption and wealth shocks (e.g., *Poterba and Samwick, 1996; Juster et al., 1999*). These models predict that unexpected wealth shocks change the permanent income of households and thereby affect the life-cycle pattern of savings and consumption (*Lettau and Ludvigson, 2004*). A companion literature has argued that shocks to different forms of wealth can elicit varying consumption responses (e.g., *Iacoviello, 2004; Lettau and Ludvigson, 2004; Piazzesi et al., 2004; Case et al., 2005; Lustig and Van Nieuwerburgh, 2005*) and empirical studies have generally borne this out (e.g., *Case et al., 2005; Benjamin et al., 2004*).

This research assembles a unique matched data sample from the Survey of Consumer Finance and the Consumer Expenditure Survey to estimate the consumption effects associated with real estate and financial wealth. The highly-detailed micro data enable us to shed new light on household consumption behavior in several important ways. Specifically, we assess household responses among different categories of consumption spending and to various components of financial and real estate wealth. Further, the research evaluates variability in consumption spending to changes in the market value of household asset holdings, as is customary in the empirical literature, and to changes in wealth net of debt, as is consistent with theory. The analysis also examines household responses over time and in response to volatility and trend deviations in the underlying wealth measures, so as to assess the robustness of the estimated elasticities to the marked fluctuations in stock market and real estate valuations evidenced over the 1989–2001 period. Additional estimates are presented, including those pertaining to the robustness of wealth estimates across households grouped by age and by credit constraint in consumer debt markets.

The research proceeds as follows. The next section provides background and a review of relevant literature. The dataset and empirical specifications are described in Section 3. Section 4 presents the statistical results, and Section 5 discusses implications of statistical findings for macroeconomic activity.

2. Background and literature review

Recent literature has sought to nuance our understanding of the link between consumer behavior and shocks to household wealth. In that regard, *Lettau and Ludvigson (2004)* stress that unexpected wealth shocks must be perceived as permanent to affect consumption spending. The authors present evidence that households do not respond to transitory shocks by adjusting consumption patterns.⁵

² See *Bostic and Surette (2001)* for a discussion of some of these financial and mortgage market innovations.

³ In a speech to the Mortgage Bankers Association in 1999, Chairman Greenspan suggested that “One might expect that a significant portion of the unencumbered cash received by house sellers and refiners was used to purchase goods and services...”. Greenspan further articulated the role of home equity extraction in support of U.S. economy activity in subsequent statements.

⁴ On January 25, 2006, Justin Lahart of the Wall St. Journal wrote “Housing is becoming a front-burner issue for Wall St. First of all, investors fret that because prices ran up by so much over the past several years, the real estate market could be in for more than a garden-variety slowdown. Second, they worry that because housing’s strength has provided a big boost to consumer spending; even a garden variety slowdown could prompt big-time belt tightening.”

⁵ There is not complete unanimity regarding this view, however, as some research suggests that households do not always behave in the way predicted by these standard models. Work by *Choi et al. (2004)* suggests in a study of 401k contributions that households can respond to a positive wealth shock by saving more to take advantage of higher rates of return, and can respond to a negative shock by consuming more now.

The literature also has posited that consumption responses can vary depending on the type of wealth. There are several possible explanations for this. First, households may view some forms of wealth as temporary or more uncertain (e.g., *Edison and Slok, 2001; Lettau and Ludvigson, 2004; Case et al., 2005*). Second, households may find it more difficult to measure or liquefy certain types of wealth. For example, transactions costs related to borrowing against home equity could result in a lower marginal propensity to consume out of home equity relative to stock market equity, all things equal. Also, households with significant debts or other credit constraints may be differentially affected by shocks to particular types of wealth. In that regard, *Iacoviello (2004)* suggests that house prices should enter a correctly specified Euler equation for consumption if household borrowing capacities are tied to the value of their houses.

Another behavioral possibility is that households “hold” different assets classes in separate “mental accounts” (*Thaler, 1990*), leading them to respond differently to changes in their gross or net positions in financial or housing wealth. For example, a dollar made in capital gains may be considered more discretionary than a dollar in existing wealth, especially if the capital gains in stocks or housing are largely unanticipated and viewed as windfalls.⁶ Also, as suggested by *Juster et al. (2006)*, the housing asset may serve more than one purpose — as housing is both an instrument of savings and a consumption good. Accordingly, while house price increases add to the wealth of homeowners, such increases may make trade-up less affordable to households and accordingly dampen their consumption response. Finally, a number of authors (e.g., *Piazzesi et al., 2004; Lustig and Van Nieuwerburgh, 2005*) suggest that housing may provide consumption insurance, and therefore affect consumption patterns differently than does financial wealth.

While not all previous work has used these theoretical justifications as their basis for inquiry, a number of studies have investigated the possible independent roles of both financial and housing wealth on consumption. In general, analyses of the role of housing wealth in the determination of consumption spending have used one of three types of information: aggregate time-series data at the state or national level, micro-data from household-level surveys, and data based on refinance activity. The literature is summarized in *Table 1*.

Elliot (1980) conducted an early study of the impact of non-financial and financial wealth on consumption spending using aggregate data, and concluded that non-financial wealth had no impact on consumption. In contrast, applying an error correction framework, *Belsky and Prakken (2004)* find that the estimated consumption effects of real estate and corporate equity are sizable and similar in magnitude (about 5-1/2 cents on the dollar), but different in immediacy of impact.⁷ *Carroll (2004)* applies aggregate time-series data over frequencies of a few quarters to estimate housing and stock wealth elasticities; the estimated elasticities are similar in magnitude to those of *Belsky and Prakken (2004)*. However, in the *Carroll (2004)* study, the immediate quarterly MPC was estimated at only 1-1/2 cents on the dollar, but accumulates gradually to about 4–10 cents over the ensuing couple of years. *Case, Quigley, and Shiller (CQS) (2005)* apply both state- and country-level data and find that the marginal propensities to consume out of housing wealth are substantially in excess of those for financial wealth. *Dvornak and*

⁶ As suggested by *Shefrin and Thaler (1988)*, the marginal propensities to consume may differ across assets because of varying perceptions of liquidity. That is, for behavioral reasons, household may self-impose differing asset-based constraints on liquidity.

⁷ The authors construct service and durable goods measures of consumption from information contained in the NIPA and the Federal Reserve’s Flow of Funds. The Flow of Funds accounts were further utilized to construct national time-series measures of housing and corporate wealth as well as to compute home equity withdrawals. Findings suggest that about 80 % of the long-run housing wealth effect is realized within 1 year, whereas it takes close to 5 years for stock wealth to approach 80 % of its long-run impact.

Table 1
Selected studies on wealth effects on consumption

	Data	Measure of housing/financial wealth	Housing wealth effect	Financial wealth effect
<i>Studies using aggregated data</i>				
Case, Quigley, and Shiller (2005)	Panel of countries and panel of U.S. states	Aggregate housing and financial wealth	.11–.17 (Int'l), .05–.09 (States)	0 (Int'l), .02 (States)
Benjamin, Chinloy, and Jud (2004)	U.S. national time series of states	Aggregate housing and financial wealth net of debt outstanding	.08	.02
Dvornak and Kohler (2003)	Panel of Australian states	Aggregate housing and financial wealth net of debt outstanding	.03	.06–.09
Bhatia (1987)	U.S. Census, National accounts	Self-reported home values, no financial	.32–.53	–
<i>Studies using household surveys</i>				
Lehnart (2003)	Panel Survey of Income Dynamics (PSID)	Self-reported home values, no financial	.04–.05, varies with age	–
Engelhardt (1996)	PSID	Self-reported home values less improvement value, no financial	.14, .03 for median household	–
Skinner (1996)	PSID	Self-reported home values, no financial	–	–
Levin (1998)	Retirement History Survey	Housing equity (net of debt), financial wealth	.06, .05 for liquidity constrained	Less than .02
<i>Studies using refinance activity</i>				
Canner, Dynan, and Passmore (2002)	Survey of U.S. households	Cash extracted via mortgage refinancing, no financial	.60 of refinance dollars	–

NOTE: Wealth effects reflect increase in consumption spending associated with a 1 unit increase in wealth or net wealth.

Kohler (2003) obtain the opposite results in application of the CQS methodology to the Australian economy, with larger effects for financial wealth, but smaller effects for housing wealth. Benjamin, Chinloy, and Jud (2004) use U.S. state-level data similar to that used in CSQ (2005) and find sizable housing wealth effects. Finally, Case (1992) linked the real estate price boom in the late 1980's in New England to a substantial increase in consumption for the region.

A number of other studies have used the Panel Study of Income Dynamics (PSID), a household-level survey, to investigate the relationship between housing wealth and household consumption spending. Owing to data limitations in the PSID, these studies evaluate only non-durable or food measures of consumption. Further, only the limited information in the period wealth supplements of the PSID is available to measure financial and housing wealth. Skinner (1996) finds that increases in housing wealth result in increased consumption spending by younger households, but not by older households, who tend to be more cautious in spending those gains.⁸ Engelhardt (1996) identifies the marginal propensity to consume out of housing wealth to be about .03, but finds this effect to be asymmetric and significantly associated only with declines in house values (i.e., reverse wealth effects). Lehnart (2003) finds an overall marginal propensity to consume of similar magnitude, but also observes variation in estimated results across the age distribution.⁹ Levin (1998), using micro data from the Retirement History Survey, finds no effect of housing wealth on consumption. In marked contrast, using micro data from the U.K., Campbell and Cocco (2005) estimate a house price elasticity as large as 1.7 for older households.¹⁰

In a study of mortgage re-finance activity, Canner et al. (2002) apply Survey of Consumer Finance data to estimate the magnitudes of housing wealth extraction and related consumption effects during 2001–2002. They find that the median household extracted approximately \$20,000 in housing equity during that period, and that 60% of the extracted wealth went towards new consumption, whereas the remainder was used to pay off debt. The Canner et al. (2002) analysis

estimates this magnitude of home equity extraction led to \$67 billion in new consumption spending. However, the study lacks nuanced measures of consumption and concludes that it is difficult to estimate a direct wealth effect.

While the above studies provide important insights as regards the role of financial and housing wealth in the determination of consumption spending, past assessments have been constrained as regards data resources and methodology. Studies relying on aggregate time-series data lack a clear behavioral link between fluctuations in wealth and household spending. That is, it is not possible to identify whether increases in consumption expenditures are incurred by those households that experienced an increase in wealth. The macro datasets also typically lack controls for household demographic and economic characteristics and may suffer from omitted variables and endogeneity issues. While studies using the longitudinal PSID address concerns regarding the direct behavioral link between consumption spending and changes in household wealth, the PSID lacks important indices of both consumption and wealth and thus does not permit more nuanced analyses that may be of interest to researchers and to macroeconomic analysts. For example, studies relying on the PSID have difficulty distinguishing between effects on durable and non-durable consumption or in evaluating responses associated with changes in either gross or net-of-debt measures of household wealth. Further, the PSID data lack detailed information on household asset holdings across financial, homeownership, and other real estate classifications.

This study addresses these shortcomings directly. By combining highly-detailed micro data on household wealth from the Survey of Consumer Finances (SCF) with household consumption and demographic information from the Consumer Expenditure Survey (CEX), we develop a unique micro data set that permits a careful and nuanced investigation of the relationship between consumer spending and the various wealth measures. In contrast to most prior research, we are able to disaggregate consumption spending into total consumption and durable goods spending and to test for differential wealth estimates across those categories. As suggested above, previous research largely has focused on total consumption or food purchases, and the purchase of consumer durables may be more or less affected by changes in wealth. If spending on durable goods is predicated in part on unanticipated wealth increases or is viewed as enhancing to diversification of the household portfolio, then durable consumption may have a greater elasticity with respect to wealth than non-durable consumption. Alternatively, if durables are treated as long term purchases by households, they may be less affected by short-run fluctuations in wealth.

⁸ Skinner (1996) also found an asymmetry in effects in that households under 45 who realized declines in housing wealth increased saving by 10 cents per dollar of decline, whereas those that realized gains decreased savings by 0.4 cents per dollar of increase.

⁹ Lehnart (2003) finds the largest effects for the youngest households and for those households on the verge of retirement, who may be downsizing their housing needs.

¹⁰ Campbell and Cocco (2005) apply household data from the UK Family Expenditure Survey to estimate the response of consumption to house prices. Their model allows for regional heterogeneity in outcomes. However, owing to the pseudo-panel data structure, they are not able to precisely identify those households for whom the wealth effect of house price changes is the largest or for whom borrowing constraints are non-binding. We address those issues directly in our estimation below.

Another innovation is our use of household balance sheet information from the SCF to estimate wealth effects across financial, housing and other forms of wealth. Information in the SCF on household wealth is sufficiently detailed so as to permit the separation of holdings of owner-occupied real estate from other forms of real estate and to estimate related wealth effects. While very few households hold other forms of real estate, asset values in these markets are more volatile than those of owner-occupied housing, and therefore may have a different impact on consumer spending.

Further, we test whether households base their consumption decisions on the market value of their asset holdings or on those wealth measures net of debt. To our knowledge, only one prior study of consumption spending (Dvornak and Kohler, 2003) has used a measure of net wealth – in this case, home equity – to assess housing wealth effects. That analysis, however, was confined to aggregate data. Other relevant studies examine the relationship between consumption and asset market values. The estimated relationship is then taken to represent wealth effects. However, this equivalence need not hold. For example, households may less accurately assess their net asset position, introducing measurement error that could bias the estimated net wealth coefficients downwards.

Also, we establish whether wealth shocks have induced variability in household consumption responses over time. To do so, we estimate the financial wealth and housing wealth elasticities cross-sectionally for the 1989, 1992, 1995, 1998 and 2001 survey years. We then pool data from the 1989–2001 survey years so as to evaluate the robustness of the estimated financial and housing wealth elasticities to deviation from trend and volatility in the household financial and housing wealth measures. Such an analysis, not previously done, helps to shed light on the stability of household behavioral responses to wealth shocks and also provides insights as to the importance of housing cycle and other economic considerations for household consumption decisions. Finally, we investigate the robustness of estimation results across the age distribution and among household with impaired borrowing capacity, with the latter test providing an evaluation of the [Iacoviello \(2004\)](#) Euler equation hypothesis.

3. Data and model

As noted above, our research relies on a dataset that was expressly developed so as to allow appropriately nuanced specification of the wealth-related hypotheses. That dataset links detailed individual-level consumption information with similar quality wealth data and accordingly is substantially better suited to the questions at hand than the data used in prior studies. The data are drawn from two surveys. The U.S. Bureau of Labor Statistics' *Consumer Expenditure Survey (CEX)* has since 1980 collected detailed information about U.S. household expenditures.¹¹ Detailed indicators of household financial and housing wealth are drawn from the Federal Reserve Board's *Survey of Consumer Finances*.

We use information obtained from the CEX to calculate a household's consumption-related expenses for a calendar year. For our purposes, we track total expenses, as well as expenses on durable goods. Our CEX sample also includes demographic information on the households, such as the age, race, marital status, housing tenure, and level of education of the household head. Unfortunately, the wealth data in the CEX is limited in terms of scope and precision, and thus the CEX alone is not sufficient for our purposes.¹²

We therefore turn to a different survey that specializes in household wealth and income, the Federal Reserve Board's *Survey of Consumer Finances (SCF)*. The SCF is a triennial survey of U.S. households that

provides highly detailed information on U.S. families' assets and liabilities, use of financial services, income, and housing and demographic characteristics. Importantly, the SCF oversamples relatively wealthy households to ensure strong coverage of households with significant financial holdings.¹³ This survey provides far more information about a household's balance sheet and financial position than any other survey of households. It thus is an ideal instrument to address our question of how consumption varies with the market value of a household's assets as well as with the net wealth position of those households.

The particular variables of interest are the asset value and net wealth measures. Our analysis includes each household's financial assets, the value of the household's home if they own it, and the value of any other real estate the household might own.¹⁴ We also use SCF information on consumer debt and mortgage debt associated with both owner-occupied and the other real estate in the household's portfolio to compute the household's net wealth position. The SCF data also include demographic variables such as age, race, marital status, years of education, and housing tenure status that are important for the matching procedure.

Although both the CEX and SCF began in the early 1980s, because the SCF question frame changed prior to the 1989 survey, comparisons across years are only appropriate for surveys implemented from 1989 to the present. The analysis therefore examines the 1989 to 2001 time period, and uses responses associated with the 1989, 1992, 1995, 1998, and 2001 SCF and CEX surveys. The study further includes information from the Wilshire 5000 Index and the regional repeat sales house price indices of the Office of Federal Housing Enterprise and Oversight (OFHEO) on performance of stock and housing markets over the 1989–2001 study period. The latter indices are utilized to assess the robustness of the estimated financial and housing wealth elasticities to deviations from trend and volatility in housing and stock prices. To create an ideal dataset, we match observations across the SCF and CEX, a process that is described in the following section.

3.1. The matching procedure

Because the CEX and SCF do not survey the same households, linking the consumption data in the CEX with the detailed wealth data in the SCF requires a matching algorithm. We use a nonparametric procedure suggested by [Goel and Ramalingam \(1989\)](#) that first partitions both samples into cells based on individual characteristics known to be highly-correlated with variation in consumption, such as age, marital status, and education. As a precaution, the dimensionality of these characteristics was restricted to increase the likelihood that cells were not empty for either sample. For this paper, the match was established along four dimensions:

- Marital status – Married or not;
- Race – white, black, or other;
- Level of schooling – Less than high school, high school graduate, some college, college degree or more; and
- Age – 25–35, 36–50, and 51–65;

Based on the matching dimensions, we partitioned the sample into 72 cells, within which the CEX and SCF observations were matched. Given the focus of the analysis and to mitigate against matching across tenure status, the sample was restricted to homeowners. The sample was further restricted to household heads between 25 and 65 years of age to eliminate issues regarding heterogeneous consumption during

¹¹ The CEX consists of two surveys. In the Diary survey, respondents track expenses on frequently purchased items such as food over a two-week period. In the Interview survey, which is conducted quarterly, respondents report on regular expenses, such as monthly bills, and major expenses of large items.

¹² See [Dyner and Maki \(2001\)](#).

¹³ The SCF is sponsored by the Board of Governors of the Federal Reserve System in cooperation with the U.S. Department of the Treasury, and conducted by the Survey Research Center at the University of Michigan. For more on the sampling technique used in the SCF, see [Kennickell \(2000\)](#).

¹⁴ Financial assets in the SCF are calculated as the sum of liquid assets, certificates of deposit, mutual funds, stocks, bonds, other managed assets, cash life insurance, and quasi-liquid retirement savings.

college-age years and retirement. The match process yielded a dataset with 2759 observations in 2001.

Matching within a cell proceeded as follows. CEX observations were rank ordered by income. SCF observations were likewise ranked by income, with each SCF observation included four times to ensure that each CEX observation had a match. From this “quadrupled” SCF sample, a random sample was drawn of a size equal to the number of CEX observations. The two sets of rank ordered samples – the CEX sample and the randomly-drawn SCF sample – were then matched one-to-one.¹⁵ Given the over sampling of high income households in the SCF, we truncated that sample in each year at 90 percent of observed household income, so as to enhance to comparability of the SCF and CEX income matches.^{16,17}

Each observation in the matched sample includes a measure of income from both the SCF and CEX. As a check of the match procedure, we compared the correlations between the two measures of income and between the income measures and the consumption and wealth variables that appear exclusively in only one or the other of the surveys. Those correlations are displayed in Table 2 for the 2001 survey year.¹⁸ Note that the two income measures are highly correlated. Further, the correlations between the SCF income variable and the CEX consumption variables are stronger than the within CEX correlations, and their rank orderings and relative magnitudes remain intact across the surveys, which offers a degree of confidence in the quality of the match. This relationship is also observed regarding the SCF wealth variables, where the CEX income correlations are similar in magnitude to those of the SCF.¹⁹

The nonparametric procedure described above is also known as statistical matching (Singh et al., 1993). The challenge in implementing such a procedure is that the resulting dataset will violate the conditional independence assumption (Barry, 1988) across matched datasets. We overcome this in two ways. First, as described, we implement a constrained matching procedure, which is much less likely to suffer from this deficiency (Rodgers, 1984). Further, we implement a bootstrap procedure to guard against the possibility that an idiosyncratic match might drive the results, and to obtain a measure of confidence regarding the robustness of parameter estimates. All regressions (described below) were estimated 100 times, each associated with a different draw from the matching procedure. The parameters reported in the results section represent the average parameter values and the standard error of the parameter estimates over the 100 runs.

3.2. The empirical specification

The standard approach in the literature has been to establish a relationship between the market value of assets and consumption, controlling for income. As summarized above, these approaches have included both time series and simple cross sectional models. Regardless of approach, none of the prior papers have made any claim as to the causal impacts of the wealth effects, as it is difficult to imagine an instrument that would be predictive of wealth, yet unrelated to unobserved factors that affect consumption. While this paper similarly is unable to propose an uncontaminated instrument, we are able to further refine the estimates of wealth effects by utilizing better data than past analyses

¹⁵ That is, the CEX observation with the highest income was matched to the SCF observation with the highest income, the second highest CEX income to the second highest SCF income, and so on.

¹⁶ In most cases, this type of matching procedure will be comparable to other more sophisticated statistical matching techniques. For more, see Goel and Ramalingam (1989).

¹⁷ The estimated results were robust to the income truncation algorithm.

¹⁸ Correlation coefficients are computed for the other survey years and are of similar magnitude to those displayed in Table 2. They are available from the authors upon request.

¹⁹ As a further check of our method, the matching procedure was reapplied to a sample in which the SCF observations were not ranked by income. The correlation between CEX income and SCF income fell dramatically from over .8 to about .2, providing some evidence suggesting that the sampling and matching process employed is not introducing undue biases.

Table 2
Comparison of correlation coefficients for variables across the surveys

	CEX log (income)	SCF log (income)
CEX log(income)	1.000	0.759***
SCF log(income)	0.759***	1.000
CEX consumption variables		
Total	0.406***	0.434***
Nondurable	0.202***	0.202***
Durable	0.452***	0.496***
Food	0.283***	0.330***
SCF wealth variables		
Financial	0.146***	0.153***
House value	0.296***	0.366***
Other real estate	0.094***	0.123***
Net financial	0.141***	0.146***

Correlation results are from one matched sample from 2001 CEX and SCF.
*** $p < .001$.

and by conducting a large number of robustness checks across various sub-samples. These latter results using stratified samples seek to address concerns about unobserved variables and provide confidence that the results are not unduly influenced by a particular subset of the population or by a particular definition of consumer spending.

Our basic empirical model is a reduced form and is estimated at the household-level; a logarithmic transformation is required to linearize consumption, income, and wealth, and so the standard specification is:

$$\log C = f(\log Y, \log V, Z), \tag{1}$$

where C is consumption, Y is current income, V is asset value, and Z is a vector of household demographic, human capital and like controls.²⁰

Our approach expands the standard methodology in two ways. First, it disaggregates asset value and evaluates the relationship between consumption and the various components of asset value. In the context of the standard methodology, this modifies Eq. (1), but only slightly, as the components of asset value also need to be linearized using the log transformation:

$$\log C = f(\log Y, \log V_f, \log V_h, \log V_r, Z), \tag{2}$$

where V_f is the value of the individual's financial holdings, V_h is the value of the individual's primary residence, and V_r is the value of the other real estate assets an individual holds.

The second innovation – the introduction of debt considerations – complicates matters a bit more. The existence of negative values, which can arise if debts exceed asset value, means that our more comprehensive characterization of an individual's overall financial position can not be transformed using the log function. Fortunately, the difference of two log-normal variables is normal. Thus, if debts are distributed comparably to asset values, the difference between the asset values and debt is normally distributed and can be estimated untransformed in a standard regression framework. For this portion of the analysis, we therefore estimate

$$\log C = f(\log Y, V_f - D, V_h - M, V_r - M_r, Z) \tag{3}$$

where D represents non-real estate debt, M is the value of the mortgage on the individual's primary residence, and M_r is the total value of mortgages associated with the other real estate assets held by the individual.

In the empirical analysis to follow, Eqs. (2) and (3) are estimated cross-sectionally using micro data from the 1989, 1992, 1995, 1998,

²⁰ Together, the components of Y , V , and Z serve to proxy household permanent income. In fact, Goodman and Kawai (1982) compute household permanent income by regressing Y on V and Z . Our specification is common to the literature that seeks to cull out the separable effects of household wealth and socio-demographic characteristics on consumption propensities. Note further that those households in the upper and lower tails of the income distribution are most likely to experience transitory shocks to current income. Accordingly, we tested the sensitivity of our results to exclusion from the sample of the top ten percentile and bottom ten percentile of the income distribution. Results are available from the authors upon request; they suggest that the estimated consumption elasticities are robust to the various sampling algorithms.

Table 3
Homeowners: market value regression results

	1989	1992	1995	1998	2001
<i>Total Consumption</i>					
log (Income)	0.162*** (0.012)	0.198*** (0.013)	0.188*** (0.012)	0.197*** (0.015)	0.191*** (0.012)
log (Financial wealth)	0.021*** (0.005)	0.024*** (0.005)	0.023*** (0.005)	0.018** (0.006)	0.020*** (0.005)
log (House value)	0.060*** (0.011)	0.050*** (0.013)	0.050*** (0.014)	0.046** (0.016)	0.042*** (0.012)
log (Other real estate)	0.008*** (0.002)	0.006** (0.002)	0.006** (0.002)	0.004 (0.003)	0.005* (0.002)
N	2116	2033	1994	2097	2759
R-squared	0.401	0.433	0.418	0.337	0.376
<i>Durable Goods</i>					
log (Income)	0.243*** (0.028)	0.207*** (0.024)	0.230*** (0.022)	0.226*** (0.023)	0.199*** (0.019)
log (Financial wealth)	0.021 (0.011)	0.030*** (0.009)	0.027** (0.009)	0.018 (0.009)	0.020* (0.008)
log (House value)	0.076** (0.026)	0.042 (0.024)	0.038 (0.025)	0.039 (0.023)	0.033 (0.021)
log (Other real estate)	0.008 (0.005)	0.006 (0.004)	0.006 (0.004)	0.006 (0.004)	0.002 (0.003)
N	2116	2033	1994	2097	2759
R-squared	0.191	0.268	0.234	0.256	0.223

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

and 2001 survey periods. Those equations allow for estimation and assessment of drift in the estimated wealth elasticities over the study period. We also estimate the above models by pooling data over the survey years. The pooled models enable the introduction of interactive terms to explicitly assess the robustness of the estimated wealth elasticities to deviations from trend and volatility in measures of stock market and housing wealth. The pooled models further include year-year-specific fixed effects. The pooled models are specified as follows:

$$C = f(\log Y, \log V_f, \log V_h, \log V_r, \log V_f * \text{devWil5000}, \log V_f * \text{volWil5000}, \log V_h * \text{devOFHEO}, \log V_h * \text{volOFHEO}, \text{year fixed effects}, Z), \quad (4)$$

where the year-specific household financial and housing wealth terms are interacted with deviations from trend and computed volatility over the prior three years in the Wilshire 5000 and the regional OFHEO repeat sales quality-adjusted house price indexes, respectively.²¹ To the extent that households view the computed drift and volatility in household financial and housing wealth as transitory, one would anticipate little significant effect of those terms on consumption spending. As suggested above, we also stratify Eqs. (2)–(4) above across total consumption and durable goods consumption. If spending on durable goods is predicated in part on unanticipated changes in wealth or is viewed as enhancing the diversification of the household portfolio, then it is possible that durable consumption may have a greater elasticity with respect to wealth than non-durable consumption. Alternatively, if durables are treated as long term purchases by households, they may be less affected by short-run fluctuations in wealth.²²

4. Results

The estimated income, financial wealth, and housing elasticities as derived from the cross-sectional models (Eq. (2)) are displayed in Table 3. As suggested above, that specification estimates consumption elasticities associated with the *market value* of real estate and financial assets. Table 4 specifies the estimating equations in terms of *net wealth measures* (e.g., asset values net of mortgage or other debt as described in

Eq. (3), above). The estimates are computed for each of the 1989, 1992, 1995, 1998, and 2001 SCF survey years, so as to facilitate assessment of variability in consumption wealth elasticities over a period of substantial volatility and structural change in U.S. financial and housing finance markets. For the sake of parsimony, the tables display only the estimated elasticities for the income, financial wealth, housing wealth and other real estate wealth terms. Also, each of the tables displays the estimated elasticities for total and durable goods consumption.²³ Finally, Table 5 displays results of estimation of models which pool observations over the 1989–2001 survey years (Eq. (4)). As suggested above, those models also include controls for year-specific fixed effects and for deviation from trend and volatility in financial and housing asset values. While the primary coefficients of interest are displayed in Tables 3–5, full regression results are contained in Appendix Tables B–F.²⁴ Variable definitions are contained in Appendix A.

In both year-specific and pooled models, our results generally conform to those of the earlier literature in that both household income and financial and housing wealth are shown to exert significant positive effects on total consumption.²⁵ Moreover, the sensitivity of total consumption to an asset's value is larger for housing than for financial holdings. As evidenced in Table 3, the estimated house value elasticities range from .060 in 1989 to .042 in 2001 and are highly significant throughout. In marked contrast, the estimated elasticities of consumption spending with respect to financial wealth are smaller in magnitude and trend down modestly from 0.24 in 1992 to .020 in 2001. Overall, estimation findings suggest a modest decline in the importance of financial wealth to consumption spending over the course of the 1990s.

Research findings further indicate some variability in consumer behavior across durable and total consumption spending. During the 1990s, housing asset value elasticities associated with durable goods consumption – at about 0.04 – are of somewhat diminished magnitude and statistical significance relative to the elasticities for total consumption.²⁶ By contrast, for most years, the elasticity of durable goods

²³ Results for nondurable consumption are available from the authors upon request.

²⁴ Among control variables, in the year-specific analyses we observe a monotonic relationship between the level of education and consumption for both total and durable goods consumption. In addition, consumption propensities are sizable and significant for married and separated households and for larger families. Relative to the Midwest, consumption propensities also appear to be elevated in the Northeast and West.

²⁵ In a parsimonious specification which excludes the household socio-demographic controls, the estimated durable consumption elasticity with respect to income ranges from about .64 in 1989 to .42 in 2001. As evidenced in Table 3 and in related appendix tables, the inclusion of the socio-demographic controls serves to mediate those effects.

²⁶ In contrast, house value fluctuations appear to be more important to non-durable goods consumption. In the cross-sectional analyses, the estimated elasticities (not shown) were close to .06, highly significant, and relatively stable across estimation years. Those results are available from the authors upon request.

²¹ The pooled models are estimated for the gross wealth specifications alone, owing to limitations in data pertaining to changes over time in household debt required for computation of deviations from trend and volatility in measures of household net wealth.

²² Out of a concern that the matching procedure might be creating bias in the analysis, all regressions were run using a sample in which incomes were not sorted prior to matching. The results showed only a marginal propensity to consume out of current income, with no relationships observed between financial, housing, or other real estate wealth and consumption. That the matching procedure yields results more in conformity with the extant literature provides additional support for the validity of using that approach.

Table 4
Homeowners: Net Wealth regression results

	1989	1992	1995	1998	2001
<i>Total Consumption</i>					
log (Income)	0.194*** (0.011)	0.236*** (0.012)	0.219*** (0.012)	0.225*** (0.014)	0.219*** (0.011)
Net financial wealth (mill \$)	0.065** (0.021)	0.026* (0.010)	0.062*** (0.017)	0.008 (0.005)	0.009* (0.004)
Home equity (mill \$)	0.247*** (0.065)	0.160*** (0.048)	0.076* (0.038)	0.096* (0.047)	0.120** (0.038)
Other real estate equity (mill \$)	0.011* (0.005)	0.014* (0.006)	0.024* (0.012)	0.017 (0.015)	0.013 (0.012)
N	2116	2033	1994	2095	2700
R-squared	0.386	0.418	0.403	0.330	0.369
<i>Durable goods</i>					
log (Income)	0.284*** (0.026)	0.250*** (0.022)	0.262*** (0.021)	0.254*** (0.021)	0.227*** (0.017)
Net financial wealth (mill \$)	0.041 (0.048)	0.023 (0.019)	0.067* (0.031)	0.007 (0.007)	-0.002 (0.006)
Home equity (mill \$)	0.233 (0.148)	0.124 (0.088)	0.030 (0.070)	0.099 (0.068)	0.107 (0.061)
Other real estate equity (mill \$)	0.019 (0.010)	0.016 (0.012)	0.037 (0.022)	0.009 (0.022)	-0.006 (0.019)
N	2116	2033	1994	2095	2700
R-squared	0.185	0.260	0.229	0.252	0.220

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5
Pooled Estimation Owners: "Market Value" regression results

		Total Consumption	Durable Goods
log (Income)	c_loginc	0.187*** (0.002)	0.219*** (0.003)
log (Financial wealth)	lfinancial	0.021*** (0.002)	0.017** (0.004)
log (House value)	lhouse	0.053*** (0.004)	0.053*** (0.009)
log (Other real estate)	lrealst	0.005*** (0.001)	0.005*** (0.002)
log (House value)* (Deviations in financial wealth)	lfinfdevin	0.004 (0.005)	0.017 (0.010)
log (House value)* (Volatility in financial wealth)	lfinvolin	-0.002 (0.017)	0.071 (0.042)
log (House value)* (Deviations in regional house value)	lhsehdevin	-0.016*** (0.002)	-0.015*** (0.003)
log (House value)* (Volatility in regional house value)	lhsehvoin	-0.191*** (0.007)	-0.370*** (0.012)
Year 1989	dum89	-0.208*** (0.030)	-0.434*** (0.069)
Year 1992	dum92	-0.128*** (0.019)	-0.197*** (0.037)
Year 1995	dum95	-0.130*** (0.027)	-0.205*** (0.052)
Year 1998	dum98	-0.101*** (0.025)	-0.161*** (0.048)
N R-squared		0.402	0.441

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

consumption with respect to changes in financial assets was estimated to be modestly larger than that associated with total consumption.²⁷

Table 4 further presents our estimates of Eq. (3), in which we introduce debt and characterize a household's position in terms of net wealth. The value of each of the asset classes is computed net of debt; for example, house value is replaced by home equity and the value of other real estate is similarly defined as other real estate equity. Results here indicate a less precise relationship between home equity and total consumption, perhaps owing to the fact that some households spend out of passive savings, whereas others finance their consumption via the acquisition of debt.²⁸ The estimated coefficients do trend down over the period of the analysis. Given the mean home equity value of \$176,000 in 2001 for the truncated SCF sample, the elasticity of consumption spending with respect to home equity was computed to be about .02 in 2001, down from approximately .04 in 1989.²⁹ Results suggest the possibility of household measurement error in assessing net wealth positions, whereby consumption decisions are more sensitive to the more readily known nominal (gross-of-debt) market value of housing than to net housing equity holdings.³⁰

²⁷ Consumption of durable goods is more sensitive to changes in household income than is total consumption.

²⁸ Juster et al. (2006) estimate the effect of capital gains on saving by asset type. In so doing, they distinguish among active and passive savings and across housing and other asset classes. Results of their analysis suggests that over five-year periods, the effect of capital gains (passive savings) in corporate equities on saving is substantially larger than the effect of capital gains on housing or other assets.

²⁹ Here we convert the estimated coefficients of the semi-log net wealth specifications into elasticities. The non-truncated mean home equity value of \$301,914 for 2001 yields an estimated elasticity of .03 for that year.

³⁰ These results are also consistent with a behavioral theory of differential household sensitivity to alternative wealth categories (Thaler, 1990).

In the pooled sample (Table 5), the estimated elasticities of consumption with respect to house values and financial wealth are about .05 and .02, respectively. Results further indicate significant negative coefficients associated with the interactions of house value with deviations from trend and volatility in the house price term.³¹ Those results are consistent with the theoretical notion (Lettau and Ludvigson, 2004; Case et al., 2005) that deviations from trend or volatility in house values, if viewed by households as transitory in nature, may not be factored into permanent income nor reflected in elevated consumption.³² Pooled estimation results further indicate a statistically significant but economically modest impact of non-owner occupied housing real estate holdings on consumer spending. The pooled results also indicate the sensitivity of consumer spending to the stage in the economic cycle, as evidenced by the highly significant estimates of the year-specific fixed effects.

5. Supplemental findings

In supplemental analyses, we also investigated the effects on household spending of (a) quantity constraints on credit extensions and (b) borrower credit quality. As regards the former, the theoretical literature suggests that household borrowing capacity, which can be influenced both by a household's credit rating and level of outstanding debt, should play a role in shaping how changes in different forms of wealth affect consumption (Iacoviello, 2004; Piazzesi et al., 2004). If

³¹ Those terms are computed based on historical values of the OFHEO regional house price series over the previous three years.

³² In contrast, the log deviations from trend in financial wealth interactive term enters the equation with a positive and significant coefficient, suggesting that consumers attach more permanence to that measure of financial wealth.

Table 6
Credit-constrained Homeowners: Market value regression results

	1989	1992	1995	1998	2001
<i>Total consumption</i>					
log (Income)	0.109*** (0.024)	0.132*** (0.025)	0.255*** (0.030)	0.163*** (0.026)	0.135*** (0.020)
log (Financial wealth)	0.027** (0.010)	0.036*** (0.009)	0.011 (0.009)	0.017 (0.011)	0.022* (0.009)
log (House value)	0.072** (0.026)	0.040 (0.026)	0.033 (0.028)	0.047 (0.027)	0.028 (0.023)
log (Other real estate)	0.004 (0.006)	0.007 (0.005)	0.001 (0.005)	0.005 (0.005)	0.000 (0.005)
N	431	517	512	559	718
R-squared	0.408	0.418	0.411	0.346	0.293
<i>Durable goods</i>					
log (Income)	0.210*** (0.053)	0.166*** (0.047)	0.357*** (0.056)	0.210*** (0.041)	0.144*** (0.032)
log (Financial wealth)	0.039 (0.021)	0.046** (0.017)	0.011 (0.016)	0.014 (0.018)	0.028 (0.016)
log (House value)	0.093 (0.057)	0.059 (0.049)	-0.012 (0.052)	0.044 (0.043)	0.024 (0.038)
log (Other real estate)	0.000 (0.014)	0.006 (0.010)	0.000 (0.010)	0.008 (0.008)	-0.006 (0.008)
N	431	517	512	559	718
R-squared	0.250	0.250	0.262	0.255	0.172

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

borrowing capacity affects the ability of households to consume out of increases in asset values, then we would expect households with high LTV's to be more sensitive to a relaxing of the constraint on their borrowing capacity. To evaluate this possibility, we included two additional variables in Eq. (2): a categorical variable which is equal to one if a household has an LTV over 90% and an interaction term of this categorical variable and the house price variable. Despite evidence in [Iacoviello \(2004\)](#) that these issues are important, both variables proved insignificant in our models.

Regarding borrower credit quality, households were grouped according to whether or not they were credit-constrained based on a definition of such from the SCF that has been used in previous research ([Gabriel and Rosenthal, 2005](#)).³³ Given these definitions, model (2) was re-run limiting the sample to either credit constrained or non-credit constrained households (Table 6). Contrary to expectations, the estimated findings are not significantly different among households who are credit constrained. One may have expected credit constrained households to have more sensitivity to income and wealth, but the pattern of coefficients over time does not reveal any systematic differences. Further, due to smaller sample size, the financial wealth and housing value coefficients often fail to achieve accepted levels of statistical significance in the credit constrained sample.

Finally, akin to [Skinner \(1996\)](#) and [Lehnart \(2003\)](#), we investigated the robustness of estimation results across the age strata (not shown). Like those studies, we find significant variability in estimated income and wealth elasticities among age cohorts. However, our research shows both damped wealth elasticities and elevated income elasticities among households aged 25–35, relative to older age cohorts. As anticipated by the lifecycle hypothesis, income elasticities are found to decline whereas wealth elasticities increase during the peak earnings years. These results stand in contrast to those of [Skinner \(1996\)](#) and [Lehnart \(2003\)](#), who estimated elevated wealth elasticities among younger households.³⁴

6. Conclusion

This research assembled a unique matched data set from individual files of the Survey of Consumer Finances and the Consumer Expenditure Survey to estimate the consumption effects associated with housing and financial wealth. Estimates are provided for all survey years of the

Survey of Consumer Finances from 1989–2001, so as to assess any significant drift in estimated elasticities as might derive from the larger business cycle, evolution in mortgage finance and the like. Further, year-specific data from those survey years is pooled so as to test the robustness of the estimated wealth elasticities to deviations from trend and volatility in household financial and housing asset values.

Overall, research findings indicate relatively large housing wealth effects. Among homeowners, the house value elasticities are estimated in the range of .06 over the course of the 1989–2001 study period and are highly significant throughout. In marked contrast, the estimated elasticities of consumption spending with respect to financial wealth, while largely significant, are smaller in magnitude and are in the range of .02. Results from a sample of data pooled over the 1989–2001 study period indicate that the estimated financial and housing wealth elasticity estimates are sensitive to controls for deviation from trend and volatility in household financial and housing wealth. Finally, we conducted numerous robustness tests across various sub-samples of the data that confirm the main findings of the analysis.

The sizable consumption elasticity estimated for housing wealth, together with the marked run-up in housing wealth over the course of recent years, point to the sustaining influence of housing wealth on the U.S. economy during a period of financial market weakness. Data from the Fed's Flow of Funds accounts indicate that household financial and real estate wealth accounted for 1-1/2 and 12-1/4%, respectively, of the growth in personal consumption expenditures over the 2001:Q1–2005:Q3 period.³⁵ Those same household finance and real estate wealth effects comprised about 1 and 9 percent of U.S. GDP growth over that same period.

Those same computations suggest the possibility of sizable reverse wealth effects in the context of a retrenchment in house values. For example, a “back of the envelope” partial equilibrium computation, based on the above estimation findings, suggests that a 10% decline in housing wealth from 2005 levels (equivalent to a roll back in wealth holdings to about 2004 levels), would result in a \$105 billion or 1.2% contraction in personal consumption expenditures. Given the level of real GDP in 2005, the housing-related decline in PCE would be roughly

³³ Specifically, households are coded as credit constrained if they responded in the survey that they were turned down for a loan, partially turned down for a loan, or failed to apply for a loan owing to fears that the application would be rejected.

³⁴ Full estimation results for the regressions using the constrained and non-constrained samples, as well as all regression results for the samples partitioned by age are available from the authors upon request.

³⁵ Data from the Federal Reserve Board's Flow of Funds accounts indicate that household financial wealth trended down from \$33 billion in 2000:Q4 to about \$29 trillion in 2003:Q1 before rebounding to \$38 trillion in 2005:Q3. In marked contrast, the value of real estate owned by households recorded appreciable gains throughout the entirety of the recent period, from about \$11.4 billion in 2000:Q4 to \$19.1 billion in 2005:Q3. Given average values of financial and real estate assets owned by households of \$32.6 and \$14.9 billion, respectively, over the 2001:Q1 – 2005:Q3 period, the estimated financial and housing wealth elasticities of 0.02 and 0.06, respectively imply that financial and real estate wealth accounted for 1-1/2 and 12-1/4 percent of growth in personal consumption expenditures, respectively, over that period.

equivalent to a 1 percentage point reduction in real GDP growth, a sizable reduction from the approximate 4% real GDP growth recorded for prior years.

Appendix A. Variable definitions

Variable	Definition
<i>CEX Consumption Variables</i>	
Total consumption	Total annual spending on all goods and services
Durable goods	Annual spending on durable goods+
Nondurable goods	Annual spending on nondurable goods
<i>SCF Wealth Variables</i>	
<i>Market Value</i>	
Financial wealth	Liquid and quasi-liquid financial assets including retirement and pensions
House value	Estimated value of primary residence
Other real estate value	Estimated value of all real estate other than primary residence value
<i>Net Wealth</i>	
Net wealth	Liquid and non-liquid financial assets minus financial debt
Home equity	House value minus mortgages and home equity loans
Other real estate equity	Real estate value net of mortgages and equity loans
<i>Interactive SCF Wealth Variables</i>	
<i>Market Value</i>	
lfinfdev	Interaction of log household financial wealth and current year deviation from average of prior 3 years in Wilshire 5000 index
lfinfol	Interaction of log household financial wealth and volatility of Wilshire 5000 (as measured by standard deviation of Wilshire 5000 index over prior three years)
lhsehdev	Interaction of log household house value and current year deviation from average of prior 3 years in regional OFHEO house price repeat sales index
lhsehvol	Interaction of log household house value and volatility of regional OFHEO repeat sales house price index (as measured by standard deviation of OFHEO index over the prior three years)
<i>Net Wealth</i>	
Nfinfdev	Interaction of net financial wealth and current year deviation from average of prior 3 years in Wilshire 5000 index
Nfinfol	Interaction of net financial wealth and volatility of Wilshire 5000 (as measured by standard deviation of Wilshire 5000 index over the prior three years)
Heqhdev	Interaction of home equity and current year deviation from average of prior 3 years in regional OFHEO house price repeat sales index
Heqhvol	Interaction of home equity and volatility of regional OFHEO repeat sale house price index (as measured by standard deviation of OFHEO index over the prior three years)
<i>Categorical Matching Variables</i>	
Race	White, black, other race
Age	Age 25–35, age 36–50, age 51–65
Marital status	Married, not married
Education	Less than high school, high school, some college, college degree
<i>Control Variables</i>	
dum89	= 1 if Year 1989
dum92	= 1 if Year 1992
dum95	= 1 if Year 1995
dum98	= 1 if Year 1998
Less than high school	= 1 if HOH's highest education is less than high school diploma
Some college	= 1 if HOH's highest education is some college
College graduate	= 1 if HOH's highest education is 4-year college degree
Family size	number of family members living in household
Age 25–35	= 1 if HOH's age is 25–35
Age 51–65	= 1 if HOH's age is 51–65
White	= 1 if HOH identifies race as white
Black	= 1 if HOH identifies race as black

Appendix A (continued)

Variable	Definition
<i>Control Variables</i>	
Northeast	= 1 if household is in the Northeast
South	= 1 if household is in the South
West	= 1 if household is in the West
Married	= 1 if household is married
Divorced	= 1 if household is divorced
Separated	= 1 if household is separated
Widow	= 1 if household is widow

+ Durable goods are defined based on the U.S. Census Bureau's Manufacturing, Mining, and Construction Statistics available at: <http://www.census.gov/indicator/www/m3>.

Appendix B. Homeowners: market value regressions full results for 'Total Consumption'

Total Consumption	1989	1992	1995	1998	2001
log (Income)	0.162*** (0.012)	0.198*** (0.013)	0.188*** (0.012)	0.197*** (0.015)	0.191*** (0.012)
log (Financial wealth)	0.021*** (0.005)	0.024*** (0.005)	0.023*** (0.005)	0.018** (0.006)	0.020*** (0.005)
log (House value)	0.060*** (0.011)	0.050*** (0.013)	0.050*** (0.014)	0.046** (0.016)	0.042*** (0.012)
log (Other real estate value)	0.008*** (0.002)	0.006** (0.002)	0.006** (0.002)	0.004 (0.003)	0.005* (0.002)
Less than high school	– (0.124***)	–0.069 (0.036)	– (0.142***)	– (0.171***)	– (0.041)
Some college	0.034 (0.028)	0.097*** (0.029)	0.092** (0.029)	0.089** (0.034)	0.104*** (0.028)
College graduate	0.163*** (0.029)	0.187*** (0.028)	0.211*** (0.029)	0.216*** (0.035)	0.259*** (0.028)
Family size	0.054*** (0.008)	0.048*** (0.008)	0.054*** (0.008)	0.043*** (0.010)	0.059*** (0.008)
Age 25–35	–0.068* (0.026)	–0.052* (0.027)	0.018 (0.029)	–0.020 (0.034)	–0.028 (0.029)
Age 51–65	– (0.121***)	– (0.137***)	– (0.091***)	–0.080* (0.032)	– (0.121***)
White	0.179*** (0.041)	0.069 (0.040)	–0.049 (0.039)	0.095* (0.044)	0.105** (0.035)
Black	0.039 (0.059)	–0.046 (0.055)	–0.096 (0.055)	0.124* (0.062)	–0.025 (0.050)
Northeast	0.018 (0.029)	0.109*** (0.029)	0.102*** (0.031)	0.098* (0.040)	0.037 (0.032)
South	–0.006 (0.027)	0.061* (0.028)	0.029 (0.027)	–0.066* (0.033)	–0.022 (0.027)
West	0.164*** (0.029)	0.140*** (0.029)	0.088** (0.030)	0.149*** (0.037)	0.054 (0.029)
Married	0.311*** (0.042)	0.295*** (0.047)	0.206*** (0.043)	0.237*** (0.052)	0.261*** (0.041)
Divorced	0.120* (0.050)	0.097 (0.052)	0.012 (0.049)	0.057 (0.058)	0.030 (0.046)
Separated	0.251** (0.078)	0.094 (0.077)	0.034 (0.096)	0.094 (0.099)	0.097 (0.090)
Widow	0.161** (0.061)	0.219** (0.072)	0.075 (0.061)	0.109 (0.081)	0.157* (0.064)
N	2116	2033	1994	2097	2759
R-squared	0.401	0.433	0.418	0.337	0.376

Note: Standard errors are in parenthesis. *p<0.05; **p<0.01; ***p<0.001.

Appendix C. Homeowners: market value regressions full result for 'Durable Goods'

Durable Goods	1989	1992	1995	1998	2001
log (Income)	0.243*** (0.028)	0.207*** (0.024)	0.230*** (0.022)	0.226*** (0.023)	0.199*** (0.019)
log (Financial wealth)	0.021 (0.011)	0.030*** (0.009)	0.027** (0.009)	0.018 (0.009)	0.020* (0.008)

(continued on next page)

Appendix C (continued)

Durable Goods	1989	1992	1995	1998	2001
log (House value)	0.076** (0.026)	0.042 (0.024)	0.038 (0.025)	0.039 (0.023)	0.033 (0.021)
log (Other real estate value)	0.008 (0.005)	0.006 (0.004)	0.006 (0.004)	0.006 (0.004)	0.002 (0.003)
Less than high school	-0.036 (0.078)	-0.202** (0.068)	-0.155* (0.071)	-0.144* (0.069)	-0.114 (0.065)
Some college	0.171** (0.064)	0.143** (0.054)	0.126* (0.053)	0.111* (0.049)	0.138** (0.044)
College graduate	0.306*** (0.066)	0.300*** (0.053)	0.246*** (0.053)	0.274*** (0.052)	0.308*** (0.045)
Family size	0.003 (0.018)	0.049** (0.015)	0.050** (0.016)	0.019 (0.015)	0.068*** (0.013)
Age 25–35	0.145* (0.061)	0.057 (0.050)	0.126* (0.053)	0.120 (0.050)	0.077 (0.046)
Age 51–65	-0.303*** (0.061)	-0.346*** (0.051)	-0.219*** (0.050)	-0.222*** (0.047)	-0.232*** (0.040)
White	0.246** (0.094)	-0.086 (0.076)	-0.096 (0.071)	-0.072 (0.064)	0.066 (0.056)
Black	0.198 (0.135)	-0.156 (0.103)	-0.205* (0.101)	0.151* (0.092)	-0.166* (0.080)
Northeast	-0.079 (0.067)	0.244*** (0.055)	0.219*** (0.056)	0.195*** (0.058)	0.069 (0.051)
South	-0.091 (0.062)	0.115* (0.052)	0.059 (0.050)	-0.153** (0.049)	-0.073 (0.043)
West	0.258*** (0.068)	0.334*** (0.055)	0.264*** (0.055)	0.271*** (0.054)	0.101* (0.047)
Married	0.348*** (0.096)	0.315*** (0.088)	0.200* (0.079)	0.301*** (0.076)	0.235*** (0.065)
Divorced	0.083 (0.116)	0.145 (0.098)	0.098 (0.089)	0.102 (0.085)	0.113 (0.073)
Separated	0.218 (0.180)	0.173 (0.145)	0.066 (0.176)	0.139 (0.146)	0.132 (0.144)
Widow	0.207 (0.140)	0.162 (0.135)	0.059 (0.112)	-0.059 (0.118)	0.097 (0.102)
N	2116	2033	1994	2097	2759
R-squared	0.191	0.268	0.234	0.256	0.223

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Appendix D. Homeowners: net wealth regression full results for 'Total Consumption'

Total Consumption	1989	1992	1995	1998	2001
log (Income)	0.194*** (0.011)	0.236*** (0.012)	0.219*** (0.012)	0.225*** (0.014)	0.219*** (0.011)
Net financial wealth (million \$)	0.065** (0.021)	0.026* (0.010)	0.062*** (0.017)	0.008 (0.005)	0.009* (0.004)
Home equity (million \$)	0.247*** (0.065)	0.160*** (0.048)	0.076* (0.038)	0.096* (0.047)	0.120** (0.038)
Other real estate equity (million\$)	0.011* (0.005)	0.014* (0.006)	0.024* (0.012)	0.017 (0.015)	0.013 (0.012)
Less than high school	-0.167*** (0.034)	-0.111** (0.036)	-0.209*** (0.038)	-0.203** (0.047)	-0.114** (0.040)
Some college	0.050 (0.028)	0.126*** (0.029)	0.120*** (0.029)	0.110*** (0.033)	0.121*** (0.027)
College graduate	0.220*** (0.028)	0.252*** (0.027)	0.263*** (0.028)	0.266*** (0.034)	0.305*** (0.027)
Family size	0.054*** (0.008)	0.047*** (0.008)	0.053*** (0.009)	0.043*** (0.011)	0.059*** (0.008)
Age 25–35	-0.102*** (0.026)	-0.080** (0.027)	-0.039 (0.028)	-0.057 (0.034)	-0.066* (0.029)
Age 51–65	-0.107*** (0.027)	-0.102*** (0.027)	-0.061* (0.027)	-0.054 (0.031)	-0.096*** (0.025)
White	0.204*** (0.041)	0.082* (0.041)	-0.040 (0.039)	0.107* (0.044)	0.114** (0.035)
Black	0.003 (0.059)	-0.062 (0.056)	-0.138* (0.055)	0.103 (0.063)	-0.036 (0.050)
Northeast	0.021 (0.029)	0.120*** (0.030)	0.106*** (0.031)	0.102* (0.040)	0.038 (0.032)
South	0.003 (0.027)	0.067* (0.028)	0.028 (0.028)	-0.071* (0.033)	-0.023 (0.027)
West	0.175*** (0.030)	0.143*** (0.030)	0.091** (0.030)	0.014*** (0.037)	0.055 (0.030)

Appendix D (continued)

Total Consumption	1989	1992	1995	1998	2001
Married	0.330*** (0.042)	0.334*** (0.047)	0.244*** (0.043)	0.269*** (0.052)	0.398*** (0.040)
Divorced	0.106* (0.051)	0.102 (0.053)	0.009 (0.049)	0.064 (0.058)	0.041 (0.046)
Separated	0.226** (0.079)	0.087 (0.078)	0.029 (0.097)	0.097 (0.100)	0.120 (0.091)
Widow	0.147* (0.062)	0.234** (0.073)	0.067 (0.062)	0.097 (0.081)	0.171** (0.064)
N	2116	2033	1994	2095	2700
R-squared	0.386	0.418	0.403	0.330	0.369

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Appendix E. Homeowners: net wealth regression full results for 'Durable Goods'

Durable Goods	1989	1992	1995	1998	2001
log (Income)	0.284*** (0.026)	0.250*** (0.022)	0.262*** (0.021)	0.254*** (0.021)	0.227*** (0.017)
Net financial wealth (million \$)	0.041 (0.048)	0.023 (0.019)	0.067* (0.031)	0.007 (0.007)	-0.002 (0.006)
Home equity (million \$)	0.233 (0.148)	0.124 (0.088)	0.030 (0.070)	0.099 (0.068)	0.107 (0.061)
Other real estate equity (million\$)	0.019 (0.010)	0.016 (0.012)	0.037 (0.022)	0.009 (0.022)	-0.006 (0.019)
Less than high school	-0.092 (0.078)	- (0.251***)	- (0.222**)	-0.176* (0.068)	-0.155* (0.064)
Some college	0.193** (0.064)	0.176** (0.054)	0.152** (0.053)	0.132** (0.049)	0.155*** (0.044)
College graduate	0.384*** (0.063)	0.374*** (0.050)	0.293*** (0.051)	0.320*** (0.049)	0.353*** (0.043)
Family size	0.033 (0.018)	0.048** (0.015)	0.049** (0.016)	0.019 (0.015)	0.068*** (0.013)
Age 25–35	0.105 (0.060)	0.025 (0.050)	0.070 (0.052)	0.082 (0.049)	0.043 (0.046)
Age 51–65	- (0.281***)	- (0.300***)	- (0.188***)	- (0.194***)	- (0.205***)
White	0.270** (0.094)	-0.066 (0.076)	-0.084 (0.071)	-0.061 (0.064)	0.079 (0.056)
Black	0.152 (0.135)	-0.169 (0.103)	-0.244* (0.100)	0.131 (0.092)	-0.176* (0.080)
Northeast	-0.075 (0.067)	0.258*** (0.056)	0.222*** (0.056)	0.199*** (0.058)	0.071 (0.052)
South	-0.085 (0.062)	0.121* (0.052)	0.059 (0.050)	- (0.157**)	-0.073 (0.043)
West	0.277*** (0.068)	0.338*** (0.055)	0.268*** (0.055)	0.269*** (0.054)	0.104* (0.047)
Married	0.368*** (0.096)	0.358*** (0.088)	0.236** (0.079)	0.329*** (0.076)	0.263*** (0.064)
Divorced	0.069 (0.116)	0.150 (0.099)	0.095 (0.090)	0.108 (0.085)	0.122 (0.073)
Separated	0.187 (0.181)	0.164 (0.146)	0.061 (0.176)	0.143 (0.146)	0.149 (0.144)
Widow	0.188 (0.141)	0.176 (0.136)	0.052 (0.112)	-0.071 (0.119)	0.109 (0.102)
N	2116	2033	1994	2095	2700
R-squared	0.185	0.260	0.229	0.252	0.220

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Appendix F. Pooled estimation full regression results "Market Value" for Homeowners

		Total Consumption	Durable Goods
log (Income)	c_loginc	0.187*** (0.002)	0.219*** (0.003)
log (Financial wealth)	lfinancial	0.021*** (0.002)	0.017** (0.004)
log (House value)	lhouse	0.053*** (0.004)	0.053*** (0.009)

Appendix F (continued)

		Total Consumption	Durable Goods
log (Other real estate)	lrealst	0.005*** (0.001)	0.005*** (0.002)
log (House value)*	lfnfdevin	0.004 (0.005)	0.017 (0.010)
(Deviations in financial wealth)			
log (House value)*	lfnfvolin	- 0.002 (0.017)	0.071 (0.042)
(Volatility in financial wealth)			
log (House value)*	lhsehdevin	- 0.016*** (0.002)	- 0.015*** (0.003)
(Deviations in regional house value)			
log (House value)*	lhsehvolin	- 0.191*** (0.007)	- 0.370*** (0.012)
(Volatility in regional house value)			
Year 1989	dum89	- 0.208*** (0.030)	- 0.434*** (0.069)
Year 1992	dum92	- 0.128*** (0.019)	- 0.197*** (0.037)
Year 1995	dum95	- 0.130*** (0.027)	- 0.205*** (0.052)
Year 1998	dum98	- 0.101*** (0.025)	- 0.161*** (0.048)
Less than high school	nodip	- 0.118*** (0.018)	- 0.136*** (0.031)
Some college	somcoll	0.084*** (0.013)	0.136*** (0.023)
College graduate	badegree	0.214*** (0.013)	0.289*** (0.024)
Family size	famsize	0.051*** (0.004)	0.044*** (0.007)
Age 25–35	age2535	- 0.033* (0.013)	0.106*** (0.023)
Age 51–65	age5065	- 0.112*** (0.012)	- 0.264*** (0.022)
White	White	0.079*** (0.018)	0.014 (0.031)
Black	Black	- 0.001 (0.025)	- 0.048 (0.044)
Northeast	Northeast	0.093*** (0.015)	0.172*** (0.027)
South	South	- 0.014 (0.013)	- 0.050* (0.023)
West	West	0.144*** (0.016)	0.295*** (0.029)
Married	Married	0.262*** (0.020)	0.277*** (0.036)
Divorced	Divorced	0.058* (0.023)	0.115* (0.041)
Separated	Separated	0.113** (0.039)	0.151* (0.070)
Widow	Widow	0.139*** (0.030)	0.101 (0.054)
N		10,938	10,938
R-squared		0.402	0.441

Note: Standard errors are in parenthesis. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

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