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Wealth, Composition, Housing, Income, and Consumption

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Abstract

The present research, which covers the latest residential boom and bust cycle, highlights that there are no uniform or constant time invariant wealth, housing, and income relations. Even more important, wealth composition is shown to be a significant determinant of consumption. The marginal effects of housing wealth, financial wealth, and income differ substantially with wealth composition. Households with the highest percentage of net worth in financial assets have much lower income effects, have substantially higher marginal effects associated with stock holdings, and have housing equity effects that differ noticeably from other households. Income effects for groups with the smallest amounts of relative financial wealth are dramatically higher than for households with greater financial wealth. Wealth and its composition affect consumption.

Key words: consumption, income, wealth composition, wealth effect, housing effect

1. Introduction

The relations between housing wealth, financial wealth, income, and consumption are of substantial interest to public policy analysts, economic forecasters, and business managers since consumer spending is a dominant component of economic activity. While it would be helpful if the relations between these factors were known with certainty, the existing literature provides mixed and ambiguous results,[1] which may be related to limitations in data utilized, temporal variability, the composition of individual household wealth, and the permanence of unexpected income or wealth gains.

Acknowledgement of inequalities in financial wealth is also necessary since financial wealth impacts the composition of household net worth. Inequality in financial wealth affects the marginal importance of housing wealth and income on consumption when households are segmented by aggregate wealth and percentage of total wealth in financial assets. While residential wealth is a major component of many households' net worth, it is less accessible than financial wealth and often has ongoing, recurrent costs, even when unencumbered by debt, due to routine maintenance and property taxes. Studies imply that owner occupied residential real estate acts as a forced savings plan since the asset generally increases in value in the long term while debt secured by the property is amortized. Concurrently, few studies on this topic formally acknowledge the skewed household wealth patterns found in the United States. None investigate the *relative composition* of wealth.

The data examined cover the pre-real estate boom period (1994-1999), the real estate boom market (2001-2005), and the post-boom (heading into bust) real estate market

[1] Existing research has pegged marginal consumption from a housing wealth effect at anywhere from 2% to 15% or more based on methodology and data studied (Benjamin, Chinloy and Jud (2004), Case, Quigley, and Shiller (2005), Campbell and Cocco (2007), Kishor (2007), and Carroll, Otsuka and Slacalek (2011) and others).

(2007).[2] By inclusion of the real estate boom and decline periods, our analysis depicts a broader picture of housing wealth effects on consumption than has generally been permitted. We also segment the results by household wealth and link the relative magnitude of financial versus housing wealth into the assessment. Assessment is provided using pooled data as well as with specific disaggregation by sample year.

The focus on non-durable consumption differs from Bostic, Gabriel, and Painter (2009), who examine total consumption and durable goods consumption.[3] Durable goods purchases are discrete in timing, have non-negligible transaction costs, and consequently have different consumption patterns than non-durables. Interestingly, Bostic etal (2009) find no significant relations between house value or equity and durable goods consumption, although they find a relation between house value and total consumption. The implication is that non-durable consumption may be more dependent on house value or home equity. While this may seem counterintuitve, the largest durable goods (automobiles, for example) acquired by housholds are often financed with purchase loans. Large scale financing operations related to their sale are the norm. Our concentration on non-durable consumption thus helps fill one of the voids in the literature. Research by Benjamin and Chinloy (2004) and Benjamin, Chinloy and Jud (2008) positing that the relations between consumption and housing wealth need not be positive is also extended.

Empirical results, including those from the *relative composition* of wealth, follow. First, we show that the wealth effects of stock and housing differ over time and that the use of a measure derived from pooled data can be misleading. The housing wealth effect is normally

[2] Bostic Gabriel, and Painter (2009), Benjamin, Chinloy, and Jud (2004), and Benjamin, Chinloy, and Jud (2008) and others confine their analysis to the pre-real estate boom period.

[3] A major issue that has impacted the assessment of these effects is limited data on consumption. Like in prior studies this limitation is acknowledged.

stronger than the stock holdings/financial assets effect. However, subsequent to the housing market peak, the relative strength of the competing effects switch. Next, we investigate whether wealth level by itself influences consumption elasticity. We find that the more wealthy families enjoy higher elasticities of consumption on all components of wealth, but not income. This indicates that even the more wealthy households (based on total assets including residential housing and finanical assets) are still partially dependent on housing equity for consumption.

To further address the wealth impact on consumption, we extend studies by Grossman and Laroque (1990), Stokey (2009), and Flavin and Yamashita (2008, 2011), which highlight the role of housing-to-wealth ratios in determining optimal portfolio choice and life-cycle consumption allocation. That is, the housing value to wealth ratio is important and not just wealth level. While we use the housing value to net worth or wealth ratio from the literature, we also use a cleaner measure of housing equity as a percentage of wealth. The ratio of home equity to wealth is used to segment the aggregate sample into several subsamples. For households whose home equity matters more in their wealth position, the consumption elasticity corresponding to home equity is substantially higher. For households whose stock holdings or finanical assets matter more, the consumption elasticity of the stock holdings is significant and higher. The results show the importance of characterizing households using wealth composition. Consumption by households with the lowest percentage of net worth in housing (highest percentage in stock/financial assets) is not impacted by housing wealth. Consumption by households with the greatest concentration of net worth in financial assets/stock is affected by financial wealth, but not

home equity. In all cases, the magnitude of the differences in marginal effects is large with practical implications.

The relations between housing wealth, financial wealth, income and consumption are complex. Wealth alone, wealth composition associated with the percentage of net worth in financial assets, and temporal effects associated with macro-economic conditions all impact consumption. Differentiation of impacts based on wealth composition provides the foundation for additional investigation of spending patterns using segmented consumer groups. For the wealthiest, financial asset performance is likely to have a greater impact than home equity changes. With regard to the average household, the importance of housing to consumption is manifested.

2. Literature

There is substantial interest in wealth effects and consumption. Research in several related disciplines has concentrated on these relations as consumption is central to economic activity, housing wealth is a major portion of total household wealth, and housing construction and related activities are central to economic growth. Consumption cycles are related to life cycles which are impacted by wealth and potentially transient asset flows. The general wealth effect and real estate or housing specific wealth effects are most germane to the present research. Existing empirical assessments, while generally showing wealth effects impacting consumption, suffer from substantive variation in coefficient magnitudes and changing measures of statistical significance.

There are a number studies that investigate financial and housing wealth effects. Major studies include earlier work by Elliot (1980) and Bhatia (1987), and more recently, Belsky

and Prakken (2004), Lettau and Ludvigson (2004), Case, Quigley, and Shiller (2005) and Carrol, Otuska, and Slacalek (2011) which focus on non-housing wealth effects, while controlling for housing effects. Additional studies by Skinner (1989), Benjamin, Chinloy, and Jud (2004), Campbell and Coco (2007), Kishor (2007), Benjamin and Chinloy (2008), and Bostic, Gabriel, and Painter (2009) are more focused on the housing wealth effect.

Using aggregate United States time series data, Elliot (1980) shows a large financial wealth effect, but finds no real estate related wealth effect. Bhatia (1987) counters Elliot's use of construction costs as the measure of real estate wealth, and, by employing market value measures instead, finds a substantial housing wealth effect (coefficient estimate of .37), and no financial wealth effect. The housing wealth effect is likely masked in the earlier period due to data issues coming from aggregated data and the lack of a more liquid real estate market, including the ability to refinance mortgage loans easily and access housing wealth through equity lines of credit, during the period studied. Skinner (1989) extends Elliot (1980) and Bhatia (1986) by showing a positive housing wealth effect. The suggestion is that the housing wealth effect is meaningful and needs additional investigation. Belsky and Prakken (2004) find that the housing wealth effect is about .05 to .07 which is much lower than that of Bhatia.

Lettau and Ludvigson (2004) argue that the expected permanence of a wealth effect is important. Hence, financial wealth with more volatility is likely to have a smaller wealth effect than housing wealth which is postulated to have more permanence. Their empirical assessment backs this claim, although one would no longer argue that housing wealth is inherently more permanent after the latest real estate cycle. Case, Quigley, and Shiller (2005) look at housing and financial wealth effects in the United States and internationally

and show a substantial housing wealth effect, but no or little financial wealth effect in the United States. Data are for the year 1999 and prior. Variability of the housing effect at the state level is also shown. The suggestion is that the housing effect is of more importance than other wealth effects. Carroll, Otsuka, and Slacalek (2011) compare financial and housing wealth effects and postulate that the empirical specifications of the housing and financial effects are similar at about .02 in the short run with additional longer term impacts. This estimate is at the lower range of existing studies.

Benjamin, Chinloy, and Jud (2004) use aggregate data from the United States to investigate the relation between housing wealth and consumption. A .08 marginal housing wealth effect is shown along with a much smaller .02 financial wealth effect. Perhaps more interesting, Benjamin and Chinloy (2008) argue that consumption need not be positively correlated with net wealth. Wealth can either be accumulating or being used for consumption and the relation is dependent on other economic factors and the smoothing of consumption over time. This implies that marginal effects will change over time, without changing the model specification.

Kishor (2007) finds marginal effects for housing of about .07 and .03 for financial wealth in a study using United States data. Bostic, Gabrial, and Painter (2009) model total consumption prior to the real estate boom and bust cycle using matched micro data and find that relations between housing wealth and consumption are large and much greater than financial effects. They find no relation between housing wealth and durable consumption, but do show a relation with total consumption. Finally, another point of emphasis is the variability of marginal effects shown in prior studies. The coefficients of interest in existing studies are not stable, but do evidence directionally expected outcomes.

In almost all existing cases, interest is primarily associated with generating macro level financial and housing wealth effects using aggregate data. Our interest is in generating marginal effects from household level data, estimating time-varying differences, addressing the skewed wealth distribution in the United States and acknowledging that a household's level and *relative composition* of wealth will impact consumption.

3. Model and Empirical Specification

From the classical theory of consumption, a consumer bases his consumption decision on existing and expected resources. We conjecture that consumers/households view the components of their wealth portfolio differently, depending upon both the availability of each component, the ease of conversion to spendable cash, and the cash outlays associated with ownership of the asset. In comparing housing and stock/financial wealth, stock holdings are easier to liquidate and spend for consumption. Only a small fraction of the U.S. population holds stocks at meaningful levels, especially outside of retirement accounts that generally have high use costs associated with taxes. Historically, home equity is more equitable across households, and borrowing against home equity has been cheaper than other means of borrowing such as credit cards. The constraining side is the level of home equity available to a household as well as the tightness of credit markets. Existing mortgage indebtedness constrains the capability to tap home equity for consumption since a greater outstanding balance of mortgage debt reduces the net equity in housing. Current income is a cash equivalent, while the ability and desire for using other assets is determined by the level and composition of other wealth components.

3.1 The Model

In the economy there is one composite, liquid risky market asset, which we call stocks. In addition, a household can choose the amount of housing units (in market value relative to consumption goods) for personal residence. We assume a household manages its balance sheet according to cash equivalent units and define λ_S and λ_H as values between 0 and 1, and being the cash equivalent coefficients for stock holdings and house equity, respectively. Following Benjamin and Chinloy (2008), the cash-equivalent wealth equality is:

$$W_t = \lambda_S S_t + \lambda_H (H_t - D_t) + D_t = \lambda_S S_t + \lambda_H H_t + (1 - \lambda_H) D_t, \qquad 1$$

where S, H, D stand for stock holding, house value, and debt, respectively. The use of a mortgage provides a cash equivalent in two ways. First, the greater the use of debt in the property acquisition the smaller the homeowner's cash outlay for acquisition. And second, with more debt, the ability to actually refinance and extract cash through the refinancing procedure will decline.[4] Equation 1, by itself, is without any restriction of having to pay off debt. Thus, more debt is associated with more cash-equivalents for use. An additional equality in the above equation is illuminating: a higher cash-equivalent coefficient for housing assets, λ_H, leads to a higher level of wealth perceived by the household, due to the convertibility of house value (or equity) to cash. However, the cash equivalent of existing debt decreases due to the higher opportunity cost of the current debt balance.

[4] Muellbauer (2007) makes a related argument that higher loan-to-value ratios increase consumption. Again, higher debt allows retention of cash for consumption.

In the equation that relates consumption to wealth by the marginal propensity to consume (MPC) or α,

$$C_t = \alpha W_t = \alpha\lambda_S S_t + \alpha\lambda_H H_t + \alpha(1-\lambda_H)D_t = \beta_S S_t + \beta_H H_t + \beta_D D_t. \quad (2)$$

The overall coefficients (β) before each component of wealth are the product of MPC and corresponding cash equivalent coefficients. Our goal of the model sketched below is to determine the optimal value of α to see how it is related to the λ's and other parameters.

Stock and housing prices follow the Brownian process (subscripts S, H, m indicate the process for stocks, housing assets, and mortgage, respectively)

$$\frac{dP_{j,t}}{P_{j,t}} = \mu_j dt + \sigma_j dZ_{j,t} \qquad (j = S, H) \quad (3)$$

The formula for the dynamics of this cash-equivalent wealth is

$$dW_t = (\lambda_s S_t \mu_s + \lambda_h H_t \mu_h + (1-\lambda_h)D_t)dt - C_t dt - \mu_m D_t dt$$
$$+\boldsymbol{\lambda}_{\mathrm{s}}\mathrm{S_t}\boldsymbol{\sigma}_{\mathrm{s}}\mathrm{dZ_{s,t}} + \boldsymbol{\lambda}_{\mathrm{h}}\mathrm{H_t}\boldsymbol{\sigma}_{\mathrm{H}}\mathrm{dZ_{H,t}} - \boldsymbol{\sigma}_{\mathrm{m}}\mathrm{D}_t\mathrm{dZ_{m,t}}. \quad (4)$$

There is a limit for mortgage borrowing, however. Otherwise people will withdraw as much cash as they want. We model this limit as the house value at each point of time, that is, the mortgage debt cannot go above a certain percentage of the house value

$$\mathrm{D_t} \leq \mathrm{LH_t}. \quad (5)$$

where L ($0 < L < 1$) is the maximum loan-to-value ratio.

We assume the household is maximizing its expected lifetime utility which includes housing services and a nondurable consumption good

$$E \int_0^T e^{-\beta t}\, U(H_t, C_t) dt. \qquad 6$$

While it is easy to propose a frictionless model, it has been correctly noted in the literature that housing assets do not adjust frictionlessly (Grossman and Laroque, 1990). Typically, a household pays transaction costs when buying and selling houses and when refinancing. Assuming the proportion of transaction costs to the value of a house is θ, the Bellman equation that characterizes a household's optimization problem is (without loss of generality, suppose the decision time is at time 0):

$$J(W_0, H_0) = \mathrm{Sup}_{\tau, C_t, H_\tau', S_\tau', D_\tau'}\, E[\int_0^\tau e^{-\beta t} U(H_t, C_t) dt + e^{-\beta \tau} J(W_\tau - \theta H_\tau, H_\tau')]. \qquad 7$$

where $H_\tau \neq H_\tau'$ indicates the selling of an old house before purchasing a new one. This is an optimal stopping problem since the household has to decide when to sell a house (the value of τ) along with other variables.

Between stopping times, however, the household's decisions only involve adjusting the liquid financial assets, including mortgage debts, and non-durable consumption goods, while the value of its housing assets is exogenously changed by market conditions. During a short time interval $(0, s)$ within which stopping does not occur, the Bellman equation is:

$$J(W_0, H_0) = \mathrm{Sup}_{C_t, S_t, D_t} E[\int_0^s e^{-\beta t} U(H_t, C_t) dt + e^{-\beta s} J(W_s, H_s)]. \quad (8)$$

As shown by Flavin and Yamashita (2008), taking $s \to 0$, the solution is similar to the familiar HJB equation

$$\beta J(W, H) = \max_{C,S,D} [D^C J(W, H) + U(H, C)] \quad (9)$$

where

$$D^C J(W, H) = [\mu_S \lambda_S S + \mu_H \lambda_H H + (1 - \lambda_H - \mu_m) D - C] J_W(W, H) + \frac{1}{2} [\lambda_S^2 S^2 \sigma_S^2 + \lambda_H^2 H^2 \sigma_H^2 + \sigma_m^2 D^2] J_{WW}(W, H) \quad (10)$$

And subject to constraints in Equations 4 and 5.

The solution of this optimization problem, given in its current format, is now standard. Solving for the optimal amounts of stocks and debts, we obtain

$$\begin{cases} S^* = \frac{-\mu_S J_W}{\lambda_S \sigma_S^2 J_{WW}} \\ D^* = \min \{ \frac{-(1-\lambda_H-\mu_m) J_W}{\sigma_m^2 J_{WW}}, LH \} \end{cases}. \quad (11)$$

If a household is not borrowing constrained, the ratio between stocks and debt is

$$\frac{S^*}{D^*} = \frac{\mu_S \sigma_m^2}{\lambda_S (1-\lambda_H-\mu_m) \sigma_S^2}. \quad (12)$$

The equation for D^* in Equation 11 says that when a household is not faced with borrowing constraints and the liquidity from converting home equity (λ_H) increases, the

cashed-out home equity in relation to the overall cashable wealth decreases. The equation for $\frac{S^*}{D^*}$ in Equation12 says the ratio of stock to debt level is higher corresponding to a higher liquidity of home equity. That is, holding house stock constant, a higher degree of liquidity of home equity would lead to a higher ratio of stocks to home equity.

Further characterization of portfolio rules and consumption plan requires specification of the utility function. We stipulate the housing is complementary to non-durable consumption in a multiplicative way:

$$U(H,C) = g(H)\frac{C^{1-\gamma}}{1-\gamma} \quad 13$$

where $g(H)$ is some unspecified function of H. We conjecture that the functional form of value function $J(W,H)$ and its first and second derivatives with respect to W are

$$J(W,H) = Kg(H)\frac{W^{1-\gamma}}{1-\gamma},\ J_W = Kg(H)W^{-\gamma},\ J_{WW} = Kg(H)(-\gamma)W^{-\gamma-1} \quad 14$$

and $h = \frac{H}{W}$. When a household is not borrowing constrained, $D^* = \frac{(1-\lambda_H-\mu_m)}{\sigma_m^2}\frac{W}{\gamma} < LH$, which implies a threshold value $\bar{\lambda}_H = 1-\mu_m - Lh\sigma_m^2\gamma$ in that if $\lambda_H > \bar{\lambda}_H$, then the household is not constrained. The optimal consumption plan is $C^* = \alpha_{UC}W = \alpha_{UC}[\lambda_S S_t + \lambda_H(H_t - D_t) + D_t]$, where

$$\alpha_{UC} = \frac{\beta}{\gamma} + \left(1-\frac{1}{\gamma}\right)[\mu_H\lambda_H h - \frac{1}{2}\gamma\lambda_H^2 h^2\sigma_H^2] + \frac{1}{2}(1-\frac{1}{\gamma})[\frac{\mu_S^2}{\sigma_S^2\gamma} + \frac{(1-\lambda_H-\mu_m)^2}{\sigma_m^2\gamma}] \quad 15$$

The sign of the change of α_{UC} in response to an increase in λ_H is ambiguous. Consider $\gamma > 1$, as has been confirmed by the macro finance literature. The first square bracket term in Equation 15 captures the effect on consumption through amplifying housing asset returns and volatility by increasing λ_H, the net effect of which is undetermined without inputs from calibration values. The last square bracket term captures the negative effect on consumption by reduced cash-equivalent of existing cash-out debt due to higher opportunity cost. The total effect is thus ambiguous.

When $\lambda_H \leq \bar{\lambda}_H$, a household is borrowing constrained, $D^* = LH$. The optimal consumption plan is $C^* = \alpha_C W = \alpha_C[\lambda_S S_t + \lambda_H(1-L)H_t + D_t]$, where

$$\alpha_C = \frac{\beta}{\gamma} - \frac{1-\gamma}{2}\left[\frac{\mu_S^2}{\sigma_S^2 \gamma^2}\right] + \frac{1-\gamma}{2}(\lambda_H^2\sigma_H^2 + L^2\sigma_m^2)h^2 + \left(1-\frac{1}{\gamma}\right)(\mu_H\lambda_H + L(1-\lambda_H-\mu_m))h. \quad 16$$

Once again, the change of α_C in response to λ_H is ambiguous without further inputs of other parameter values. Thus, how consumption responds to different components of wealth in response to the liquidity of home equity is an empirical question.

Given a consumer's desire for consumption, besides income, he can draw down his available liquid financial assets, or if that is not available, choose to borrow. The ability to borrow depends on current credit market conditions. If the ability to borrow is constrained, this consumer has to rely on income source more heavily.

3.2 The Empirical Specification

The difference in λ_H, i.e., convertibility of home equity in the equations above, may be determined by two aspects of a household's wealth portfolio: first, the size of home equity itself; second, by how much else is available in liquid wealth that can support borrowing, as sizable liquid assets can help obtain favorable borrowing terms. To account for the influence of both, we proceed with home equity as a regressor in our regressions. We also segment the data along the dimension of ratio of home equity to wealth. The empirical questions are investigated in several ways. First, differences in cross-sectional regressions over various years when presumably the liquidity of home equity differs are assessed. The question of interest is the stability of the relations between stock/financial wealth, housing equity, income and non-durable consumption. Second, differences in consumption patterns for individuals who presumably differ in their access to and need for credit in the mortgage markets based on aggregate and decomposed wealth are analyzed. Aggregate wealth and the composition of wealth are posited to impact consumption patterns.

Since it is well known that many wealth measures are right-skewed, an OLS estimation would be overwhelmingly influenced by the observations at the right tails of distributions. Hence, the median regression methodology is used instead, which is also noticeably different from predominant estimation methods employed in the literature.

4. Data and Results

Cross-section samples from the Panel Study of Income Dynamics (PSID henceforth) database spanning the years from 1994 to 2007 are drawn in order to address these questions.[5] The PSID database has been used in related studies by Engelhardt (1996), Skinner (1996) and Lehnart (2003). In particular, we concentrate on those households that own a home, have non-negligible holdings of stocks (≥ $500), non-durable consumption that is not too extreme (> $500 and <$350,000), and have positive mortgage balances outstanding. Home equity is the house value net of existing mortgage balances, and is therefore a potential source of funding when positive. The literature has not focused on this subset of households in prior studies. Mortgage balances reflect cash that has already been obtained or conserved, even though debt has to be repaid.

The data is summarized in Table 1 which segments data based on observation year. The data are in constant 1982-84 dollars. The median age moves upward slightly. Family size and marital status are consistent across years. Median stock holdings remain below $15,000 in constant dollars across all periods. Average stock holdings increase by less than 100% while the standard deviation in stock holdings increases dramatically over the period indicating that a small number of households have outsized gains in financial assets. Home equity increases (about doubling) over the period. Households show increases in real income for the period on average, but median income is only up slightly. The data implies a concentration of financial assets and income in the highest tier for the period.

[5] PSID is a nationally representative sample of U.S. households starting from 1968 with over 18,000 individuals living in 5000 families. It is of longitudinal nature in design, but cross-sectionally also representative. Since 1999, PSID has switched from annual surveys to biennial ones. Furthermore, prior to 1999, wealth information is only solicited once every five years.

The first column of Table 2 presents the median regression results of the log of consumption for all observations in the sample. For the overall sample, the consumption elasticity of home equity is 0.02, doubling that of stock/financial holdings (with both being statistically significant at the 1% level). These results are in line with some existing research showing that the home equity or value impact is greater that the stock wealth effect. The results, however, are at the lower end of existing estimates. The elasticity of mortgage borrowing is higher than these two estimates (statistically significant at the 1% level) as might be expected from Benjamin and Chinloy (2008). Utilization of additional debt supported by house value is more important than prospective use as measured by actual equity. In short, additional debt is used systemically to support consumption. This is affirmative of the data in Table 1 where mortgage debt in real terms increases over the period. Coefficients of the additional control variables in the model are as expected.

The subsequent columns of Table 2 examine the relative effects of these three components separately for each data year between 1994 and 2007. During the years 2001-2005, when home credit is widely available and people can easily cash out available home equity, the consumption elasticity of mortgage balances approaches 0.10. The same is true for available home equity during 2001-2003: in 2003 it is 0.06, higher than that of any other year and implying that prospective equity cash outs supported consumption. Yet in 2005, arguably close to the peak of the housing market boom and because households had cashed out almost all of available equity, there is little room left for further cash-outs to support consumption. Correspondingly, this estimate declines to virtually zero. Credit constraints are also likely during the 2005 and 2007 periods as lenders started to reduce exposure to the residential real estate sector. In all cases there is substantial variation in the coefficients of

interest indicating that the estimated quantitative effects are not stable even if the qualitative relations are maintained.

The stock holding and income coefficients provide interesting stories as well. While stock holdings are statistically significant in the aggregate sample model, the stock holdings coefficients are not significant in the first four years of data and are only marginally significant in years 2005 and 2007. With growth and use of household wealth from residential real estate holdings, the minimal holdings of stock by the typical household matter less unless they are the only asset group available. The coefficient of the income variable increases from the 1994 model coefficient and is largest in 2007 when income is the primary source of consumption due to reduced housing equity and limited other assets. The lack of consistent statistical significance in the stock and home equity factors implies that while general relations exist, no standard effect coefficients associated with these factors are evident since these metrics are all influenced by temporal conditions. Financial, housing, and income effects change over time. The magnitude and importance of these relations change as evidenced in the substantial changes in the coefficients of interest when disaggregated over time.

The second area of interest that we address is related to the skewed distribution of wealth in the United States. Wealthier households presumably possess more in each of the net worth components: greater house equity and value, higher income, and larger stock holdings. We also know that these factors are not normally distributed across the United States population. In an initial assessment, the total sample is divided into groups based on net worth. Median regressions are then run with these subsamples. Table 3 displays the estimation for the wealthier groups versus the rest, when we define the wealthier group as

the top 33%, top 20%, or top 10% of all observations based upon net worth. For all high wealth classifications, the elasticities of consumption from home equity, stock holdings, and mortgage are higher than the less wealthy households. This is most notable for the equity factor as the high wealth cohort coefficients are at least 300% greater than those of the lower wealth groups. Also, it is only the higher cohorts of wealth that show a stock wealth effect. The top 20% and 33% cohorts show significant impacts, while the coefficient on the highest cohort is the largest, but is not statistically significant (due in part to a much lower sample size). These wealthy households are much less dependent on income. Depending on wealth classification, the elasticities of income for the highest wealth cohorts range from 0.076 to 0.05. These coefficients are 25% to 50% lower than for the lower wealth groups. Households in the higher wealth groups simply have different consumption patterns than the typical household and are more likely to use financing options.

Concurrently, if a household decides between funding sources of consumption as our theory posits, then we should be able to observe different patterns in estimates of wealth effects by examining net worth ratios decomposing the wealth components. That is, not only does net worth itself matter for estimating consumption elasticities, but also the composition of net worth matters. The overall assessment recognizes that a change in the composition of net worth will impact composition. For example, the marginal consumption of a household with a net worth of $800,000 composed of $200,000 in home equity and $600,000 in financial assets would not be the same as one which has $600,000 in home equity and $200,000 in financial assets. Financial assets are more liquid and less costly to access and housing equity has a carrying cost associated with ownership (property taxes and insurance, for example). Consistent with our model, we consider the following three

ratios: home equity to net worth, stock holdings to net worth, and house value to net worth. We omit the analysis based on the ratio of mortgage to net worth, since home equity is already computed as the house value net of outstanding mortgage debt.

Initial results are presented in Table 4. The top panel of Table 4 presents the results based on the percentiles of ratio of home equity to net worth. Since home equity is a potential source of funding net of the cash withdrawals from existing mortgage indebtedness, we expect this ratio to be relevant to our thesis. Existing equity is the component of housing value that can be leveraged when the market condition is favorable. A lower ratio indicates a higher cushion of more liquid financial wealth.

We evaluate home equity to total wealth by segmenting groups based on the ratio of home equity to net worth and present three comparisons: the bottom 33%, bottom 20% and bottom 10% of households with concurrent comparison with the remaining households in the sample. Results show that as we move to the cohort of households with the lowest percentage of net worth in home equity (from the bottom 33% to the bottom 10% of households), the wealth effect of home equity declines from 0.019 to almost zero and ceases to be statistically significant. Concurrently, the coefficients of stock holdings steadily increase from 0.010 to 0.043, and become more statistically significant (not significant for the 33% cohort and statistically significant at the 1% level for the 10% cohort). The impact of mortgage debt changes little for the cohorts while the coefficients remain statistically significant for each cohort. With regard to income, the households with a higher percentage of wealth in housing equity have marginal effects that are at least 45% greater than those with more financial assets (the bottom 33% to non-bottom 33% comparison). Finally, as home equity becomes a lower percentage of wealth, the marginal

impact of income decreases. The coefficient on income for the 10% cohort is .052 versus .0778 for the 33% cohort.

The middle panel uses a classification based on the ratio of stock holdings to net worth.[6] The greater the ratio shown the greater the percentage of net worth in stock. Cohorts are created based on the top 33%, 20% and 10% of households. The minimal housing effect is more manifested in this presentation. The magnitude of the equity factor coefficients are generally lower and show less statistical significance than in the first panel. The stock wealth effect is more evident with larger coefficients for each cohort, which are all statistically significant at the 1% level. Of interest, with the exception of the group with the highest stock holdings in net worth, the mortgage coefficients are all slightly higher than in the first panel while the top group shows no statistical relation. The differences in income coefficients are noticeably lower. The major takeaway is the lack of importance of housing equity in consumption for the households with the greatest proportion of wealth in stock holdings. These households' consumption is more related to stock holdings.

The bottom panel (Panel 3) of Table 4 presents results based on the ratio of house value to net worth which is used to segment the overall sample. This is a less precise measure than the prior two measures, but has been used in prior studies and is thus included here. The noted weakness as presented is that the ratio used to segment the sample is directly related to variables used in the previous assessments (home value less mortgage debt is housing equity). The results are less robust, but support the prior results since housing value and housing equity are correlated. Households with highest value of housing, but also with the lowest proportion of value to total wealth show no housing equity related wealth effect.

[6] In our model and data, we have not considered the fractions in riskless savings deposits, thus observations are not exactly switched off in classification tiers based on the ratio of stock holdings versus that of housing equity.

The stock variable is less robust. The magnitude of stock holdings increases when moving to the top tier, but the coefficients of stock holdings are not statistically significant, but the other relations are similar.

Additional robustness checks are provided in Table 5 and Table 6. Median regressions using subsamples based on a minimum net worth of $50,000 are presented in Table 5 with Table 6 containing results from subsamples with a minimum net worth of $100,000. This is to address the concern that low wealth level itself will artificially inflate the ratios with wealth as the denominator. These regressions refine and extend the results from those in Table 4. In the first panel of both tables the cohorts again are based on ratio of house equity to net worth ratio. For the higher net worth cohorts with greater financial wealth, housing equity is not a major influence on consumption, which supports our basic theory. Concurrently, when compared to the results in Table 4, in both cases (Table 5 and Table 6 first panel) the non-bottom samples have larger home equity coefficients (statistically significant at the 1% level). This is confirmatory of prior results. The stock holdings results are similar with support for a greater impact for those household with lower proportions of net worth in housing equity. Interestingly, the relation between mortgage debt and consumption is more pronounced than in Panel 1 of Table 4. Even the households with the lowest equity as a percent of net worth utilize mortgage debt to influence consumption. The income relations are similar although the coefficients on income are lower for the households with less financial wealth than in Table 4 (the non-bottom tier column results), presumably due to a higher wealth cutoff.

The biggest differences in the estimation results are found in Panel 2 of Table 5 and Table 6. The results find more in relation between housing equity and consumption than

the prior. The non-high ratio of stock to net worth households have large housing equity coefficients and even the households with the highest percentage of stock holdings to net worth have significant relations. For the high stock asset households, the stocking holding coefficients in Tables 5 and 6 are all statistically significant and much larger than in Table 4. The stock effect is larger for these cohorts. The mortgage results are similar as are the income results, although there may be a slight increase in the coefficients.

The Table 5 and 6 Panel 3 results are similar and again less robust for reasons already addressed. Households with the highest values of housing, but also with the lowest proportion of value to total wealth show no housing equity related wealth effect. The stock variable is less robust as is the income factor.

The empirical analysis highlights three substantial points. First, while wealth, housing, income, and consumption relations are evident over time and in aggregate, their statistical significance and magnitude have substantial variability. There are no generic marginal effects. Second, in a country with skewed wealth distribution like the United States, marginal effects will differ when this distribution of wealth is addressed. Households with the highest level of wealth evidence different wealth, income and consumption relations and are more likely to be involved with debt markets that facilitate consumption. Third, composition of wealth matters. Households with greater net worth in financial assets relative to real estate equity evidence marked differences in consumption patterns. Consumption by high net worth households with a greater percentage of net worth in financial assets is related to financial assets and not housing wealth.

5. Conclusions

A basic understanding of the relations between financial wealth, housing wealth, income and consumption provides a foundation for evaluating economic policies and assessing prospective economic activity. While the underlying theoretical underpinnings of these relations are well-established, empirical assessment has produced ambiguous results. Empirical application of theory is extended through the latest real estate boom and bust cycle, use of controls for skewed wealth levels in the United States, and by investigating the *relative composition* of household net worth.

The statistical significance and magnitude of the relations between financial wealth, housing wealth, income, and consumption change over time. The influence of these factors is subject to large fluctuations. This implies that care is needed in assessing wealth and housing effects. There are no out of the box marginal effects that are accurate over all economic cycles. The marginal impacts are best understood within the context of concurrent economic market conditions. We also show that level of household wealth influences marginal consumption patterns including the magnitude and appearance of financial wealth, housing wealth, and income effects. The differences in magnitude and statistical significance are large with practical implications.

By acknowledging that the holdings of financial assets are skewed and that the *relative composition* of wealth matters, the literature is further extended. Households with greater net worth and those with more financial assets relative to real estate equity exhibit different consumption patterns than other households. Consumption by high net worth households with a greater percentage of net worth tied to financial assets is related to financial assets

and not housing wealth. Higher net worth households are nonetheless users of debt which can smooth consumption patterns.

A need for additional assessment of consumption patterns is evident. The movement of retirement benefits to defined contribution plans, the reduction in the percentage of workers covered by defined benefit retirement plans, the aging of the boomer generation, and a requirement to be more active in one's own retirement planning will likely change consumption patterns. Wealth composition matters. This suggests continued debate.

6. References

Belsky, E., & Prakken, J. (2004) Housing wealth effects: housings impact on wealth accumulation, wealth distribution, and consumer spending. National Center for Real Estate Report W04-13. Harvard University, Boston. http://www.jchs.harvard.edu/publications/finance/w04-13.pdf.

Benjamin, J. D., Chinloy, P., & Jud, G. D. (2004). Real estate versus financial wealth in consumption. *Journal of Real Estate Finance and Economics*, 29, 341-354.

Benjamin, J. D., Chinloy, P., & Jud, G. D. (2004). Why do households concentrate their wealth in housing? *Journal of Real Estate Research*, 26, 329-343.

Benjamin, J. D., & Chinloy, P. (2008). Home equity, household savings and consumption. *Journal of Real Estate Finance and Economics*, 37, 21-32.

Bhatia, K. B. (1987). Real estate assets and consumer spending. *Quarterly Journal of Economics*, 102, 437-444.

Bostic, R., Gabriel, S., & Painter, G. (2009). Housing wealth, financial wealth, and consumption: new evidence from micro data. *Regional Science and Urban Economics, 39*, 79-89.

Campbell, J. Y., & Cocco, J. (2007). How do house prices affect consumption? Evidence from Micro data. *Journal of Monetary Economics*, 54, 591-621.

Carroll, C. D. , Otsuka, M., & Slacalek, J. (2011). How large is the housing wealth effect?: a new approach. *Journal of Money, Credit, and Banking*, 43,

Case, K., Quigley, J., & Shiller, R. J. (2005). Comparing wealth effects: the stock market versus the housing market. *Advances in Macroeconomics, 5*, Article 1.

Disney, R., Gathergood, P., & Henley, xx. (2010). House price shocks, negative equity and household consumption in the United Kindgom. *Journal of the European Economic Association*, 8, 1179–1207.

Elliot, J. W. (1980). Wealth and wealth proxies in a permanent income model. *Quarterly Journal of Economics*, 95, 509-535.

Engelhardt, G. V. (1996). House prices and home owner saving behavior. *Regional Science and Urban Economics*, 26, 313–36.

Flavin, M., & Yamashita, T. (2001). A Model of Housing in the Presence of Adjustment Costs: A Structural Interpretation of Habit Persistence.

Flavin, M., & Yamashita, T. (2011). Owner-occupied housing: life-cycle implications for the household portfolio. *American Economic Review: Papers & Proceedings*, 609-614.

Greenspan, A. and Kennedy, J. (2005). Sources and uses of equity extracted from homes. *Oxford Review of Economic Policy*, 24, 120-144.

Grossman, S. J., & Laroque, G. (1990). Asset pricing and optimal portfolio choice in the presence of illiquid durable consumption goods. *Econometrica*. , 25-51

Kishor, N. K. (2007). Does consumption respond more to housing wealth than to financial market wealth? If so, why? *Journal of Real Estate Finance and Economics*, 35, 427-448.

Lehnart, A. (2003). Housing, consumption, and credit constraints. Board of Governors of the Federal Reserve System.

Lettau, M., & Ludvigson, S. (2004). Understanding trend and cycle in asset values: reevaluating the wealth effect on consumption. *American Economic Review* 94, 276–29.

Muellbauer, J. N. (2007), Housing, credit, and consumer expenditure. *Housing, Housing Finance, and Monetary Policy*, Conference Proceedings, Federal Reserve Bank of Kansas City.

Piazessi, M., Schneider, M., & Tuzel, S. (2007). Housing, consumption and asset pricing. *Journal of Financial Economics*, 83, 531-569.

Skinner, J. (1989). Housing wealth and aggregate saving. *Regional Science and Urban Economics*, 19, 305-324.

Skinner, J. S. (1996). Is housing wealth a sideshow? Advances in the economics of aging, National Bureau of Economic Research Report. University of Chicago Press, Chicago, Il, 241–268.

Slacalek, J. (2009). What drives personal consumption? The role of housing and financial wealth. *B. E. Journal of Macroeconomics*, 9, article 37.

Stokey, N. L. (2009). Moving costs, nondurable consumption and portfolio choice. *Journal of Economic Theory*, 144, 2419-2439.

Table 1. Summary statistics

	1994 (obs. 965)			1999 (obs. 583)			2001 (obs. 637)		
	Median	Mean	Std. Dev	Median	Mean	Std. Dev	Median	Mean	Std. Dev
Age	43	43.3	9.3	45	45.0	9.3	46	45.6	9.3
Family size	3	3.2	1.3	3	3.1	1.3	3	3.2	1.4
Marital status		0.84	0.37		0.86	0.35		0.84	0.37
Income	41,835	49,327	45,173	48,019	60,276	65,181	46,584	58,836	58,708
Mortgage balance	43,522	52,443	41,433	49,220	60,693	45,009	50,819	60,510	51,599
Home equity	33,063	47,615	51,549	42,017	56,112	53,697	47,995	67,868	84,890
Stockholdings	13,495	39,025	87,370	15,006	52,498	120,837	12,422	46,352	100,188
Net worth	90,486	180,159	370,919	128,752	269,667	778,659	143,987	255,438	781,377
	2003 (obs. 965)			2005 (obs. 583)			2007 (obs. 637)		
	Median	Mean	Std. Dev	Median	Mean	Std. Dev	Median	Mean	Std. Dev
Age	47	46.8	10.0	47	47.4	10.2	48	48.2	10.3
Family size	3	3.0	1.3	3	3.0	1.2	3	2.9	1.3
Marital status		0.84	0.37		0.85	0.36		0.85	0.36
Income	43,478	56,983	89,456	46,250	62,180	111,530	46,551	60,477	60,520
Mortgage balance	55,163	69,992	65,846	62,274	78,182	71,311	62,711	79,834	75,679
Home equity	58,424	82,497	99,432	67,076	103,037	137,651	75,216	114,246	162,206
Stockholdings	13,587	50,891	119,265	12,801	55,131	152,673	14,469	75,326	246,506
Net worth	148,370	271,708	479,053	173,451	353,996	1,049,661	194,487	395,802	988,101

All values are in constant 1982-84 dollars.

Table 2. Median regressions of consumption for all observations and across years

Independent Variables	All years	1994	1999	2001	2003	2005	2007
Log of home equity	0.0244***	0.0275***	0.0188	0.0424***	0.0603***	0.0060	0.0092
Log of stock holdings	0.0112***	0.0089	0.0120	-0.0043	0,0028	0.0159*	0.0193*
Log of mortgage balance	0.0451***	0.0451***	0.0329	0.0834***	0.0804***	0.0987***	0.0374*
Log of income	0.1119***	0.0503***	0.1316***	0.1149***	0.1034***	0.1123***	0.1564***
Age	0.0144***	0.0180**	0.0277*	0.0127	0.0176	0.0283**	0.0009
Age squared	-0.0001	-0.0002	-0.0001	-0.0001	-0.0002	-0.0002*	0.0001
Family size	0.0948***	0.1048***	0.0879***	0.0795***	0.1133***	0.0877***	0.1016***
Marital Status	0.1653***	0.1489***	0.1601**	0.1834***	0.1282	0.1795***	0.1146*
Dummy: year 1999	-0.9682***						
Dummy: year 2001	-0.9069***						
Dummy: year 2003	-0.8438***						
Dummy: year 2005	-0.7946***						
Dummy: year 2007	-0.0128						
Constant	6.6016***	7.2601***	5.4108***	5.4012***	5.1522***	5.1709***	6.6731***
Observations	3948	965	583	637	604	584	575
Pseudo r^2	0.4242	0.1699	0.1717	0.1565	0.1950	0.1538	0.1860

Results are from median regressions. The dependent variable is the logarithm of total non-durable consumption. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively. For year dummy variables, the default year is 1994. The other variables are self-defined.

Table 3: Median regressions of consumption for segmented by net worth percentile groups

	Classification based on percentiles of net worth					
Independent Variables	Top 33%	Non-top 33%	Top 20%	Non-top 20%	Top 10%	Non-top 10%
Log of home equity	0.0485***	0.0167***	0.0501***	0.0184***	0.0671**	0.0223***
Log of stock holdings	0.0171**	0.0002	0.0219*	0.0037	0.0322	0.0059
Log of mortgage balance	0.0694***	0.0536***	0.0799***	0.0516***	0.1079***	0.0523***
Log of income	0.0768***	0.1157***	0.0725***	0.1101***	0.0500*	0.1147***
Observations	1315	2633	788	3160	393	3555
Pseudo r^2	0.3729	0.4427	0.3659	0.4343	0.3500	0.4298

Results are from median regressions. The dependent variable is the logarithm of total non-durable consumption. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively. For year dummy variables, the default year is 1994. The control variable results are not presented but are as expected. The focus is on the variables of interest.

Table 4. Median regressions of consumption for net worth ratio percentile groups

	Classification based on percentiles Ratio of home equity to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0187***	0.0700***	0.0130*	0.0752***	0.0065	0.0749***
Log of stock holdings	0.0107	0.0034	0.0220**	0.0015	0.0436***	0.0036
Log of mortgage balance	0.0645***	0.0544***	0.0636***	0.0522***	0.0701**	0.0531***
Log of income	0.0778***	0.1127***	0.0625***	0.1126***	0.0520**	0.1133***
Observations	1315	2633	789	3159	394	3554
Pseudo R^2	0.3965	0.4384	0.3874	0.4358	0.3790	0.4331
	Classification based on percentiles Ratio of stock holdings to net worth					
Independent Variables	Top 33%	Non-top 33%	Top 20%	Non-top 20%	Top 10%	Non-top 10%
Log of home equity	0.0128*	0.0278***	0.0063	0.0280***	0.0066	0.0285***
Log of stock holdings	0.0398***	0.0153***	0.0516***	0.0137***	0.0545***	0.0094**
Log of mortgage balance	0.0703***	0.0537***	0.0807***	0.0538***	0.0336	0.0605***
Log of income	0.1162	0.1027***	0.1180***	0.1055***	0.1294	0.1058***
Observations	1314	2634	792	3156	395	3553
Pseudo R^2	0.4451	0.4144	0.4572	0.4158	0.5016	0.4138
	Classification based on percentiles Ratio of home value to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0193**	0.0201***	0.0147	0.0256***	0.0118	0.0262***
Log of stock holdings	0.0057	0.0097**	0.0100	0.0078*	0.0272	0.0066
Log of mortgage balance	0.0706***	0.0618***	0.0673***	0.0594***	0.0598*	0.0600***
Log of income	0.0728***	0.1501***	0.0762***	0.1301***	0.0496	0.1287***
Observations	1315	2633	789	3459	394	3554
Pseudo R^2	0.3870	0.4427	0.3651	0.4386	0.3506	0.4329

Results are from median regressions. The dependent variable is the logarithm of total non-durable consumption. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively. For year dummy variables, the default year is 1994. The control variable results are not presented but are as expected. The focus is on the variables of interest.

Table 5. Median regressions of consumption for different net worth ratio percentile groups (net worth ≥ $50,000)

	Classification based on percentiles Ratio of home equity to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0184**	0.0932***	0.0149	0.1030***	0.0049	0.0906***
Log of stock holdings	0.0144*	-0.0002	0.0237*	-0.0040	0.0395***	0.0017
Log of mortgage balance	0.0815***	0.0570***	0.0629**	0.0550***	0.0854***	0.0582***
Log of income	0.0733***	0.0865***	0.0604**	0.0892***	0.0412*	0.0880***
Observations	1067	2136	640	2563	320	2833
Pseudo R^2	0.3827	0.4250	0.3758	0.4219	0.3579	0.4197
	Classification based on percentiles Ratio of stock holdings to net worth					
Independent Variables	Top 33%	Non-top 33%	Top 20%	Non-top 20%	Top 10%	Non-top 10%
Log of home equity	0.0421***	0.0325***	0.0136	0.0431***	0.0341*	0.0402***
Log of stock holdings	0.0449***	0.0114*	0.0655***	0.0087	0.0971***	0.0069
Log of mortgage balance	0.0828**	0.0632***	0.0719***	0.0617***	0.0258	0.0661***
Log of income	0.0892***	0.0771***	0.1048***	0.0775***	0.0861**	0.0833***
Observations	1067	2136	640	2563	321	2882
Pseudo R^2	0.4412	0.3967	0.4443	0.4014	0.4840	0.3995
	Classification based on percentiles Ratio of home value to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0304***	0.0492***	0.0137	0.0532***	0.0124	0.0473***
Log of stock holdings	0.0119	0.0033	0.0182*	0.0007	0.0221	0.0047
Log of mortgage balance	0.0798***	0.0648***	0.0719***	0.0670***	0.0728*	0.0648***
Log of income	0.0737***	0.1000***	0.0736***	0.0892***	0.0200	0.1018***
Observations	1067	2136	640	2563	319	2884
Pseudo R^2	0.3886	0.4184	0.3542	0.4241	0.3644	0.4139

Results are from median regressions. The dependent variable is the logarithm of total non-durable consumption. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively. For year dummy variables, the default year is 1994. The control variable results are not presented but are as expected. The focus is on the variables of interest.

Table 6. Median regressions of consumption for different net worth ratio percentile groups (net worth ≥ $100,000)

	Classification based on percentiles Ratio of home equity to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0137	0.0978***	0.0133	0.0981***	0.0018	0.0923***
Log of stock holdings	0.0097	-0.0023	0.0255*	-0.0035	0.0367**	-0.0000
Log of mortgage balance	0.0661***	0.0605***	0.0873***	0.0546***	0.0949**	0.0613***
Log of income	0.0701***	0.0907***	0.0655***	0.0943***	0.0310	0.0949***
Observations	793	1589	475	1907	237	2145
Pseudo R^2	0.3712	0.4074	0.3609	0.4065	0.3710	0.4015
	Classification based on percentiles Ratio of stock holdings to net worth					
Independent Variables	Top 33%	Non-top 33%	Top 20%	Non-top 20%	Top 10%	Non-top 10%
Log of home equity	0.0335***	0.0223**	-0.0051	0.0369***	0.0470***	0.0374***
Log of stock holdings	0.0787***	0.0072	0.0949***	0.0070	0.1074***	0.0023
Log of mortgage balance	0.0751***	0.0561***	0.0634***	0.0566***	0.0416*	0.0621***
Log of income	0.0921***	0.0817***	0.0991***	0.0798***	0.0895***	0.0901***
Observations	793	1589	475	1907	237	2145
Pseudo R^2	0.4392	0.3785	0.4547	0.3818	0.4842	0.3845
	Classification based on percentiles Ratio of home value to net worth					
Independent Variables	Bottom 33%	Non-bottom 33%	Bottom 20%	Non-bottom 20%	Bottom 10%	Non-bottom 10%
Log of home equity	0.0213**	0.0538***	0.0045	0.0454**	0.0059	0.0456***
Log of stock holdings	0.0108	-0.0022	0.0187	-0.0042	0.0368***	-0.0023
Log of mortgage balance	0.0645***	0.0664***	0.0377	0.0682***	0.0722***	0.0554***
Log of income	0.0744***	0.0971***	0.0661***	0.1001***	0.0127	0.1051***
Observations	794	1588	476	1906	238	2144
Pseudo R^2	0.3672	0.4076	0.3724	0.4014	0.3892	0.3966

Results are from median regressions. The dependent variable is the logarithm of total non-durable consumption. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively. For year dummy variables, the default year is 1994. The control variable results are not presented but are as expected. The focus is on the variables of interest