

Examining the Household Responses to the
2008 Recession Wealth Shocks:
A Natural Experiment Testing the Non-Unitary
Household Decision Model of Intra-Household Bargaining

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Abstract

In this paper, I examine the effects of the recent US housing and stock market crises on household spending with the Health and Retirement Survey data (HRS). Particularly, by treating household wealth shocks from the 2008 recession as a "natural experiment," I analyze the impact of the inter-spousal bargaining power on the household-level financial decisions to test the non-unitary household decision-making model. I first find that housing and financial wealth losses have a substantial negative effect on household consumption. More importantly, using relative spousal characteristic variables that are proxies for inter-spousal bargaining power, I demonstrate that inter-spousal bargaining power contribute to differential consumption responses to the wealth shocks, and that higher female bargaining power influence household-level decisions to be more aligned with female individual consumption preference. The results are consistent with the literature on gender differences in savings behavior that women have higher propensity to save, and they also support the non-unitary bargaining models of household decisions in that inter-spousal relative characteristics play a significant role in household financial decisions.

1 Introduction

The relationship between an unexpected economic shock and consumption is often studied because it reveals information about the choice between present and future consumption and how consumption is traded off against other uses of wealth. In addition, the macroeconomic effects could induce booms or busts in the economy. This paper contributes to this literature by using household-level data on wealth changes and spending before and during the Great Recession to investigate household responses to wealth shocks, and more specifically, how these responses depend on household composition and inter-spousal characteristics. I use the intra-household bargaining power model with a non-unitary model of household decisions, to test the hypothesis that households' financial decisions in response to unexpected economic shocks depend on which spouse has more "bargaining power." Consequently, I also contribute to the intra-household bargaining power literature by using the 2008 recession as a "natural experiment" to test the non-unitary bargaining power household decision model.

The results first show that there are gender differences in saving preferences in response to wealth shocks, which implies that households do have to compromise the two diverging preferences of individual spouses when making a household level decisions on savings. Then, the results demonstrate that households in which wives have relatively more bargaining power decrease consumption more in response to losses in financial and housing wealth. The results are consistent with previous literature demonstrating that women tend to have higher propensities to save, especially when the couple is older, and they also support the non-unitary household decision model by showing that relative characteristics of the spouses influence household-level decisions. This study provides an insight to an important topic regarding household consumption and savings,

and the results testify that it is crucial to consider intra-household gender dynamics as a crucial factor when examining and analyzing household's consumption patterns and responses to macroeconomic changes.

2 Literature Review

The relationship between an unexpected economic shock and consumption is often studied in order to understand individual and household's inter-temporal choices and how consumption is traded off against other uses of wealth. Because of the importance to economic policy, there is an extensive literature of wealth effects on consumption. Using time series data on consumption and housing and financial wealth across 16 countries, Slacalek (2009) estimates that the marginal propensity to consume out of wealth is about 0.05. There are also studies at the micro level. For example, Bottazzi et al. (2015) use data from the Survey on Household Income and Wealth (SHIW) to estimate that a shock to financial wealth results in a change in total consumption equal to about five percent of the shock. Christelis et al. (2014) use data from an Internet supplement to the Health and Retirement Study to estimate that the marginal propensity to consume is 0.033 for a financial wealth shock, and out 0.01 for a housing wealth shock.

While there are studies estimating household reaction to changes in wealth, there are no studies that consider the effects of spousal characteristics. However, inter-spousal characteristics matter more and more in terms of understanding household financial decisions. While in the past, most families were single-earning households, with one person (generally the husband) bringing in household resources, there has been a significant increase in dual-earning households. As an increasing proportion of women has joined the labor force, dual earner couples have become more

than twice as common as couples with husbands as the sole family member in the labor force (Lundberg & Pollak, 2007). In light of increasing educational attainment and labor force participation rates of women, it seems axiomatic that women will acquire greater volition in household decisions. Women who have invested heavily in the acquisition of personal resources, e.g. through the attainment of advanced education, are likely to have greater influence on family decisions, presumably extending into decisions regarding finances and consumption. Thus, the study of the relationship between inter-spousal characteristics and household's financial decisions has become more relevant and important.

Several microeconomic models attempt to explain household spending. By considering life-cycle income and wealth, attitudes toward risk, and discount factors. Traditionally it is assumed that households are a single decision-making unit. However, as it has become more evident that household members have potentially conflicting preferences, there have been attempts to analyze household decisions from the perspective of bargaining models. Additionally, a small but growing body of literature suggests that there are gender differences in risk attitudes, financial decisions, and consumption preferences (i.e., Barber & Odean, 2001; Jianakoplos & Bernasek, 1998; Pålsson, 1996). Given their divergent social and economic circumstances within and outside the household, women and men may have differing saving propensities.

Some research has found significant differences in retirement savings and investment decisions by gender. In general, men and women differ in risk averseness, prudence, self-control, and discount factor, all of which are considered to be the standard determinants of household savings and consumption. Most studies have found or suggested that women have a higher propensity to save than men. Using individual financial transaction data, Barber & Odean (2001) found that men trade more excessively than women, which lowers their net returns significantly. Similarly,

Jianakoplos & Bernasek (1998) looked at the U.S. Survey of Consumer Finances, and found that single women are more risk-averse than single men and married couples. Additionally, using a wide range of variables that measure risk-taking in a study of Swedish households, Pålsson (1996) similarly finds evidence that women are more risk-averse than men.

A number of studies show that women are more conservative in their investment decisions. For example, V. Bajtelsmit & Bernasek (1996) find that U.S. women hold a much higher proportion of their private pension portfolios in fixed assets. V. L. Bajtelsmit & VanDerhei (1997) also find gender differences in pension decisions, with women significantly less likely to invest in employer stock and equities. Similarly, Hinz et al. (1997) examine the allocation patterns of federal government workers in the U.S. Thrift Savings Plan and find that women invest their pensions more conservatively than men. Looking at individual contributions to 401(K) pension plans in the U.S., Hungerford (1999) shows that women contribute at a significantly higher rate than men.

There are several mechanisms through which gender is likely to affect consumptions and savings. First, drawing from an extensive literature in psychology, several studies suggest that women's attitude toward risk differs from men's and demonstrate that gender is a powerful determinant of risk attitudes and judgments. For example, Flynn et al. (1994) and Barke et al. (1997) find in their research on North American scientists that male respondents tend to judge risks as smaller and less problematic than do females.

There are also socio-economic and cultural reasons for women's risk aversion. Thomas (1990) found that women are generally more concerned about children than men, which influences them to increase savings for their children's education and future. Anderson & Baland (2002) found that women prefer to purchase more durable goods than men and therefore to save more. Additionally, Bernasek & Shwiff (2001) argues that such differences in perceived risk result from women's

different experiences and perceived vulnerability. Women, on average, experience greater vulnerability than men since they earn on average less than men, are more likely to care for children and elderly, are more likely to live in poverty, and are less likely to have health insurance and pension coverage in their jobs. Women's tendency to exhibit greater caution and be more averse to risk may then be a rational response to their greater vulnerability and lack of control over their lives (Bernasek & Shwiff, 2001). Yet another reason why women want to save more is biological; women have a higher discount factor because they usually live longer than men (Lundberg & Ward-Batts, 2000).

Thus, it follows from gender differences in preferences for savings and consumption and the increase in women's acquisition of personal resources that the balance of bargaining power between spouses should matter in household financial decisions. A few recent studies have attempted to incorporate bargaining into the standard model of household savings and consumption. A growing empirical literature based on the bargaining framework provides evidence that the share of household income controlled by the wife affects household behavior, including expenditures on various goods, individual labor supplies, and health outcomes for children. Using the Panel Study of Income Dynamics (PSID), Nargis (2003) found that household savings tend to increase with the wife's bargaining power, which was measured by relative earnings. Similarly, Lundberg & Ward-Batts (2000) show that wives with strong bargaining power accumulate more net wealth as they approach retirement. They measure the balance of power by a spouse's relative control over income sources, relative age, and relative education.

While the existing literature examines the relationship between the inter-spousal bargaining power and the households' general long-term patterns of consumption and savings, there are no studies that examine how bargaining power might affect household responses to unforeseen, tem-

porary shocks. This study extends the current literature that incorporates bargaining into the standard model of household decisions by investigating how households reveal their financial propensities and preferences in response to an unforeseen exogenous economic shock. Using the 2008 financial crisis as an external negative economic shock and a “natural experiment,” this study looks at the extent to which households adjust their savings and consumption patterns, and how the responses are altered by intra-household and inter-spousal characteristics that are indicators of inter-spousal bargaining power.

The 2008 financial crisis is a great “natural experiment” for testing the bargaining model on household decisions for several reasons. First, it is an exogenous shock that not only impacted almost all households in the U.S. (albeit unequally and in different ways), but also had a significant impact on household’ savings and consumption (Christelis et al., 2014; Petev et al., 2012). Second, the unforeseen and exogenous nature of the 2008 financial crisis could be used as an “experiment” that prompts households to quickly reveal their financial propensities and preferences in response to economic distress. Lastly, the widely spread phenomenon affected households with various circumstances, backgrounds, and compositions, and the heterogeneity of the sample allows me to analyze how inter-spousal bargaining power affected household-level decisions, with other things controlled.

The microdata I use for the analysis are the 2006–2009 data from the HRS, Health and Retirement Survey, a longitudinal data set that began with a representative set of households in 1968. This long panel data would allow me to track changes in the family’s financial situation as well as the spouses’ ex-ante bargaining power prior to the economic shock. In addition, it contains both household and individual data, allowing me to examine the individual-level characteristics of the married couples as well as family background information. Furthermore, in this study, I utilize the

HRS supplementary Internet Survey in 2009 on housing, consumption, and wealth data to get a better overview on how and to what extent the households were affected by the crisis and how they reacted to it.

This study contributes to the existing literature in several ways. This paper is the first to empirically test differences in household responses to negative economic shocks depending on the households' intra-household and inter-spousal characteristics. Several studies examine differences in household responses to the recession depending on socio-economic status and income brackets, but do not consider how intra-household and inter-spousal characteristics. Second, this study is also the first to incorporate bargaining into the standard model of household savings and consumption in the context of households facing shocks. As shown in the literature review, several studies have shown a general long-term relationship between the inter-spousal bargaining power and the households' savings and consumption patterns, but no studies have looked at how inter-spousal bargaining power affects households' reactions to unforeseen shocks and scarcity.

3 Data

The Health and Retirement Survey (HRS) is a longitudinal, nationally representative micro survey interviewing those aged 50 and above in the US. The survey, conducted every other year since 1968, provides detailed information on household members' socioeconomic and demographic characteristics, income, and assets holdings. The HRS consists of data on individual household members, which allows examination of the individual-level characteristics of both spouses as well as household-level characteristics. The longitudinal nature of the study allows me to analyze individual and family characteristics that might influence spending decisions. The panel data also

allow me to control for unobserved time-invariant characteristics with a fixed effects specification.

Because the HRS only provides information on older U.S. population, the results cannot be generalized to all age groups. However, the older population maybe better suited to analyze the impact of wealth shocks on consumption. First, older households have accumulated significant amounts of wealth over the life cycle and therefore control a large fraction of society's resources, and thus their decisions have pronounced aggregate implications. Second, the older population tend to have higher stock market participation rates than the rest of the population, and a higher fraction of their wealth is invested in risky financial assets (Christelis et al., 2014). Lastly, about 90 percent of households in the sample own their home, which allows me to be more in control of endogeneity bias and the heterogeneity of responses with respect to wealth losses experienced by home owners and home renters.¹

In this study, I use Wave 8 (HRS Main 2006) and 9 (HRS Main 2008) of HRS, which was conducted between February 2006 and February 2007 and February 2008 and February 2009, respectively. Since the questionnaires ask the respondents to refer to one year prior to the survey, HRS 2006 has information on the household's characteristics in 2005 and HRS 2008 on 2007. Thus, these responses allow me to examine the household and individual's characteristics prior to the wealth shock from the recession. In addition, a subset of the Wave 9 respondents were asked in 2009 to participate in a supplementary HRS Internet survey, in order to collect information on households in the ongoing recession. In the 2009 Internet Survey, which was conducted from March to August 2009, most of the sampled individuals had participated in wave 9 of the HRS and had reported having Internet access. Its sample consists of 4,415 respondents belonging to 3,438 households, with the sample response rate about 77 percent. This supplementary Internet survey

¹Out of 3,124 household observations in the sample, only 338 (10.03%) of the households do not own a home.

contains information on the wealth losses that respondents have experienced, their consumption adjustments, and on how they responded to the financial difficulties. I merge the 2009 Internet Survey with the 2008 main survey, thus ending up with a sample of 3,370 households.

The sample is restricted to couples who are married living with a spouse, and these respondents were identified by an indicator variable based on the respondent's household members and their relationship to the respondent.² The sample excludes individuals who were divorced at the initial year of observation and those who were cohabiting or maintaining a long-distance unmarried relationship. Because the main empirical analysis in this paper utilizes the one-wave lagged values of all the covariates, I only keep observations that include not only the values of the covariates from 2008 and 2009, but also values from 2006, characteristics before the financial crisis to indicate the ex-ante bargaining power of the spouses. For this reason, I only include couples that remained intact for two consecutive interviews of the 2006 - 2008 waves of the HRS Main survey and the 2009 Internet Survey. Families were included in the analytical sample only if neither spouse has missing data for key variables (financial assets, housing wealth, sex, education, employment status, income, and all their lagged variables) or was a member of the armed forces, retired, permanently disabled, on public assistance, or in prison or jail at the start or at the end of an observation period. These restrictions limited the sample to 2,673 observations, which is about 79% of the original merged data.

²For individual-level analysis, I also include households with individuals who are single, divorced, or widowed. This gives me an unequal number of observations for male and female, as seen on Table 1.

3.1 Dependent Variables, Key Covariates, and Controls

Housing wealth is defined as a gross self-reported value of the primary residence. Financial wealth is the sum of all individual stocks, bonds, certificates of deposit, and checking/saving accounts. All variables that indicate the changes in the housing and financial wealth were calculated by comparing the values from the HRS 2009 Internet Survey with the 2008 HRS Main survey. All variables used to indicate the couples' inter-spousal bargaining power were obtained from the 2006 HRS Main survey, including both spouses' age, levels of education, work status, retirement status, and annual income. All monetary measures are adjusted for inflation.

The dependent variable, change in consumption, is obtained from the HRS 2009 Internet Survey, in which the respondents were asked about changes in their total spending during the 2008 recession compared to the previous year (i.e., 2007). They are first asked to indicate whether their current spending is lower, higher, or has stayed the same. Subsequently, if they indicate that their spending has changed, they report the percentage change in their total spending.

It is important to note that I am using self-reported values of consumption and wealth changes, and these self-reported values may not be accurate measures of the actual impact of the recession. However, what really matters for households' spending decisions is this perceived loss, and not the accurately recorded one. It is reasonable to assume that households act on what they think has occurred, and actual impact matter less for the households' responses, if the respondents are not aware of it.

To control for different household characteristics that may affect their consumption patterns and responses to the economic shock, I use a variety of household characteristics and individual socio-economic characteristics taken from the HRS Main Surveys. These include education, age,

household size, working status, retirement status, and annual income. In addition, I use the information on the respondents' current income during the recession using the HRS 2009 Internet Survey. Furthermore, I take into account households' resources in 2008 by controlling for total household income and net worth. I control for net household income, net financial wealth, and net housing wealth, which all have highly skewed distributions. Thus, I use the inverse hyperbolic sine transformation with the following equation (shown for household income), which allows for nonlinear effects and is defined for zero and negative values:

$$IHS(income_{total}) = \log(income_{total} + (income_{total}^2 + 1)^{1/2}) \quad (1)$$

where $income_{total}$ refers to total household income. This IHS function is asymptotic to the logarithmic one starting from values of household income close to zero (Burbidge et al., 1988). Thus, an estimated coefficient of such IHS-transformed variable can be interpreted in the same way as a log variable.

3.2 Defining Key Covariates: Comparative Advantage Variables

To explore the bargaining power hypothesis in the non-unitary model for husbands and wives, a set of “comparative advantage” variables are used to gauge the relative income and human capital of the spouses. Data from the HRS Main Survey and 2009 Internet Survey were used to create these proxies for spouses' bargaining power.

“Comparative Advantage” is defined in different ways for each covariate, based on previous literature. Shauman (2010) gathered information from the existing literature about what it means to be “comparatively advantaged” in a spousal relationship. For a binary variable, *Age*, a spouse

is defined to be comparatively advantaged if 1) their age is greater than their spouse's age when the older spouse is younger than 65 years (assumed as age of retirement);³ or 2) their age is less than their spouse's age when the older spouse is older than 65 years. For the binary variable, Educational Attainment, a spouse is indicated as having a comparative advantage if 1) his/her highest educational attainment is a professional degree while their spouse's is either a college degree, a high school diploma, or less; or 2) his/her highest educational attainment is a college degree while their spouse's is either a high school diploma, or less; or 3) his/her highest educational attainment is a high school diploma while their spouse's is less than a high school diploma. A couple is defined as having spousal equality if both spouses' highest levels of educational attainment are the same. For the binary variable, Share of Income, a spouse is indicated as having a comparative advantage if he/she has higher share of income than their spouse.⁴ For the ordinal variable, Work Status, a spouse is indicated as having a comparative advantage if 1) he/she is working full-time while their spouse is either working part-time or not working or 2) he/she is a part time worker while their spouse is not working. A couple is defined as having spousal equality if their employment statuses are the same. For the ordinal variable, Retirement Status, a spouse is indicated as having a comparative advantage if he/she is not retired yet, while their spouse is. A couple is defined as having spousal equality if their retirement statuses are the same (either both retired or neither retired).

³Additional robustness check is made with a numerical variable, age difference between husband and wife.

⁴share of income is defined as $\frac{Y_i}{Y_i+Y_j}$. If one of the spouses is not working, his/her income is imputed as zero, so share of income of the working spouse would equal to 100%.

4 Model Specification

4.1 Conceptual Models on the Saving Behavior of a Two-Person Household

Women typically live longer than men and wives are typically younger than their husbands.⁵ These statistics may naturally lead to an assumption that saving preferences of married households with forward-looking members may differ between husband and wife, especially when saving for old age. This assumption stands in contrast to "unitary" models of household inter-temporal allocation, which assume that the household has a single utility function.

For my conceptual model, I build on the simple two-person (husband and wife) two-period model introduced by Browning (2000), in which there is only one asset-saving. Due to the gender differences in each spouse's life prospect, it is assumed that the husband discounts the future more than the wife. Browning (2000) assumes that there are two-periods with the younger partner surviving to the end of period 2 with certainty, while the older partner faces a probability of survival equal to λ after the end of period 1 (with $0 < \lambda < 1$). Thus, the utility functions of the two people are:

$$\begin{aligned} u_i &= u(C_1) + \lambda u(C_2) \\ u_j &= u(C_j) + u(C_2) \end{aligned} \tag{2}$$

where C_t is consumption in period t . Note that the only discount factor is for i and this simply takes account of the probability of survival. In addition, we assume that $u(\cdot)$ is strictly increasing and strictly concave (Browning, 2000).

⁵According to data published in May 2016 by World Health Organization, female life expectancy in the US is 81.6 while male life expectancy is 76.9. According to data on age difference in heterosexual married couples by 2013 US Current Population Survey, only 14.1% of couples have the wife older than her spouse.

In period 1, the couple has given incomes Y_i and Y_j , respectively for spouse i and j . Building onto Browning's model, I also include financial and housing wealth into this model, noted with F and H , respectively. I define $Y = (Y_i + Y_j)$ and household's total wealth as $W = F + H$. I define household's total net value as $T = Y + W$. I denote the wife's bargaining power and control over the resources (defined in more detail in the following section) by ρ . Period 2 household net value is what is saved from period 1. For simplicity, the real interest rate is set to zero so that the budget constraint is simply $C_2 = (T - C_1)$.

In this framework, husband and wife may have different views as to how much of household resources to save for the future. In order to posit how the household comes to make decisions, I also adopt a Nash approach that Browning (2000) employs in his model: each person s contributes to consumption in period 1 from Y_s , and any income or wealth left over is saved for the next period (Browning, 2000). Denoting S_i and S_j as i and j 's savings decisions, respectively, I have the following problems for the two agents (spouses):

$$\begin{aligned} \max_{S_i} u(T - S_i - S_j) + \lambda u(S_i + S_j) \text{ with } 0 \leq S_i \leq Y_i + W \\ \max_{S_j} u(T - S_i - S_j) + u(S_i + S_j) \text{ with } 0 \leq S_j \leq Y_j + W \end{aligned} \quad (3)$$

Now, let π be the individually chosen saving rate in a case such that π is the solution to:

$$\begin{aligned} \max_{\pi} u((1 - \pi)T) + \lambda u(\pi T) \text{ with } 0 \leq \pi \leq 1 \\ \max_{\pi} u((1 - \pi)T) + u(\pi T) \text{ with } 0 \leq \pi \leq 1 \end{aligned} \quad (4)$$

As well as relative incomes, savings decisions will depend on the relative ages of the two partners (Browning, 2000). As reported in Table 1, the mean differences in age between husband

and wife are 3.37 years for the samples from HRS. In Table 2, I present the distribution of the difference in ages. As can be seen there are considerable numbers of households in which the husband is at least three years older than his wife. In the light of our model it might be expected that this would lead to disagreement about how much to save for retirement.⁶ Browning (2000) assumes that this translates into different propensities to save. I employ this assumption and apply it to my conceptual model, as discussed in the following section.

In sum, these household saving models take explicit account of the possible differences between spouses' preferences for saving for the future. The models suggest that household decisions depend on the relative bargaining power of the two partners.

4.2 Conceptual Models on Intra-Household Bargaining

As opposed to the unitary model, in a collective model of household behavior, husbands and wives make joint decisions for the household while trying to maximize individual utility functions. The determinants of relative bargaining power are discussed more explicitly in cooperative bargaining models, which are special cases of the general collective model. In "divorce threat" models, the sharing of household resources depends upon a threat point that corresponds to the husband's and wife's best options outside the marriage. The bargaining power of each spouse will be a function of the public and private resources available to divorced men and women, and on conditions in the remarriage market. In the "separate spheres" model, the threat point is internal to the marriage, and is determined by an inefficient non-cooperative marital equilibrium. In this case, measures of

⁶To illustrate the differences in survival probabilities, demographic information has been taken from National Center for Health Statistics Life Tables for 2017. Given survival to age 65, the expected lifetime remaining is 17.9 years for a man and 20.5 years for a woman. For a woman aged 62 the expected remaining lifetime is 22.9 years. Thus, for a couple in which the wife is three years younger than the husband, the difference in expected lifetime given that both survive until the husband is 65 is 5 years.

control over resources within the marriage will be the determinants of relative bargaining power (Lundberg et al. (2003)).

The unitary household model assumes that individual members pool their incomes and maximize a single common utility function. For simplicity, I consider a two-period model of consumption, discussed by Lundberg (1997). Suppose that a household maximizes the following utility function:

$$u(C) = u(c_{i,1}, c_{j,1}) + \lambda u(c_{i,2}, c_{j,2}) \quad (5)$$

where λ is the household discount factor, $u(C)$ is the household's periodic utility function, and $c_{s,t}$ is the consumption of spouse j , with $s \in \{i, j\}$ at time t .

Now, I consider a simple household bargaining model where individual spouses have potentially divergent preferences. Then, I define a utility function that is specific to the individual, $u_s(C)$ where $s \in i, j$ and i is the spouse with $P(\text{Survival in Period 2}) = p$, where $0 < p < 1$, and j is the spouse that with $P(\text{Survival in Period 2}) = 1$.⁷ Each spouse's utility function is defined as following:

$$\begin{aligned} u_i(C) &= u_i(c_{i,1} + \lambda_i(p * u_i(c_{i,2}))) \\ u_j(C) &= u_j(c_{i,1} + \lambda_j(p * u_j(c_{j,2}) + (1 - p) * \mu_j(c_{j,2}))) \end{aligned} \quad (6)$$

This model is an extension of the existing models where I combine two factors that might influence each spouse's preference in inter-temporal consumption and individual discount factors. Note, this individual-level utility function is egoistic since it only depends on the individual's own consumption. In each period, spouses divide total income for their consumption and savings. In period 2,

⁷As mentioned in the literature review on life expectancy by gender and spousal age difference, I assume spouse i to be usually the husband and j the wife in this model

there is a possibility that spouse i is deceased and spouse j is widowed. In addition, unlike the unitary model, total savings also depend on the balance of power because spouses have different preferences. For example, if the wife has a high discount factor (high λ_j), she would prefer to save more. I can also infer from this model that even when both spouses' standard discount factors λ for the future are equal, i 's will discount the future even more, due to their probability of death in period 2. Assuming that household decisions are on the ex-ante Pareto frontier (Mazzocco, 2004), I can represent the household's optimization problem as:

$$u(C) = \rho [u_j(c_{i,1} + \lambda_j(p * u_j(c_{j,2}) + (1 - p) * \mu_j(c_{j,2}))) + (1 - \rho) [u_i(c_{i,1} + \lambda_i(p * u_i(c_{i,2})))]] \quad (7)$$

where ρ denotes the wife's relative bargaining power, $0 < \rho < 1$. The household maximizes the collective welfare function subject to the budget constraints. The constraint for the first period is the same as that in the unitary model in equation 7. In the second period there is a possibility of death of spouse i .

5 Empirical Strategy

5.1 Estimation

To test the empirical validity of the unitary household model and the bargaining model, I estimate a system of equations for change in consumption between pre- and post-recession:

$$\frac{\Delta c_{it}}{c_{it-1}} = \alpha + \beta' W_{it} + \vartheta' X_{it} + \varepsilon_{it} \quad (8)$$

where the subscript represents household i . X_{it} is a vector of individual and household characteristics, and it includes total household earnings, housing wealth, and financial assets in inverse hyperbolic sine transformation, each spouse's age, education, work status, retirement status, an indicator for region of residence, and a constant. A vector of key variables is W_{it} , proxies of the wife's relative bargaining power. The parameter β represent the effects of bargaining power on the household's change in consumption. The unitary model predicts a cross-equation restriction that $\beta = 0$.

For the analysis, I run two separate regressions using different set of proxies for the relative bargaining power. First, I use "share of income" as the proxy for bargaining power, as it has been often used in the literature (i.e., Browning, 2000; Lundberg & Pollak, 2007). I also run a separate regression using a set of "comparative advantage" variables defined in the previous section, including advantage in education, age, work status, and retirement status. The reason for doing two different set of regressions is that although share of income is generally recognized as a good proxy for bargaining power in the literature, individual income was very volatile in this period after the recession. Therefore, given that the Internet survey was conducted over the span of the months between 2008 to 2009, the surveyed values of each spouse's current income may not be the best proxy of their bargaining power. Thus, I choose other measure of individual characteristics that are recognized in the literature as good proxies for bargaining power, including education, age, retirement status, and labor force participation status, which are highly correlated with share of income, but less volatile.

The core assumption made in this paper in examining households' responses to unexpected economic shocks is the standard life-cycle model, in which forward-looking individuals maximize their lifetime utility by deciding how much to consume over a finite time horizon. I study the

effect that capital gains and losses on housing and financial assets have on consumption by using a linear specification, in which the percentage change in consumption (ΔC) will be associated to the percentage changes in the values of housing and financial wealth (HW and FW , respectively) as well as to various changes over time in a vector of household and individual demographic variables X_{it} . With these percentage change specification of the ΔC , HW , and FW variables, the coefficient results can be interpreted as elasticity of consumption in response to wealth changes. (e.g., if β is positive, then one percentage loss of wealth leads to β percentage decrease in consumption.)

More importantly, I examine the effect of inter-spousal bargaining power on the households' responses to the shock. In order to examine this effect, I interact all the changes in wealth variables with binary variables that indicate whether the wife has a "comparative advantage" on individual characteristics that are proxies for bargaining power, including education, age, share of income, work status, and retirement status. Thus, I estimate the following equation:

$$\frac{\Delta c_{it}}{c_{it-1}} = \alpha + \beta' W_{it} \times \left(\frac{\Delta HW_{it}}{HW_{it-1}} \right) + \gamma \left(\frac{\Delta HW_{it}}{HW_{it-1}} \right) + \delta' W_{it} + \vartheta' X_{it} + \varepsilon_{it} \quad (9)$$

$$\frac{\Delta c_{it}}{c_{it-1}} = \alpha + \beta' W_{it} \times \left(\frac{\Delta FW_{it}}{FW_{it-1}} \right) + \gamma \left(\frac{\Delta FW_{it}}{FW_{it-1}} \right) + \delta' W_{it} + \vartheta' X_{it} + \varepsilon_{it} \quad (10)$$

where the subscript i denotes the household, subscript t denotes time, C_{it} is consumption, $'W_{it}$ is a vector of binary variables indicating wives' comparative advantage on variables that are proxies for inter-spousal bargaining power (education, age, share of income, work status, retirement status), $'X_{it}$ is a vector of household and individual demographic variables, and ε_{it} is the error term.

This specification has been often used in the literature in order to capture the effect of various factors on changes in consumption. In this framework, the coefficients γ of the variables indicating

the percentage changes in the values of the housing and financial assets have a straightforward economic interpretation, representing the elasticity of consumption with respect to those assets. A positive and statistically significant coefficient would indicate that the more wealth loss that the household experiences, the more they will save. A statistical significance of the coefficient β of the interaction terms would indicate that wife's comparative advantage, and thus higher bargaining power, have an added effect on the households' consumption adjustment in response to the shock. From my hypothesis that women tend to have higher propensity to save, I expect β to be positive and significant, which would indicate that women's higher bargaining power would allow them to influence the household to save more.

For robustness, I also estimate an alternative model. The motivation is that my prediction about the effect of W on $\frac{\Delta c_{it}}{c_{it-1}}$ is valid after conditioning the latter on the event of decrease in consumption. I assume a two-stage Heckman decision-making procedure in which households first decide on changing consumption and, conditional on the decision to change, decide on the amount of change. More specifically, I first use a probit model to estimate the household's decision to make any changes to their consumption in response to the wealth shock. Then in the second stage, I use the Inverse Mills Ratio (indicated with λ) on the results from the first stage to estimate the magnitude of the change. I estimate the following system of equations:

$$C = \begin{cases} \alpha + \beta_1'W_{it} + \beta_2'[\lambda(W_{it}) - \lambda(-W_{it})] + \beta_1'X_{it} + \beta_2'[\lambda(X_{it}) - \lambda(-X_{it})] + \varepsilon_{it} & \text{if } d^* \neq 0 \\ \text{n/a} & \text{if } d^* = 0 \end{cases} \quad (11)$$

where $d^* \neq 0$ for deciding to change consumption and $d^* = 0$ for deciding to not change consumption. This two-stage model is necessary to check for robustness since the data on perceived

percentage change in consumption are unavailable for households that reported that they had no change in consumption. As mentioned earlier, households were first asked if their consumption has changed at all compared to 2007, and if they respond with a "yes," then they were further asked to report the specific percentage change of consumption. Thus, for households that do not respond with a "yes" in the first question, the consumption percentage change values are missing. Such two-step format of the survey question may skew and bias the responses. Consequently, the analysis on perceived change in consumption would be affected by selection bias. However, the same variables that influence the household's initial decision of consumption change also influence how much the household decides to change. Thus, this two-stage heckman model is used to remove the selection bias in the OLS estimators by treating the two decisions separately and treating the second decision conditional on the first.

6 Results

6.1 Descriptive Statistics

The summary statistics in Table 1 show that the average age of the husbands in this sample is 64 and the wives is 61. Both spouses have an average of 14 years of education, which indicates that the average sample has a college degree. For both husband and wife, about half to the sample works for pay, which excludes people who are unemployed or not in the labor force. About 36% of men in the sample are retired while 26% of women are. Lastly, it also shows that wives, on average, have lower annual income than the husbands.

Furthermore, Table 1 provides descriptive statistics on the couples' relative characteristics.

Table 1: Summary Statistics on Spousal Characteristics

Variable Name	Obs	Mean	St. Dev.
Individual-Level Characteristics			
Husband			
Age	2,966	65.538	8.780
Years of Education	2,966	14.318	2.376
Currently Working	2,966	0.541	0.498
Annual Income	2,668	37269	90067
Whether Retired	2,966	0.384	0.487
Wife			
Age	3,195	62.647	8.917
Years of Education	3,195	13.977	2.236
Currently Working	3,195	0.514	0.500
Annual Income	3,087	21999	41415
Whether Retired	3,195	0.287	0.453
Relative Spousal Characteristics			
Education Advantage - Wife	2,689	0.323	0.468
Age Advantage - Wife	2,689	0.268	0.443
Age Difference (Husband - Wife)	2,689	3.366	5.945
Age Difference More than 3 Years	2,689	0.461	0.499
Age Difference More than 5 Years	2,689	0.348	0.476
Work Status Advantage - Wife	2,689	0.240	0.427
Retirement Advantage - Wife	2,689	0.220	0.414
Earnings Advantage - Wife	2,689	0.276	0.447
Single Earner Households			
Wife - Single Earner	1,131	0.546	0.498
Husband - Single Earner	1,131	0.463	0.499
Dual Earner Households			
Share of Income - 25 pct	748	0.218	0.240
Share of Income - 50 pct	748	0.419	0.240
Share of Income - 75 pct	748	0.573	0.240

Descriptive statistics are estimated with Stata's `svy:mean` command correct for the influences of sampling design and nonindependence of multiple observations within couples. Samples are weighted by given sampling weights from HRS 2008 data.

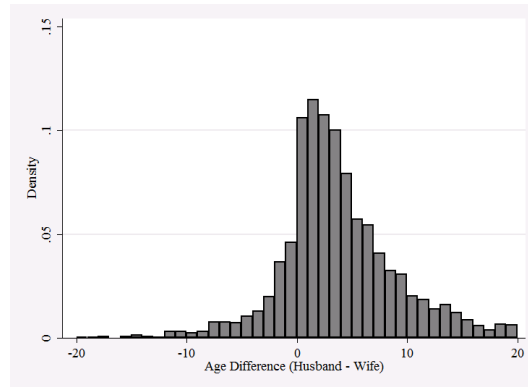


Figure 1: Distribution of Age Difference (Husband - Wife)

It indicates that in about 33% of the couples, the wife has a higher level of education than the husband. In addition, about 26% of the wives have work status advantage over their husbands (they work for pay while their husbands do not), and about 30% of them have higher hourly earning (total annual income divided by total hours worked annually (hours per week * weeks per year)). Lastly, the average age difference between the spouses is 3.37 years (husband minus wife), and about half of the sample has the husband at least three years older than the wife, which indicates that the sample allows me to employ the conceptual models on the saving behavior of a two-person household that I discussed in the previous section. Figure 1 provides an overview of the age distribution, which further indicates that the distribution of age difference between husband and wife is skewed to the left, and the sample is reflective of what the conceptual models predict about the age difference between spouses that would likely affect individual spouse's consumption patterns.

In addition, Table 1 also provides the sample distribution of spousal share of total household income. In this sample, 28% of the sample is dual earner households, and out of the dual earner households, Figure 2 indicates that the distribution of share of income is slightly skewed to the right, which indicates that there are more households with higher husband income. However, as

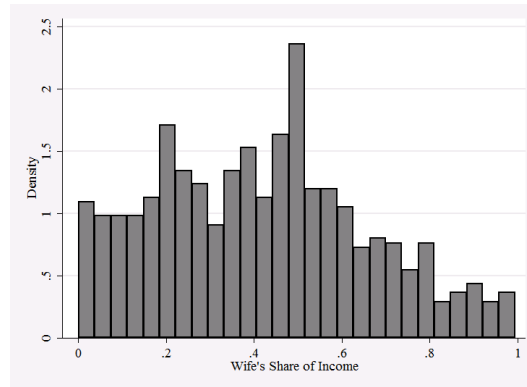


Figure 2: Distribution of Wife's Share of Income

shown in Table 1, there are more single earner households with wife as the sole income earner. Overall, these summary statistics indicate that the sample has a sufficient variation on household bargaining power and comparative advantage to run regressions on the effect of bargaining power on household's financial decisions.

Table 2 presents the descriptive statistics on households' financial and housing wealth and consumption in 2006 and 2008. First, it shows that on average, households decreased their consumption by 8 percent from 2006 to the year of recession. The table shows that median total housing wealth, financial wealth, and household income all decreased in 2008 compared to 2006, and on average, households experienced negative change in their housing and financial wealth on the year of recession in 2008. Log difference of these variables show that households experienced about 16% decrease in household income, 6% decrease in housing wealth and 8% decrease in financial wealth. All these evidence that demonstrates the trend of household wealth loss provides me with sufficient data to test the households' responses on unexpected economic wealth shock.

Table 2: Summary Statistics on Household Wealth

	Obs	Mean	Std. Dev.
% Change in Consumption	1,607	-0.081	0.292
2008			
Total Household Income	2,699	56681	84728
Total Financial Wealth	2,699	71556	348761
Total Housing Wealth	2,699	220174	313969
2006			
Total Household Income	2,673	72221	121322
Total Financial Wealth	2,673	72892	348394
Total Housing Wealth	2,673	264209	349739
Change in Housing Wealth	2,673	-42974	284846
Change in Financial Wealth	2,673	-5224	271658
Log Difference			
Total Household Income	1,597	-0.163	0.900
Total Housing Wealth	2,673	-0.066	0.518
Total Financial Wealth	2,673	-0.080	0.504

Descriptive statistics are estimated with Stata's `svy:mean` command correct for the influences of sampling design and nonindependence of multiple observations within couples. Samples are weighted by given sampling weights from HRS 2008 data.

6.2 Change in Household Consumption in Response to the Recession: Analysis with the Spouse Individual-Level Variables

In Table 3, I first present the relationship between household members' individual characteristics (that are proxies to individuals' bargaining power) and their consumption behavior in the 2008 recession. Table 3 Model 1 is a probit regression on the probability of decreasing consumption in year 2008 relative to 2006 with explanatory variables on the household members' individual characteristics. It shows that for women, higher levels of education and being employed increase the probability of decreasing consumption in response to the financial crisis, while such is not statistically significant for men. This result could support the hypothesis that women and men of same characteristics may have diverging preferences to responding to wealth shocks. Moreover, age is negatively associated with the likelihood of decreasing consumption for both men and women, and this supports the existing literature that younger spouses have greater incentive to save for their future (Lundberg & Ward-Batts, 2000)

Model 2 of Table 3 is an OLS regression on selected sample of the households that decreased consumption, and the results show the effect of individual characteristics on the extent to which these households decrease their consumption. Model 2 shows that while more educated wives contribute to greater percentage decrease in consumption, more educated husbands contribute to the opposite, further supporting the hypothesis that men and women may have differential preference to savings in response to the wealth shock. Furthermore, husbands' working status also lessens the household savings in response to the shock, while such is not necessarily true for the wives. These gender differential effects of individual characteristics on the household responses to the wealth shock provide an evidence for the hypothesis that analyzing the consumption patterns of individual

household members matter beyond solely examining the consumption patterns of households as a single unit.

Table 3: Individual Characteristics on Consumption Change 2006 vs 2008

	(1)	(2)
	Probit - Decrease in Consumption	% Decrease in Consumption
Female		
Years of Education	0.05370** (0.024)	0.00533* (0.002)
Age	-0.02404* (0.013)	0.00134 (0.001)
Currently Working	0.26578* (0.135)	0.00686 (0.016)
Male		
Years of Education	0.08963 (0.042)	-0.00583* (0.003)
Age	-0.02087** (0.014)	-0.00301** (0.001)
Currently Working	0.13339 (0.163)	-0.03648** (0.016)
Observations	2,673	1,607

Additional controls include IHS forms of total household financial assets, total household income, and total housing assets, and geographic region. The data are from HRS Main 2006, Main 2008, and Internet 2009 Surveys. The sample is restricted to couples that cohabited at least two consecutive years in the panel data, and all spouses have no missing values for the key covariates. The dependent variable for probit regression is a binary variable that equals 1 if the percentage change in consumption is less than zero, and 0 otherwise. The dependent variable for second-stage heckman OLS regression is a continuous variable ranging from 0 (exclusive) to 100, and it indicates the amount of percentage decrease in consumption. The dependent variable for OLS regression is a continuous variable ranging from -100 to 100, and positive values indicate increase in consumption while as negative values indicate a decrease in consumption. The table presents estimated coefficients with robust standard errors in parentheses. Observations are weighted by the appropriate sampling weight provided by the HRS 2008 data, and income and wealth values are adjusted to inflation with the base year as 2015 using price index values provided by BEA. Statistically significant coefficient estimates are indicated by a single asterisk (p ; 0.10), double asterisk (p ; 0.05), or triple asterisk (p ; 0.01).

6.3 Change in Household Consumption in Response to the Recession: Analysis with the Relative Spousal Characteristics Variables & Comparative Advantage Model

As the previous section suggests, the characteristics of each spouse have different gendered effects on households' responses to the wealth shock. In this section, I further analyze such impact of individual characteristics on consumption by analyzing them in relation to their spouses' characteristics. As noted in the literature review section, spouses have different levels of influence on the intra-household decisions depending on their individual characteristics relative to their partners'. I show how the relative characteristics of the spouses influence consumption responses.

Table 4 Model 1 presents results of a probit regression on the probability of decreasing consumption from year 2006 to 2008 with spousal relative characteristics as key covariates. The regression results show that wives' advantages in education, age, and working status significantly increase the probability of consumption decrease in 2008 recession, compared to spousal equality in these categories. Furthermore, Table 4 Model 2 shows that out of households that decreased their consumption in 2008, wives' comparative advantage on working status and retirement status further increase household savings in the year of recession. This supports the evidence that households with higher female bargaining power via higher share of household income tend to save more in response to the recession.

In addition to the regressions using comparative advantage variables, I also run regressions using share of income as a proxy. Table 4 Model 1 shows that when wife has higher share of income than her husband, the likelihood of decrease in consumption in response to the recession increases by 5%, and wife's advantage in share of income also increases the amount of which the

Table 4: Relative Spousal Characteristics on Consumption Change 2006 vs 2008

	(1)	(2)
	Probit - Decrease in Consumption	% Decrease in Consumption
Education - Wife Adv	0.03021* (0.015)	0.00166 (0.018)
Age - Wife Adv	0.00559*** (0.002)	0.04072 (0.030)
Working Status - Wife Adv	0.10932* (0.056)	0.06954*** (0.022)
Retirement Status - Wife Adv	-0.05290 (0.058)	0.05822*** (0.022)
Share of Income - Wife Adv	0.05390** (0.027)	0.02599* (0.015)
Observations	2,673	1,607

Additional controls include IHS forms of total household financial assets, total household income, and total housing assets, and geographic region. The data are from HRS Main 2006, Main 2008, and Internet 2009 Surveys. The sample is restricted to couples that cohabited at least two consecutive years in the panel data, and all spouses have no missing values for the key covariates. The dependent variable for probit regression is a binary variable that equals 1 if the percentage change in consumption is less than zero, and 0 otherwise. The dependent variable for second-stage heckman OLS regression is a continuous variable ranging from 0 (exclusive) to 100, and it indicates the amount of percentage decrease in consumption. The dependent variable for OLS regression is a continuous variable ranging from -100 to 100, and positive values indicate increase in consumption while as negative values indicate a decrease in consumption. The table presents estimated coefficients with robust standard errors in parentheses. Observations are weighted by the appropriate sampling weight provided by the HRS 2008 data, and income and wealth values are adjusted to inflation with the base year as 2015 using price index values provided by BEA. Statistically significant coefficient estimates are indicated by a single asterisk (p ; 0.10), double asterisk (p ; 0.05), or triple asterisk (p ; 0.01).

household decreases consumption, according to the results in Model 2.

6.4 Household Consumption in Response to Wealth Shock: Financial Wealth

In this section, I further analyze the influence of intra-household bargaining power on the households' response to the wealth shock from the 2008 recession by specifically examining the differential effects of wealth shock on household consumption depending on inter-spousal bargaining power.

First, on Table 5, the key covariate—change in financial assets—indicates that when a household experiences 1 percentage loss in financial assets, the likelihood of decreasing their consumption increases by 6 percent. The regression results provide evidence on the effects of bargaining power on households' differential responses to the financial loss. The coefficient of the interaction term between the change in financial assets and wife-advantage on education demonstrates that wife's comparative advantage on education attainment increases the likelihood of decreasing consumption by an additional 6 percent for 1 percentage loss in financial assets. Similarly, wife's work status advantage also increases the likelihood of consumption decrease by an additional 5 percent when the household experiences financial wealth loss. Furthermore, Model 2 of Table 4 shows that, out of the households that decreased their consumption in 2008, wife's work status advantage further increases the magnitude of household savings.

Lastly, Model 3 of Table 5 presents results for an OLS regression on percentage change in consumption with explanatory variables including the natural logarithm of households' financial wealth loss from 2006 to 2008 and its interactions with variables that are proxies for inter-spousal bargaining power. The coefficients of the interaction terms indicate that wife's comparative ad-

Table 5: Gender Differential Effect of Household Financial Wealth Change on Consumption

	(1)	(2)	(3)
	Probit - Decrease in Consumption	% Decrease in Consumption	% Change in Consumption
Δ Financial Assets	-0.06139** (0.020)	0.00421 (0.009)	0.00401 (0.011)
Δ Financial Assets * Education - Wife	-0.06389** (0.022)	-0.00965 (0.014)	0.05407*** (0.020)
Education - Wife-Adv	0.10464 (0.269)	0.01127 (0.024)	0.00165 (0.031)
Δ Financial Assets * Age - Wife	-0.32909 (0.233)	-0.03069* (0.019)	0.04530 (0.043)
Age - Wife-Adv	-0.22692 (0.275)	0.00088 (0.024)	0.02133 (0.030)
Δ Financial Assets * Work - Wife	-0.15524* (0.035)	0.03196 (0.020)	0.06970*** (0.026)
Work Status - Wife-Adv	0.16350 (0.268)	0.05044** (0.023)	0.04467 (0.029)
Δ Financial Assets * Retirement - Wife	-0.13977 (0.235)	-0.02819 (0.022)	0.04419* (0.027)
Retirement Status - Wife-Adv	0.11113 (0.243)	-0.04065* (0.023)	0.02741 (0.029)
Δ Financial Assets * Income - Wife	-0.04681** (0.021)	0.01540* (0.011)	0.02926** (0.015)
Share of Income - Wife-Adv	-0.03061 (0.026)	0.02138 (0.013)	-0.00374 (0.019)
Observations	2,673	1,607	2,673

Additional controls include IHS forms of total household financial assets, total household income, and total housing assets, and geographic region. The data are from HRS Main 2006, Main 2008, and Internet 2009 Surveys. The sample is restricted to couples that cohabited at least two consecutive years in the panel data, and all spouses have no missing values for the key covariates. The dependent variable for probit regression is a binary variable that equals 1 if the percentage change in consumption is less than zero, and 0 otherwise. The dependent variable for second-stage heckman OLS regression is a continuous variable ranging from 0 (exclusive) to 100, and it indicates the amount of percentage decrease in consumption. The dependent variable for OLS regression is a continuous variable ranging from -100 to 100, and positive values indicate increase in consumption while as negative values indicate a decrease in consumption. The table presents estimated coefficients with robust standard errors in parentheses. Observations are weighted by the appropriate sampling weight provided by the HRS 2008 data, and income and wealth values are adjusted to inflation with the base year as 2015 using price index values provided by BEA. Statistically significant coefficient estimates are indicated by a single asterisk ($p < 0.10$), double asterisk ($p < 0.05$), or triple asterisk ($p < 0.01$).

vantage in education, work status, and retirement status have statistically significant effects on the households' consumption change in response to financial wealth shocks. The coefficients indicate that higher female bargaining power contributes to higher elasticity of savings in response to housing wealth shocks, and households tend to save more in response to the decrease in financial assets from the wealth shock.

Alternatively, I run separate set of regressions by using wife's share of total household income as a proxy for bargaining power. As seen on Table 5 Model 1, such alternative specification also supports the previous results in that if the wife contributes more to the total household income, the household is more likely to decrease consumption in response to the shock on financial assets. Further, Model 2 shows that wife's share of income also plays a statistically significant role in increasing the amount of savings. Lastly, Model 3 indicates that household's elasticity of consumption also increases as the wife's bargaining power is higher. All these results are consistent with the results obtained from "comparative advantage" variables.

6.5 Household Consumption in Response to Wealth Shock: Housing Wealth

Table 6 shows the results of the similar regressions, but on the changes in housing wealth instead of the financial assets. Table 6 Model 1 shows that 1 percent decrease in housing wealth increases the likelihood of consumption decrease by 8 percent, which indicates that housing wealth loss had a bigger impact on household savings than financial wealth loss. Furthermore, the probit regression results show that a wife's work status advantage further increases the likelihood of decrease in consumption by an additional 12 percent in response to a percent decrease in housing wealth. Additionally, Table 6 Model 2 shows that out of households that decreased their consumption in

2008, a wife's education advantage further increases the magnitude of the household savings by 0.3 percent, in response to a percent decrease in housing wealth.

Lastly, Table 6 Model 3 shows an OLS regression on percentage change in consumption with explanatory variables including the natural logarithm of households' housing wealth loss and its interactions with variables that are proxies for inter-spousal bargaining power. The results indicate that wife's work status advantage and retirement status advantage have significant effects on the household's response to the housing wealth shock, and the positive coefficients indicate that higher female bargaining power contributes to a higher elasticity of saving in response to housing wealth shock, and thus households tend to decrease consumption even more in response to the decrease in its housing wealth.

Alternatively, the results from regressions using the wife's share of total household income as a proxy for bargaining power also support the previous results. Model 1 of Table 6 indicates that although wife's bargaining power has no incremental effect on the likelihood of increasing savings from the housing wealth loss, households with higher-earning wives have 5% higher likelihood of increasing consumption in response to the recession. Further, Model 2 shows that out of households that do save more, wife's share of income increases the amount of savings. Lastly, Model 3 indicates that household's elasticity of consumption also increases as the wife contributes more to the household income. All these results are consistent with the results obtained from alternative specifications using the "comparative advantage" variables.

Table 6: Gender Differential Effect of Household Housing Wealth Change on Consumption

	(1)	(2)	(3)
	Probit - Decrease in Consumption	% Decrease in Consumption	% Change in Consumption
Δ Housing	-0.08549** (0.021)	-0.00453 (0.014)	0.00896 (0.018)
Δ Housing * Education - Wife	0.11810 (0.387)	-0.00326** (0.001)	0.00182 (0.043)
Education - Wife-Adv	0.10662 (0.398)	0.00677 (0.022)	0.01339 (0.020)
Δ Housing * Age - Wife	0.08952 (0.507)	-0.04729 (0.030)	0.23582*** (0.083)
Age - Wife-Adv	-0.08812 (0.467)	-0.00405 (0.023)	0.01447 (0.025)
Δ Housing * Work Status - Wife	-0.13109* (0.060)	0.00082 (0.015)	0.02524** (0.011)
Work Status - Wife-Adv	-0.12836* (0.043)	-0.04807* (0.029)	-0.05873 (0.041)
Δ Housing * Retirement - Wife	0.19226* (0.101)	-0.00836 (0.015)	0.02604* (0.015)
Retirement Status - Wife-Adv	-0.15367* (0.833)	0.06054 (0.036)	0.04433 (0.048)
Δ Housing * Income - Wife	0.02891 (0.083)	0.06546** (0.035)	0.03843** (0.021)
Share of Income - Wife Adv	0.05035** (0.029)	0.02388 (0.018)	0.01416 (0.022)
Observations	2,673	1,607	2,673

Additional controls include IHS forms of total household financial assets, total household income, and total housing assets, and geographic region. The data are from HRS Main 2006, Main 2008, and Internet 2009 Surveys. The sample is restricted to couples that cohabited at least two consecutive years in the panel data, and all spouses have no missing values for the key covariates. The dependent variable for probit regression is a binary variable that equals 1 if the percentage change in consumption is less than zero, and 0 otherwise. The dependent variable for second-stage heckman OLS regression is a continuous variable ranging from 0 (exclusive) to 100, and it indicates the amount of percentage decrease in consumption. The dependent variable for OLS regression is a continuous variable ranging from -100 to 100, and positive values indicate increase in consumption while as negative values indicate a decrease in consumption. The table presents estimated coefficients with robust standard errors in parentheses. Observations are weighted by the appropriate sampling weight provided by the HRS 2008 data, and income and wealth values are adjusted to inflation with the base year as 2015 using price index values provided by BEA. Statistically significant coefficient estimates are indicated by a single asterisk ($p < 0.10$), double asterisk ($p < 0.05$), or triple asterisk ($p < 0.01$).

7 Discussion

In this paper, I examine the effects of the recent crises in the US housing and stock markets on household spending, using recently available HRS data for the population aged 50 and above. Particularly, I examine the impact of the inter-spousal bargaining power on the household level financial decisions. I find that housing and financial wealth losses have a substantial negative effect on household consumption. More importantly, using relative spousal characteristic variables that are proxies for inter-spousal bargaining power, I demonstrate that inter-spousal bargaining power contribute to differential consumption responses to the wealth shocks, and that higher female bargaining power does indeed influence household-level decisions to be more aligned with female individual consumption preference. This is consistent with the literature related to gender differences in consumption and savings behavior that women have higher propensity to save, and these results also support the non-unitary bargaining models of household decisions in that inter-spousal relative characteristics do matter when it comes to household decisions.

There are several limitations to this research. First, there could be some bias from measurement error induced by the nature of the survey questionnaire and responses. Most importantly, as mentioned in the data section, the key dependent variable of this study—percentage change in consumption—is obtained via two-step survey questions: The survey first asks the respondents if they have changed their consumption at all during the year of 2008, and conditional on their response, they were asked to report the percentage of change. Thus, it is reasonable to assume that respondents whose consumption change is close to zero may report that there were no change, instead of reporting the exact value of the change, even if it's small and close to zero. Thus, this may influence the distribution of the responses to be clustered at the higher percentage values at

both ends, with a big drop of responses near zero.⁸ However, this measurement error is only likely to underestimate the coefficients analyzing the effect of wealth shock on consumption, since the results would not fully reveal the effect of shock on smaller consumption changes.

Second, as mentioned earlier, the results from this study cannot be generalized to the entire U.S. population, as it specifically examines the sample with age over 50. It is reasonable to assume that consumption and saving preferences of younger population are different, and the conceptual underpinnings of this study may not be as applicable. For example, the gender differences in saving preferences may not be as apparent for younger population. There are several studies that examine the cause of gender difference in risk aversion and savings preferences, and Schubert et al. (1999) demonstrate that one of the reasons could be due to the fact that women tend to be less financially literate. However, it is reasonable to assume that as more women become involved in the labor force, their financial literacy, saving options, and thus saving preferences may become more similar to that of men. Moreover, this sample is also not representative of the population because HRS has a very high representation of white population.⁹ This is also due to the fact that the sample only includes individuals of age 50 and older. Thus, due to these reasons, this research should be further pursued with more data.

Overall, this study provides an insight to important topic regarding household consumption and savings. In the past, most families were single-earning households (usually husband as the single earner), so household-level financial decisions and savings patterns tended to be more homogeneous, as male spouses usually had control over the household resources. However, as the number of dual-earner couples increase, it is important to recognize that households' financial decisions

⁸A histogram of the distribution of the responses supports this hypothesis, and it is available upon request.

⁹For both men and women, sample is about 90% white.

and savings patterns may now be more influenced by different household gender dynamics, and understand how gender might play into household-level decisions. While there are a vast number of research done on the topic of household consumption and savings, less attention is given to how gender might play into it. However, the results from this paper testify that it is crucial to consider intra-household gender dynamics as a highly influential factor when examining and analyzing household's consumption patterns and responses to macroeconomic changes.

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