Family Finances: Intra-Household Bargaining, Spending, and Financial Structure

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Abstract

This paper aims to test recent influential theories proposing that differences in preferences of household members lead to agency problems reflected in overspending, indebtedness, and financial fee expenses at the household level. To do so, we use comprehensive transaction-level data from individuals within households. Observing individuals within households gives us a unique opportunity to empirically examine how individual revealed preferences over discretionary spending and individual patience affect spending and indebtedness at the household level. To deal with endogeneity, we use a fixed effects and instrumental variable approach, which helps us tackle both self-selection and common-shocks issues. We document that the share of household income received by the spender or impatient spouse causally increases discretionary or total spending at the household level, controlling for total household income. Moreover, we find that larger differences in household member patience increase debt and fee expenses at the household level. Our results are consistent with individuals having different preferences over spending and using expensive debt, which results in overspending and indebtedness at the household level.

JEL classifications: D14, D3, G02

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1 Introduction

This paper analyzes the relationship between the intra-household distribution of income, household spending, and financial structure with new data covering a large number of Icelandic households from 2011 to 2016. Because all accounts in Iceland are personal rather than joint, we accurately observe individual spending and debt holdings of all household members in ways that were previously not possible. Analyzing income, spending, and financial structure interactions is difficult because changes in income are often endogenous, as individuals may adjust labor market participation at both the extensive and intensive margins in response to anticipated events or changes in taste. To address this endogeneity, we employ a panel fixed effects strategy as well as an instrumental variables approach. This allows us to isolate the causal impact of the intra-household income distribution and thereby bargaining power on household spending and financial structure.

We aim to test recent influential theories asserting that household overconsumption problems arise from agency problems within the household resulting from different preferences over spending and saving, i.e., Hertzberg (2013), Hertzberg (2010), Bertaut et al. (2009), and Browning (2000). For instance, Hertzberg (2013) shows that differences in the exponential discount factors among household members translate into overconsumption and undersaving at the household level. We formally show that if bargaining power were determined by income in this model, then an increase in income of the impatient household member raises overall spending as well as his or her spending share, controlling for total income. Additionally, we extend this model to formally show that an increase in the bargaining power of the spender, the household member deriving more utility from discretionary spending, increases discretionary spending at the household level.

Earnings is commonly seen as a good proxy for the decision power of spouses and is used in a range of studies.[1] However, earnings of individuals within households is endogenous to the characteristics of the individuals and couple under consideration. We can

[1] Refer to Aizer (2010) for instance.

address all time-invariant characteristics by controlling for individual fixed effects in all our specifications. Nevertheless, we are concerned about time-varying characteristics and therefore employ an instrumental variable strategy. We use exogenous income categories, such as lotteries and tax refunds, to instrument for changes in the intra-household income distribution.

We are in a unique position to classify spouses into spenders and savers as well as measuring their patience at the individual level. Therefore, we do not rely on proxies for such preferences, for example, gender. After labeling spouses, we first test whether the share of income received by the spender or less patient spouse causally increases discretionary spending or total spending, controlling for total income. In turn, we test whether larger differences in a proxy for impatience, the individual marginal propensities to consume (MPC) out of income payments estimated using standard techniques, leads to increases in debt and fee expenses at the household level, capturing household inefficiencies.

We find that a one standard deviation shift in the income share received by the spender, the spouse who spends more on discretionary categories over the entire sample period, increases household discretionary expenses by approximately 10 percent on a monthly basis. A one standard deviation shift in the income share received by the less patient spouse increases household expenses by approximately 50 percent on a monthly basis. Additionally, we link a measure of household inefficiency, total fee expenses, to the differences in individual MPCs, and find that a one-standard-deviation larger difference in MPCs increases household fee expenses by approximately 10 percent.

We follow Gelman et al. (2014), Baker (2014), Kuchler (2015), and Kueng (2015) in using data from a financial aggregation and service application (app), which overcomes the accuracy, scope, and frequency limitations of the existing data sources of consumption and income. Gelman et al. (2014) were the first to advance the measurement of income and spending with this high-frequency app data, which is derived from the actual transactions and account balances of individuals. In contrast to US data, the data from Iceland is particularly well-suited for the questions we are trying to answer for five reasons. (1) We

observe spousal linkages; (2) all accounts are personal; (3) the data is basically free of the one remaining shortcoming of app data–the absence of cash transactions (in Iceland, consumers almost exclusively use electronic means of payment); (4) the app is marketed through banks and supplied for their customers (thus covering a fairly representative sample of the population); and (5) the income and spending data is pre-categorized (and the categorization is very thorough and accurate). Thus, we know exactly when and how much each member of a household spends and receives income and our data is exceptionally thorough with respect to capturing all spending, even compared with data sets of the same type.

Our paper is most closely related to a recent literature that links household portfolio choice to within-household bargaining power, for instance Olafsson and Thornqvist (2015); Addoum (2016); Addoum et al. (2016); Neelakantan et al. (2013); Friedberg and Webb (2006). This literature posits that increases in wifes' bargaining power reduces risky stock holdings because women are typically more risk averse than men, as shown in a range of studies (see, e.g., Byrnes et al., 1999; Croson and Gneezy, 2009, for a meta analysis and literature survey). For instance, Olafsson and Thornqvist (2015) document that increases in the share of income received by the female spouse causes decreases in household equity market participation and the riskiness of household portfolios including idiosyncratic risk. There also exists empirical evidence that marriage affects the financial decisions of heterosexual individuals as opposed to marital transitions of homosexual individuals (Christiansen et al., 2015). Such evidence suggests that gender differences in preferences within couples are driven by gender rather than by other considerations, such as assortative mating. In terms of spending, the evidence is much more limited. Lundberg et al. (2003) finds that the drop in consumption at male retirement is absent for single households and thus a product of an increase in female bargaining power when the male spouse retires. Moreover, Majlesi (2016) documents effects of female bargaining power on who makes decisions in households regarding spending, labor supply, and transfers.

Other existing empirical evidence strongly questions the idea that households make decisions as a unit (Schultz, 1990; Thomas, 1990; Hoddinott and Haddad, 1995; Lundberg et al., 1997; Browning and Chiappori, 1998) in favor of collective models of household decision making as introduced by Chiappori (1988), Chiappori (1992), and Cherchye et al. (2012). Collective models of household bargaining differ in how they characterize bargaining power in a marriage adhering to either the threat of divorce as in Manser and Brown (1980) and McElroy and Horney (1981) or the threat of separate spheres as in Lundberg and Pollak (1993). The separate spheres theory hypothesizes that non-cooperative marriage is a more plausible threat to ordinary household matters than divorce. Spouses' expected utilities in the case of non-cooperation or divorce then determines their bargaining positions. In these models, households maximize a weighted sum of all members' utilities subject to a pooled budget constraint, in which the weighting depends upon the decision power of each member. A large follow-up literature then showed that each member's decision power is influenced by considerations such as income, age, local gender ratios, targeted transfers, abortion legality, alimony, child benefits, availability of birth control, and divorce laws (Browning et al., 1994; Lundberg et al., 1997; Chiappori et al., 2002; Angrist, 2002; Chiappori and Oreffice, 2008; Attanasio and Lechene, 2014). Such distribution factors affect household decision making, if household members have different preferences, as suggested by a range of studies surveyed in Croson and Gneezy (2009) among others. While there exists comprehensive evidence on differences in risk attitudes between men and women, the picture with respect to other preferences, for instance, discount factors or attitudes towards debt, is much less clear. Therefore, we chose to not rely on gender in this study but infer preferences directly.

The remainder of the paper is organized as follows: Section 2 describes the data used in the empirical analysis. Section 3 outlines the theoretical framework. Section 4 presents empirical results and Section 5 concludes.

2 Data and summary statistics

2.1 Data

In this paper, we exploit new data from Iceland generated by Meniga, a financial aggregation software provider to European banks and financial institutions.[2] Meniga's account aggregation platform allows bank customers to manage all their bank accounts and credit cards across multiple banks in one place by aggregating data from various sources (internal and external). Meniga's financial feed reflects consumers' financial lives in familiar social media style. Categorized transactions are mixed in with automated and custom advice, notifications, messages, merchant funded offers, and various insights and interpretations of the users' finances.

Because Meniga's service is marketed through banks, the sample of Icelandic users is fairly representative. Each day, the application automatically records all the bank and credit card transactions, including descriptions as well as balances, overdraft, and credit limits. Figure 1 displays screenshots of the app's user interface. The first screenshot shows background characteristics that the user provides, the second one shows transactions, and the third one bank account information. Additionally, we display a description of the linking feature. Meniga was early and widely adopted in Iceland partly because of its spousal linking technology and the fact that all accounts in Iceland are personal.

We use the entire de-identified population of active users in Iceland and the data derived from their records from 2011 until 2016. We perform the analysis on aggregated user-level data for different income and spending categories. Additionally, the app collects demographic information such as age, gender, marital status, and postal code. Presumably, the user population is not perfectly representative of the Icelandic population, but it is a substantial, heterogeneous fraction that includes large numbers of users of different ages, education levels, and geographic locations.

[2]Meniga was founded in 2009 and is the European market leader of white-label Personal Finance Management (PFM) and next-generation online banking solutions, reaching over 25 million mobile banking users across 16 countries.

Income data: When the data is extracted from the PFM system it has already been categorized by a three tiered approach: system rules as well as user- and community-rules. The system rules are applied in instances where codes from the transactions systems clearly indicate the type of transaction being categorized. For example, when transactions in the Icelandic banking system contain the value "04" in a field named "Text key" the payer has indicated payment of salary. User rules apply if no system rules are in place and when a user repeatedly categorizes transactions with certain text or code attributes to a specific category. In those instances the system will automatically create a rule which is applied to all further such transactions. If neither system rules nor user rules apply, the system can sometimes detect identical categorization rules from multiple users which allows for the generation of a community rule. Multiple additional steps were taken to further categorize transactions based on banking system codes, transaction texts, amounts, and payer profiles. The categorization is very high quality as Iceland is not a particularly large or heterogeneous country. It is also important to note that the PFM system has already detected 1st party transactions such as between two accounts that belong to the same household. These transactions are not included in the sample data.

Payers identity as well as NACE category (The Statistical Classification of Economic Activities in the European Community)[3] are added to each income transfer whenever possible.[4] The system categorizes the income as described above into 23 different income categories. Regular income categories are: child support, benefits, child benefits, dividends, parental leave benefits, pensions, housing benefits, rental benefits, rental income, salary, student loans, and unemployment benefits. Irregular income categories are: grant, other income, insurance payments, investment transactions, loan write-offs, reimbursements, tax refunds, travel allowances, and lottery winnings. Total household income is

[3]This is is the industry standard classification system used in the European Union.

[4]Payers identity can sometimes be hard or impossible to identify because of limited information in transaction data such as generic transaction texts. In specific cases where identifying the payer was not possible, a proxy ID was created to enable the binding of payments from single sources even though the true source ID is not known. In some cases, no attempts could be made to bind transactions by origin via a proxy ID. Some payments without actual payer identity may have a proxy ID but never a NACE category as the real ID of the payer was not known.

defined as the sum of regular and irregular income of spouses.

Spending data: Spending is categorized into 10 categories and aggregated to generate a monthly panel. The spending categories are groceries, fuel, alcohol (we can observe expenditures on alcohol that is not bought at bars and restaurants because a state-owned company, State Alcohol and Tobacco Company, has a monopoly on the sale of alcoholic beverages in Iceland), ready made food, home improvement, transportation, clothing and accessories, sports and activities, gaming, theater tickets, and pharmacies. We consider households comprised of people who are observable either as single individuals or as members of collective households. Each consumption category is then aggregated to the household level. The panel thus provides household level spending information for disaggregated expenditure categories. Expenditure shares are the portions of total expenditures (as percentages) allotted to distinct aforementioned expenditure categories. This means that we can observe the budget shares for individuals living singly, and the budget shares for individuals living with a spouse, and hence the total budget shares for the household. This aspect of our data allows us to link the distribution of income within household with household expenditure shares.

Financial fees and debt expenses: We are interested in debt expenses by households as a measure for potential inefficiencies at the household level. An incomplete proxy for financial mistakes could be the payment of various fees in that fee payments may be avoided by small and relatively costless changes in behavior. We focus on three types of fees to capture the degree of financial mistakes made by households: late payment interest, non-sufficient funds fees, and late fees. Additionally, we observe interest expenses.

1 **Late-payment interest:** Credit card companies charge late-payment interest daily from the date a payment is due and payable to the date it is paid in full.

2 **Non-sufficient funds fees:** When there are insufficient funds or the overdraft limit is exceeded in consumer's current account in the event of attempted debit

card transactions, the bank charges their account with fees.

3 **Late fees:** Fees assessed for paying bills after their due date.

4 **Interest:** An overdraft occurs when withdrawals from a current account exceed the available balance. This means that the balance is negative and hence that the bank is providing credit to the account holder and interest is charged at the agreed rate. Virtually all current accounts in Iceland offer a pre-agreed overdraft facility, the size of which is based upon affordability and credit history. This overdraft facility can be used at any time without consulting the bank and can be maintained indefinitely (subject to ad hoc reviews). Although an overdraft facility may be authorized, technically the money is repayable on demand by the bank. In reality this is a rare occurrence as the overdrafts are profitable for the bank and expensive for the customer. We may consider overdraft interest as a type of mistake as the vast majority of individuals hold overdraft debt and savings at the same time.

2.2 Summary statistics

Table 1 displays summary statistics of the Icelandic users including not only income and spending in US dollars but also some demographic statistics. We can see that the average user is 41 years old, 49 percent of users are female, and 8 percent are unemployed. For comparison, Statistics Iceland reports the average age in the population to be 37 years, 49 percent being female, and 6 percent being unemployed. Thus, our demographic statistics are remarkably similar to the overall Icelandic population. This is reassuring, as it may be a concern with app data that the user population is more likely to be young, well-situated, male, and tech-savvy relative to the overall population. The representative national household expenditure survey conducted by Statistics Iceland also reports income and spending statistics. In the table, parentheses indicate when spending categories did not match perfectly with the data. We can see that the income and spending figures are remarkably similar for those categories that match well. In turn, Tables 2 and 3 dis-

play summary statistics for single and married men and women. These include monthly expenditures, budget shares, bank account and borrowing information, and income.

3 Theoretical framework

We consider a somewhat modified version of the model in Hertzberg (2013) or Hertzberg (2010). More specifically, we allow for hyperbolic discounting including naivety as Laibson et al. (2015) and Kuchler (2015) convincingly argue in favor of these preference deviations from full rationality to explain the extent of household debt holdings found empirically. Additionally, to accomodate the spender-saver paradigm put forward in Bertaut et al. (2009), we allow for the presence of a discretionary consumption good over which the household members may have different preferences. These features align the model with our empirical tests.

Each household consists of two members A and B living for $t = \{1, 2, ..., T\}$ periods. The objective function of each member i at t is

$$V_{i,t} = \gamma_i U_{i,t} + (1 - \gamma_i) U_{j,t} \tag{1}$$

$$\text{with } U_{i,t} = ln(C_{i,t}) + d_i ln(D_t) + \beta_i \sum_{x=1}^{T-t} \delta_i^x (ln(C_{i,t+x}) + d_i ln(D_{t+x})) \tag{2}$$

as he or she places a weight $\gamma_i \in (0, 1)$ on own utility, assuming that $\gamma_i > \frac{1}{2}$, i.e., household members care more about their own utility. Both household members derive utility from private consumption $C_{i,t}$ and public consumption that we consider to be discretionary spending D_t. Household members may experience different levels of utility over discretionary spending measured by the parameter d_i. Moreover, they discount future utility quasi-hyperbolically as determined by $\beta_i \delta_i$ but believe their future behavior is characterized by $\beta_i = 1$, i.e., household members are naive. The household's budget constraint is given by $W_{t+1} = W_t - C_{A,t} - C_{B,t} - D_t$ assuming interest rates are zero. The household's wealth W_t is given by the entire discounted current and future income

of both household members $\sum_{x=0}^{T-t}(Y_{A,t+x} + Y_{B,t+x})$ as we abstract from all uncertainty. Relative income determines $\eta_t \in [0,1]$, the bargaining power of member A in period t. The objective which household bargaining maximizes in any period is

$$\eta_t V_{A,t} + (1-\eta_t)V_{B,t}. \tag{3}$$

This household objective function can be seen as a cooperative bargaining outcome with η_t being determined by the relative income of household member A which determines his control over ressources. Consider the following simplified static game assuming $\gamma_i = 1$, i.e., household members are fully selfish. Household member A can refuse cooperation and consume his income $Y_A = \sum_{x=0}^{T-t}(\frac{1}{R})^x Y_{A,t}$. Alternatively, he can cooperate. To cooperate would be a best response if and only if his consumption utility is at least Y_A. If the household allocates total income $Y_A + Y_B$ then member A will cooperate if and only if his utility receives a weight $\frac{Y_A}{Y_A+Y_B} = \eta$. The same holds true for member B such that a pareto weight of η is determined by the Nash equilibrium of this game. As we do not model the income streams, we take η_t as given noting that and $\frac{\partial \eta_t}{\partial Y_{A,t}} > 0$. Combining Equations 1, 2, and 3 yields the following household objective function

$$\Pi_t = (1-\theta_t)(ln(C_{A,t}) + d_A ln(D_t) + \beta_A \sum_{x=1}^{T-t} \delta_A^x (ln(C_{A,t+x}) + d_A ln(D_{t+x})))$$

$$+\theta_t (ln(C_{B,t}) + d_B ln(D_t) + \beta_B \sum_{x=1}^{T-t} \delta_B^x (ln(C_{B,t+x}) + d_B ln(D_{t+x})))$$

with $\theta_t = \gamma_B + \eta_t(1-\gamma_A-\gamma_B)$. We guess-and-verify that $U_{i,t} = (1 + d_i + \beta_i \sum_{x=1}^{T-t} \delta_i^x (1 + d_i))ln(W_t) + g_{i,t}$ with $g_{i,t}$ a constant independent of W_t in which case the maximization problem in any period t is

$$max\{(1-\theta_t)(ln(C_{A,t}) + d_A ln(D_t)) + \theta_t (ln(C_{B,t}) + d_B ln(D_t))$$

$$+[(1-\theta_t)\beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \theta_t \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B)] ln(W_t - C_{A,t} - C_{B,t} - D_t)\}.$$

The first-order conditions for $C_{A,t}$, $C_{B,t}$, and D_t determine the optimal consumption function

$$C_{A,t}+C_{B,t}+D_t = \frac{1+(1-\theta_t)d_A+\theta_t d_B}{(1+(1-\theta_t)d_A+\theta_t d_B)+(1-\theta_t)\beta_A \sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)} W_t.$$

Total household spending is subject to an inefficiency as it differs from the spending the household would like to commit to. At $t=1$, the household solves

$$max\{(1-\theta_1)\sum_{t=1}^{T}\delta_A^{t-1}(ln(C_{A,t})+d_A ln(D_t)) + \theta_1 \sum_{t=1}^{T}\delta_B^{t-1}(ln(C_{B,t})+d_B ln(D_t))\}$$

subject to $W_1 - \sum_{t=1}^{T}(C_{A,t}+C_{B,t}+D_t)=0$. As above, we guess-and-verify the optimal consumption function to be $C_{i,t} = W_1 \psi_{i,t}$ with $\psi_{i,t}$ a constant independent of W_1. In turn, the first-order conditions for period $t=1$ together with $W_t = W_1 - \sum_{x=1}^{t-1}(C_{A,x}+C_{B,x}+D_x)$ determine optimal consumption

$$C_{A,t}^* + C_{B,t}^* + D_t^*$$

$$= \frac{(1-\theta_1)\delta_A^{t-1}(1+d_A)+\theta_1\delta_B^{t-1}(1+d_B)}{(1-\theta_1)\delta_A^{t-1}(1+d_A)+\theta_1\delta_B^{t-1}(1+d_B)+\delta_A^{t-1}(1-\theta_1)\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\delta_B^{t-1}\theta_1\sum_{x=1}^{T-t}\delta_B^x(1+d_B))} W_t.$$

The analog to the main theoretical proposition in Hertzberg (2013) holds in this model. Whenever individual discount factors differ, the household faces an overconsumption problem.

Proposition 1. *The total spending the household would like to commit to is lower than actual total spending, i.e., given some W_t, $C_{A,t}^* + C_{B,t}^* + D_t^* < C_{A,t} + C_{B,t} + D_t$, even if $\beta_A = \beta_B = 1$ so long as $\delta_A \neq \delta_B$. Moreover, the overconsumption problem is increasing in the absolute difference in the exponential discount factors.*

The proof of this and the following propositions as well as more details on the model

solution can be found in the Appendix. Additionally, if the spender of the family receives more income and therefore bargaining power the total household spending on discretionary goods increases.

Proposition 2. *Suppose* $\beta_A \sum_{x=1}^{T-t} \delta_A^x = \beta_B \sum_{x=1}^{T-t} \delta_B^x$ *and* $d_A > d_B$*, if the bargaining power of the household spender, member A, increases then the consumption of the discretionary good increases.*

Finally, if the less patient member of the family receives more income and therefore bargaining power, total spending as well as his or her share of spending increases.

Proposition 3. *Suppose* $d_A = d_B$*, if the bargaining power of the less patient household member increases then total household consumption.*

The last two propositions inform our first two empirical tests: when the spender of the family, who enjoys more discretionary spending, receives relatively more income, discretionary spending at the household level increases. Moreover, when the impatient household member's bargaining power increases then total spending increases. We can use the model to validate our empirical strategy. More specifically, we can set $d_A > d_B$, i.e., the spender, household member A, derives more utility from discretionary spending, and then simulate 6 years of monthly consumption and income data. In turn, we estimate the following ordinary least squares (OLS) regression

$$\bar{D}_t = \alpha + \beta \frac{Y_{A,t}}{Y_t} + \gamma \bar{Y}_t + \epsilon_t$$

with $\bar{D}_t = \frac{D_t}{mean(D_t)}$ and $\bar{Y}_t = \frac{Y_t}{mean(Y_t)}$. The following table displays the average regression results for 2000 households being observed 72 months each. We first simulate income data $Y_{i,t} \sim logN(\mu, \sigma^2)$ using parameters $\mu = 0$ and $\sigma = \frac{0.2}{\sqrt{12}}$ perfectly in line with the consumption literature, i.e., Carroll (1997) for instance. In turn, we assume the income stream is certain and calculate life-time income as first period wealth. Then, we solve for the optimal consumption path assuming that $d_A = 0.2$, $d_B = 0.1$, $\beta_A =$

$\beta_B = 1$, and $\delta_A = \delta_B = 0.98^{\frac{1}{12}}$ again in line with the existing literature. We focus on differences in preferences for discretionary spending here and abstract from any household overconsumption as $\beta_A = \beta_B = 1$ and $\delta_A = \delta_B$. In turn, we obtain the following coefficient estimates and t-statistics:

	α	β	γ
estimate	0.71	0.58	0.0
t-statistic	5.04	2.89	0.0

We can see that the coefficient on the spender's consumption share is positive and significant. The coefficient on the deviation of income is zero because there is no uncertainty about the income payments and the household is thus able to smooth consumption perfectly.

Finally, our last empirical test is directly about Proposition 1. After estimating individual discount factors via the marginal propensity to consume, we ask whether larger differences in discount factors lead to larger debt holdings and fee payments at the household level capturing inefficiencies caused by the agency problems within the household.

4 Empirical evidence

4.1 Instrumental-variable fixed-effects approach

In general, it is difficult to identify the causal effect of the distribution of income within households on household decision making due to selection. For instance, households in which wives earn a larger share of the household total income are different from households in which wives earn a smaller share. To deal with this, we integrate two approaches in the estimation strategy. The first is the use of household fixed effects, thereby comparing monthly expenditure shares of the same households, while the household members experience changes in the intra-household distribution of income. However, household

fixed effects may be inadequate if the intra-household distribution of income is correlated with time-varying characteristics of the household. Therefore, the estimation strategy also includes an instrumental variable approach to ascertain that the relationship between the spousal shares in household income and overall expenditures is not driven by time-varying unobservable household preferences.

For instance, one potential measurement issue with looking at changes in household income composition is that households may adjust current spending in anticipation of future changes in household income that are unobserved by the researcher. To ameliorate the potential endogeneity of the intra-household distribution of income and establish a causal relationship between the distribution of income within households and household expenditure decisions, we require exogenous variation in income as an instrument. Thus, we use income shocks originating from unexpected and exogenous income categories to instrument for changes in the intra-household income distribution. More specifically, we use lottery payments, debt write-off payments, insurance payments, and tax refunds. These shocks have sizable impacts on the intra-household income distribution. In addition, the exclusion restriction holds and shocks to the intra-household distribution of income impact household spending solely in ways that are captured by the intra-household distribution of household income, controlling for total household income. Individuals are unable to influence the timing of the exogenous payments and their size and arrival is independent of time-varying characteristics of the household under consideration.

Aizer (2010) emphasizes two desirable features of instruments for income and bargaining power: First, relative income and labor market conditions for spouses, not actual absolute income, matter in formal analysis. Second, it is the potential income that determines one's outside option. While our instrument adheres to the first feature it does not put emphasis on outside options. In that sense, our instrument is more consistent with the threat of separate spheres as in Lundberg and Pollak (1993). As mentioned, the separate spheres theory hypothesizes that non-cooperative marriage is a more plausible threat to ordinary household matters than divorce. In turn, spouses' actual income or

control over resources determines their bargaining positions.

Our identification approach relies on the exogeneity of the income categories of the instrument, which merits further discussion. The arrival time and size of these payments should be independent of time-varying underlying spousal characteristics that might be correlated with decisions made within households and would thereby bias the results. These payments may be expected or predictable without threatening our identification approach. An immediate spending response to expected payments could be due to liquidity constraints. However, we can rule out liquidity constraints directly as we observe balances and limits of households. In general, less than 3 percent of individuals have less than one day of spending left in cash or liquidity right before their paychecks.

We discuss each income category used for the instrument separately starting with lottery payments. Lottery payments are clearly exogenous with respect to their arrival. They are not expected but perfectly transitory and should thus not cause a spending response. Moreover, our fixed-effects approach controls for any observable or unobservable time-invariant individual characteristics that may drive a preference for playing the lottery. Thus, the only concern is that individuals play the lottery more often when they plan to change their spending. However, the vast majority of individuals in Iceland have subscriptions to lotteries rather than buying them individually. These lottery subscriptions are used to fund non-profit agencies, such as the shelter-rescue agency. Alternatively, individuals can buy regular lotto tickets in kiosks, grocery stores, and gas stations; there also exist ticket automats. Thus, playing the lottery on a regular basis is very common in Iceland and we think that individuals do not use lottery ticket purchases as means to increase their income and affect their bargaining power given the small chances of winning. In the entire sample, we observe 44,064 months in which tax refunds arrive and the average value is $121.

We also look at debt write-off payments originating from a car loan court case. Some time after the financial crisis, the Icelandic court ruled that car loans paid out and collected in Icelandic krona but indexed to foreign currencies violated laws designed to

protect borrowers from exchange rate risks. More than 10 percent of Icelandic households had car loans linked to foreign currencies–legacy of the credit-fueled boom years when borrowers took advantage of lower interest rates on foreign-denominated loans while Icelandic rates were soaring. Iceland's 2008 financial crisis was exacerbated by banks that borrowed in Japanese yen or Swiss francs to take advantage of lower interest rates, and then repackaged the loans in krona before passing them on to clients. Exchange rate indexation of loans means that the total amount owed in Icelandic krona varied according to its exchange rate against the currencies in which the loan was issued. Such loans were aggressively promoted by the Icelandic banks in previous years and left many diligent car and home owners with bigger debts than the original amount–despite paying their bills every month. In 2010, the Reykjavik District Court ruled that such loans are illegal–a ruling which directly contradicts a ruling in the same court in December. According to the legal precedent, courts ordered that exchange-rate-indexed loans be turned into regular inflation-indexed loans denominated in Icelandic krona. This recalculation in turn resulted in debt repayments to thousands of Icelandic households and we observe a fraction of them spread over the entire year of 2013. These payments are marked with an institutional code from the banking system that represents payments related to loan amendments. These payments are plausibly exogenous to the household and individuals did not know when their loan got recalculated or when they would receive their refund. Additionally, they are partly expected but transitory and should not cause a spending response under standard assumptions. In the entire sample, we observe 1,791 months in which loan refunds arrive and the average value is $712.

In Iceland, individuals do not have any control over the size and sign of their tax refund payment. Married individuals do not file jointly but individually and thus receive their own refund. We only look at refunds because, if individuals owe repayments, they can or cannot repay them in installments which would violate the exogeneity assumption. In Iceland, taxes get subtracted from monthly income payments automatically at the source. Moreover, all taxable transactions are third-party reported to the tax authorities. For

instance, income that is derived from interest payments, dividends on shares, capital gains from sales of property and other assets and income from renting property is all subject to a tax which is also taken at the source. While the income tax is relatively simply structured, the transaction and wealth taxes are subject to various calculations about net wealth, loans, and other income. These calculations are all performed by the tax agency after individuals reviewed their records online. Because Icelandic tax authorities maintain personal registries for all citizens, the reporting and filing requirements are not comparable to the US. Individuals do not calculate their own taxes but simply go online to check their records and approve them. In turn, their exact refund gets calculated. The tax authority does not report an expected refund amount when individuals approve their records online. For these reasons, we argue that individuals cannot control whether or not they receive a refund and are also uncertain about its size. Most individuals receive their refunds in the end of July or August after the tax authority performed the calculations. Additionally, there are instances when individuals receive refunds for other reasons throughout the year. In rare cases, individuals can file for reimbursement of paid taxes when they expect a large refund but are subject to difficulties or shocks, such as sickness, disabled children, or extensive loss of property. However, such applications take a few months to process. Similarly, an application for a refund can be submitted if an exemption or a partial relief according to a Double Taxation Agreement has been accepted, but tax has been withheld. Again, the application takes a few months to process. Overall, we think that the timing and exact amount of the vast majority of refund payments is transitory, partly uncertain, and outside the control of the household. In the entire sample, we observe 85,826 months in which tax refunds arrive and the average value is \$1,017. Souleles (1999) also explains the advantages of using tax refunds to document excess sensitivity in consumption.

Furthermore, we observe insurance payments from sources such as car, home, or health insurance. Again, the month and size of an insurance payment seems, thus expected, exogenous to time-varying characteristics of the household under consideration.

We observe payments in response to auto damages or burglaries rather than health or medical incidences. Health insurance in Iceland is fully public and everyone who has been legally resident in Iceland for six months automatically becomes a member. In turn, general practitioners, specialists, or hospitals bill the insurance directly after receiving a co-payment by the individual. Auto and home insurance thoroughly cover Icelandic individuals. We thus do not assume that a prior negative wealth shock is associated with the payments we observe. And again, the vast majority of our sample holds substantial liquidity and do not need to wait for payments to arrive. In the entire sample, we observe 6,723 months in which insurance payments arrive and the average value is $1,847. The average insurance payment is large, however, only because the distribution is very skewed–the median is only $443.

We believe that these income categories are difficult to be influenced by time-varying within-household considerations and can thus serve as instruments. While lotteries and debt reliefs can be very safely assumed to be exogenous, the exogeneity assumption with respect to insurance payments is a bit less self-evident. However, we can exclude the insurance (and also tax refunds) categories without majorly affecting the results. Figure 2 shows the distribution of the payments in all categories.

The baseline instrumental variables (IV) model can be described by the following two-equation system:

$$Y_{ht} = \beta \hat{A}_{ht} + \omega X_{ht} + \eta_{ht} \tag{4}$$

$$A_{ht} = \gamma_1 Z_{h1t} + \gamma_2 Z_{h2t} + \delta X_{ht} + \epsilon_{ht} \tag{5}$$

A_{ht} is the intra-household income gap of household h at time t, Z_{h1t} and Z_{h2t} denotes the exogenous payments of spouses 1 and 2, the spender and saver, at time t, respectively. X_{ht} is a vector of control variables that includes total household income, month-and-year dummies, and individual fixed effects. Finally, Y_{ht} is the outcome variable of interest.

4.2 Labeling spouses and outcomes

Our theoretical results concern individual preferences over discretionary spending and individual discount factors of household members in line with the emerging literature showing that differences in individual preferences lead to inefficiencies at the household level, i.e., Hertzberg (2013), Hertzberg (2010), Bertaut et al. (2009), and Browning (2000). One proxy for such differences in preferences is gender. However, our data allows us to not use gender but infer preferences from individual spending more directly. In fact, a preference for discretionary spending or impatience should be better captured by spending behavior than gender. After all, many studies show that gender is a poor predictor of preferences and within-gender variation typically exceeds between-gender variation.

We start with the spender-saver paradigm captured by the preference for discretionary consumption in our model and put forward by Bertaut et al. (2009). We measure spender versus saver preferences as straightforwardly as possible: we label the spouse with the nominally higher spending on discretionary categories, such as alcohol, ready-made-food, gaming, and theater tickets as the "spender" and the other spouse as the "saver." In turn, the appropriate household outcome to analyze is discretionary spending at the household level.

Figure 3 shows the distribution of the spender's share of household income. It can be seen that the income share is not a very predictive of the spender label neither is being male or female. Thus, it appears that we pick up an individual trait that could not be examined with just the household income share, overall household spending, or gender.

At first glance, it appears concerning that we construct an explanatory variable, the income share of the spender versus saver, by looking at the composition of the dependent variable, discretionary spending. Even if spender versus saver preferences were not predetermined, this strategy is not biasing our coefficients because the composition rather then level of discretionary spending determines how we construct the explanatory variable. Moreover, we can run Monte Carlo regressions to rule out any mechanical biases. Simulating income data as described in the theoretical section, we can assume that all

income is spent on discretionary goods and then generate a random split. In turn, we can identify the spender to check whether our regression produces significant results were none should be observed. Performing this exercise for 2000 households and 72 months each, yields average regression results that do not reveal a bias for the coefficient of interest β.

	α	β	γ
estimate	-0.65	1.33	0.49
t-statistic	-0.28	0.40	0.61

Beyond the spender-saver paradigm, we want to measure impatience at the individual level to link the bargaining power of the less patient member to total household spending. To estimate individual MPCs as a proxy for impatience, we run the following discretionary Euler equation regression for each indiviudal following the methodology in Kuchler (2015)

$$C_{it} = \alpha + \beta Salary_{it} + \delta_{dow} + \phi_m + \psi_y + \epsilon_{it}$$

where C_{it} denotes the ratio of total discretionary spending by individual i to his or her average daily discretionary spending on date t and $Salary_{it}$ is a dummy indicating whether individual i received a salary check in day t. δ_{dow} is a day-of-week fixed effect, ϕ_m is a month fixed effect, and ψ_y is a year fixed effect. In turn, β_i measures the indiviudal MPC or impatience. Figure 6 displays the estimated MPCs for our population and Figure 7 displays the frequency of differences in MPCs between spouses. The majority of MPCs are positive and significant as one would expect. Additionally, men's MPCs are typically lower than women's. Nevertheless, gender does not seem to be a very good proxy for individual MPCs. We also observe some assortative mating which appears reasonable.

In the second stage, we are interested in inefficiencies at the household level, the most straightforward and appropriate measure for that are total debt expenses on financial fees.

4.3 Results

Figure 4 shows the reduced form relationships between the share of discretionary spending at the household level and the share of income received by the spender. More specifically, the figure shows discretionary spending in one month relative to average discretionary spending over the sample period as the outcome variable. It can be seen that discretionary spending is increasing in the share of income received by the spender controlling for total household income, month-and-year fixed effects, and individual fixed effects. We split the income share into 15 bins and display the binned averages together with a quadratic fit. To see the patterns in the raw data reassures that we pick up an important feature in this analysis.

Table 4 presents the OLS and IV first- and second-stage regression results. It can be seen that, if the spender share of income increases, expenditures for discretionary categories increases. Because the outcome is defined as discretionary spending in one month relative to average discretionary spending over the sample period, a coefficient around 0.3 implies that discretionary spending increases by 30 percent if the spender's income share would go from 0 to 1. Given that the standard deviation of the income share is approximately 0.3, a one standard deviation change in the income share increases household discretionary spending by approximately 10 percent on a monthly basis. These results are consistent with our earlier statistics about how revealed preferences for different spending categories are reflected in household outcomes depending on the intra-household income distribution. These preferences shine through when the decision power of the spender increases relative to the saver's decision power. It is reassuring that we can include or exclude individual income categories of the instrument, which does not affect the coefficients much. The instrument is a good predictor of our variable of interest, which can be easily seen by looking at the strong first stage: the robust F-statistics are considerably larger than the rule-of-thumb value of 10.

Additionally, instead of considering discretionary spending and differences in preferences for that, we look at the marginal propensity to consume of each spouse and overall

spending. Figure 5 shows the reduced form relationship. Again, we display the binned averages together with a quadratic fit and are reassured that we see the pattern in the raw data. Table 5 presents the OLS and IV first- and second-stage regression results. The coefficients are in line with the idea that the impatient spouse uses his or her bargaining power to allow for additional spending at the household level. The coefficients imply that the household increases its discretionary spending by approximately 50 percent given that the income share has a standard deviation of 0.3. Again, we can exclude parts of the instrument. Here, it is reassuring again that the point estimates do not change much.

Our OLS coefficients differ from our IV coefficients which tells us that individuals' responses to changes in bargaining power are heterogeneous. After all, IV estimation consistently estimates a local average treatment effect rather than the average treatment effect in the population as does OLS. Moreover, correlation is not causality which increases IV coefficients over OLS coefficients, if exogenous changes in income have a greater impact on the outcome of interest than endogenous ones. It is reassuring that our coefficients do not differ much when we include or exclude instrument categories. Weak instruments are also not a problem here. Moreover, when we exclude insurance payments we should not have problems with endogenous instruments as explained above. We only consider households for whom we observe the entire time series. Upon digging deeper and comparing the estimation sample to the overall population, we do not find any telling differences.

The inclusion and exclusion of instruments is a commonly used form to test for over-identifying restrictions and lends credibility to the IV estimates together with a reasonably large sample size and a strong first stage. Moreover, our set of instruments do not share a common vulnerability to being invalid. which would make tests of over-identifying restrictions suspect. Furthermore, given that we control for household income we do not have to worry about our instrument being not valid because it is an omitted explanator in the model. Another potential source of concern is the measurement of standard errors. As standard in panels, we use individual fixed effects and cluster at the individual level.

While the spending and income transaction-level data should be free of measurement error, we potentially measure our spender and saver labels or patience with noise and should account for that noise in a second-stage correction. Therefore, in all specifications, we use robust standard errors clustered at the individual level. This treatment of potential second-stage uncertainty appears standard in the literature.

The theories under consideration in this paper all predict that the difference in impatience, i.e., the exponential discount factor, is relevant for overconsumption problems and inefficiencies at the household level. To look at this mechanism, we first estimate the marginal propensity to consume at the individual level to then see how the difference in MPCs between spouses is related to a household outcome that may measure such inefficiencies, total expenses resulting from financial fees.

Thus, we run a regression of all financial fee expenses incurred by the households on the differences in MPCs. We control for municipality and month-by-year fixed effects, age, and income. We include month-by-year fixed effects rather than month and year fixed effects to flexibly control for spending patterns, which may be relevant for financial fee expenses but should not be included simultaneously with income as that would constitute a serious bad-controls problem. The results can be seen in Table 6. We can see that a one standard deviation increase in the MPC difference within spouses increases financial fees by around $2.39 on a monthly basis. This amounts to approximately 10 percent of average financial fee expenses as can be seen by looking at the regression's constant. Again, second-stage uncertainty can be taken into account by computing robust standard errors.

5 Conclusion

This paper obtains new evidence on how the unitary household model fails. As the key innovation, we look at individual revealed preferences to label spouses as spender versus saver and estimate patience at the individual level. We are able to label spouses based on

their revealed spending patters because we use comprehensive and high-frequency spending and income data from individuals within households and all accounts are personal in Iceland. The longitudinal nature of our data allows us to estimate fixed effects models and we can instrument for endogenous changes in income, which help us tackle both self-selection and common-shocks issues. We show that increases in the spender (impatient) spouse's income share causes increases household discretionary (total) spending, controlling for total household income. Beyond documenting that the unitary model fails, we test the predictions of influential recent models showing that the difference in impatience among household members causes inefficiencies at the household level as measured by debt and fee expenses. Our results are consistent with individuals having different preferences over spending and using expensive debt and exerting their preferences with the bargaining power that income gives them.

We analyze indebtedness at the household level resulting from a conflict between household members with different preferences. This analysis relates to a fast-growing literature about the implications of household debt overhang on spending, employment, and future indebtedness. For instance, highly indebted individuals or households are less willing to search for jobs when being unemployed because the potential job income will have to go to debt payments (Donaldson et al., 2015). In a broader sense, we can also draw an analogy to the corporate finance literature by thinking of the impatient spouse as a "debt holder" while the other spouse is an "equity holder." Under this analogy between a firm and a family, the conflict between the debt holder and equity holder is more severe when the bargaining power of the debt holder increases followed by larger debt accumulation (this could be a household equivalent of the "leverage ratchet effect" in Admati et al. (2013)). While there does not exist research about the interaction between intra-household bargaining power and household debt overhang, there has been much research about bargaining power and debt overhang in the corporate finance setting (refer to Alanis et al., 2014, for a recent example).

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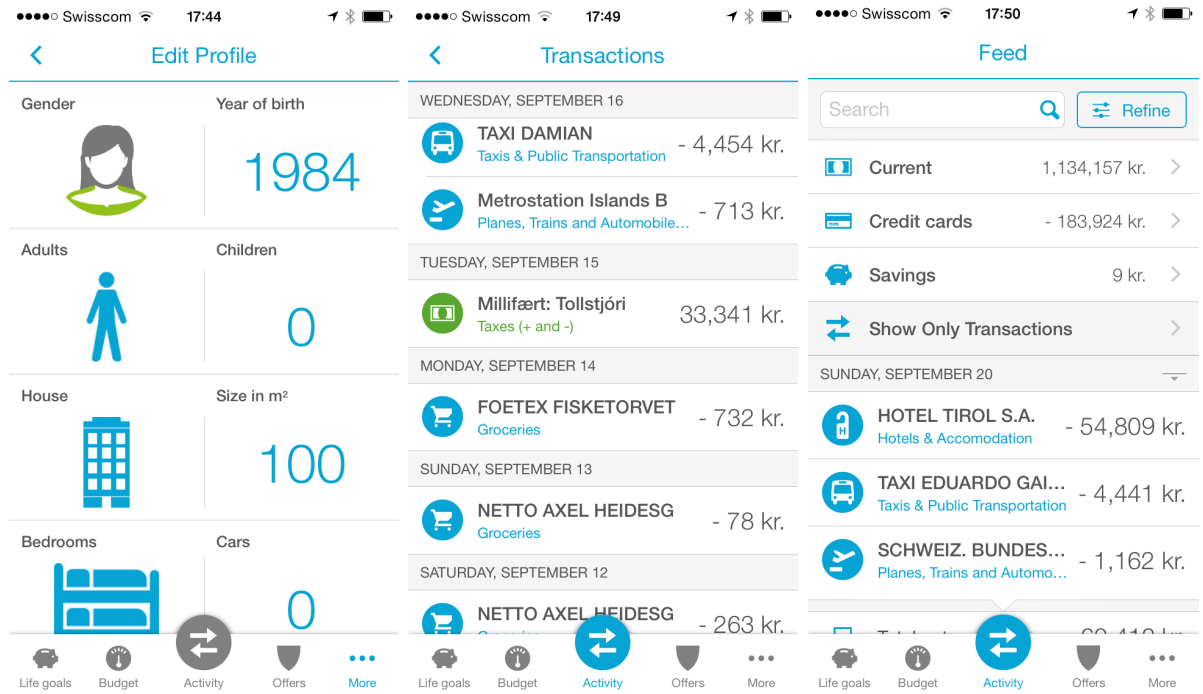


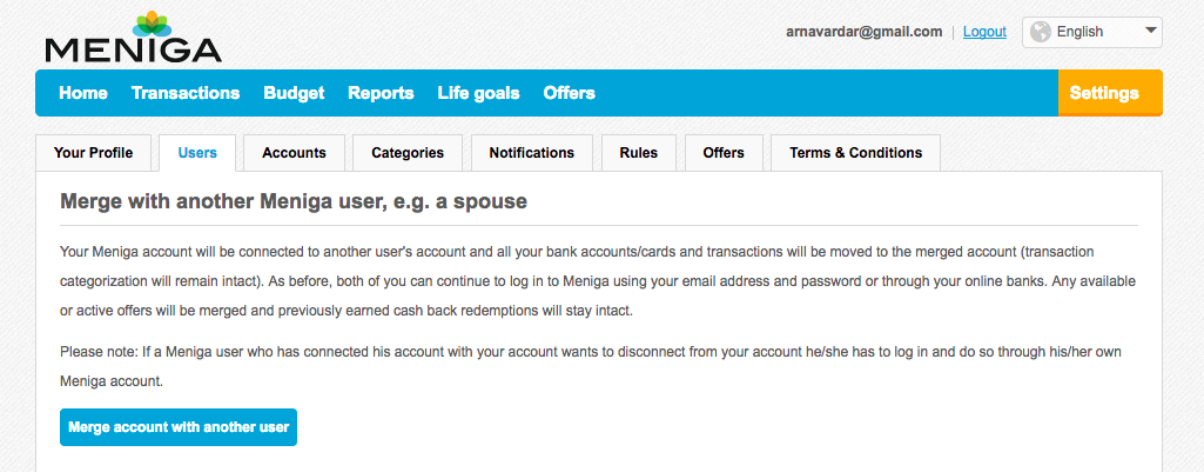


Figure 1: The financial aggregation app: screenshots

Table 1: Summary Statistics

	Mean	Standard Deviation	Statistics Iceland
Monthly total income	4,272	3530.5	3,684
Monthly regular income	3,984	3184.3	3,404
Monthly salary	3,709	2992.5	(3,404)
Monthly irregular income	288	1414.8	(279)
Monthly spending:			
Total	1,369	1224	1,378
Groceries	413	389.29	402
Fuel	174	258.77	(216)
Alcohol	48	121.43	45
Ready Made Food	160	172.64	(139)
Home Improvement	132	464.94	101
Transportations	89	700.06	98
Clothing and Accessories	106	181.27	109
Sports and Activities	17	148.41	(38)
Pharmacies	32	62.08	(57)
Age	40.8	11.5	37.2
Female	0.49	0.50	0.49
Unemployed	0.08	0.27	0.06
Parent	0.23	0.42	0.33

Note: All numbers are in US dollars. Parentheses indicate that data categories do not match perfectly.

Table 2: Summary Statistics

	Single women		Single men		Married women		Married men	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	40.7	12.6	40.8	13.2	40.7	9.9	42.7	10.8
Expenditures:								
Total Spending	1,547	1,419	1,714	1,894	1,649	1,332	1,839	2,908
Groceries	519	387	443	394	612	407	507	475
Fuel	164	221	256	347	144	194	279	2,019
Alcohol	42	100	75	144	37	90	72	134
Ready Made Food	168	169	228	239	160	186	206	212
Home improvement	139	419	169	668	158	436	198	606
Transportation	75	920	139	1,321	67	763	148	1,333
Clothing and Accessories	149	245	100	252	177	265	110	240
Sports and Activities	17	60	22	85	20	69	23	85
Pharmacies	46	85	31	58	47	65	32	58
Bank account information:								
Savings Account	3,763	40,902	4,329	30,416	2,256	12,284	3,952	48,440
Checking Account	1,436	5,975	2,773	27,145	1,625	5,426	2,362	8,154
Credit Card	-1,386	2,905	-1,671	17,934	-1,792	15,102	-2,011	10,944
CA limit	2,489	5,805	3,305	12,226	2,265	4,385	3,215	5,835
CC limit	4,177	6,685	5,339	19,257	5,038	15,982	6,462	12,737
Overdraft amount	-1,850	5,132	-2,250	10,106	-1,672	3,953	-2,134	4,468
Cash holdings	5,199	41,885	7,102	41,163	3,882	13,668	6,314	49,268
Liquidity holdings	10,478	43,100	14,076	43,876	9,393	15,407	13,980	50,048
Cash measured in days of consumption	98	465	130	772	79	288	110	607
Liquidity measured in days of consumption	193	590	246	832	190	399	254	703
Bank costs:								
Total Bank Fees and Overdraft Interest	-25.3	77.8	-28.9	96.3	-20.2	67.2	-28.3	143.1
Late Payment Interest	-0.3	2.7	-0.4	3.1	-0.3	2.2	-0.3	2.9
Non-Sufficients Funds (NSF) Fees	-0.4	3.5	-0.4	3.4	-0.4	3.4	-0.4	3.1
Late Fees	-0.1	0.8	-0.1	0.9	0.0	0.6	-0.1	0.8
Overdraft interest	-24.5	104.9	-28.1	126.8	-19.5	89.2	-27.6	181.9
# Observations	320,537		319,367		113,551		132,091	
# Individuals	5,444		5,425		1,875		2,162	

Note: All numbers are in US dollars (December 2016: 1 USD = 110 ISK).

Table 3: Summary Statistics

	Single women		Single men		Married women		Married men	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Income:								
Total income	3,660	4,487	4,997	55,255	3,392	3,906	10,713	593,496
Regular Income	3,514	4,311	4,378	9,007	3,281	3,753	10,322	571,751
Irregular Income	146	1,122	619	54,446	111	991	391	50,531
Salary	3,104	4,251	4,092	8,965	2,956	3,732	10,066	571,747
Lottery winnings	4	652	5	404	3	145	3	136
Gambling gains	0	15	2	99	0	14	0	23
Social benefits	189	742	65	477	129	586	51	506
Child benefits	13	84	7	56	9	63	8	58
Grants	0	25	0	22	0	29	0	8
Insurance claims	15	674	17	668	11	638	16	676
Interest income	12	348	21	545	9	131	33	709
Invalidity benefits	4	118	4	191	3	104	5	151
Loan write-offs	1	74	2	108	1	60	2	107
Consumer loans	1	43	0	43	1	50	0	26
Parental leave benefits	35	231	20	185	61	301	26	200
Payday loans	1	18	1	18	0	11	0	11
Pension	98	593	129	737	63	518	106	877
Rental benefits	0	4	0	0	0	1	0	0
Rental income	0	24	1	29	0	26	1	45
Student loans	30	458	18	336	22	402	14	347
Tax rebate	109	568	89	578	74	413	215	31,368
Travel allowances	14	213	499	54,428	17	307	151	39,606
Uncategorized income	0	35	1	208	1	95	1	35
Unemployment benefits	28	208	21	184	29	208	11	138
# Observations	320,537		319,367		113,551		132,091	
# Individuals	5,444		5,425		1,875		2,162	

Note: All numbers are in US dollars (December 2016: 1 USD = 110 ISK).

Additional details of the model derivation and proofs The first-order conditions for $C_{A,t}$, $C_{B,t}$, and D_t determine the optimal consumption function

$$\frac{1-\theta_t}{C_{A,t}} - \frac{(1-\theta_t)\beta_A\delta_A\sum_{x=0}^{T-(t+1)}\delta_A^x(1+d_A)+\theta_t\beta_B\delta_B\sum_{x=0}^{T-(t+1)}\delta_B^x(1+d_B)}{W_t-C_{A,t}-C_{B,t}-D_t}=0$$

$$\Rightarrow C_{A,t}=\frac{1-\theta_t}{(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}(W_t-C_{A,t}-C_{B,t}-D_t)$$

$$C_{B,t}=\frac{\theta_t}{(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}(W_t-C_{A,t}-C_{B,t}-D_t)$$

$$D_t=\frac{(1-\theta_t)d_A+\theta_t d_B}{(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}(W_t-C_{A,t}-C_{B,t}-D_t)$$

which can be solved simultaneously to yield

$$C_{A,t}+C_{B,t}+D_t=\frac{1+(1-\theta_t)d_A+\theta_t d_B}{(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}(W_t-C_{A,t}-C_{B,t}-D_t)$$

$$\Rightarrow C_{A,t}+C_{B,t}+D_t=\frac{1+(1-\theta_t)d_A+\theta_t d_B}{(1+(1-\theta_t)d_A+\theta_t d_B)+(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}W_t$$

such that

$$C_{A,t}=\frac{1-\theta_t}{(1+(1-\theta_t)d_A+\theta_t d_B)+(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}W_t \text{ etc.}$$

In turn, the first-order conditions for period $t=1$ are

$$\frac{1-\theta_1}{C_{A,1}} - \frac{(1-\theta_1)\sum_{t=1}^{T}\delta_A^{t-1}(1+d_A)+\theta_1\sum_{t=1}^{T}\delta_B^{t-1}(1+d_B)}{\sum_{t=1}^{T}(C_{A,t}+C_{B,t}+D_t)}=0$$

$$\frac{\theta_1}{C_{B,1}} - \frac{\theta_1\sum_{t=1}^{T}\delta_B^{t-1}(1+d_A)+(1-\theta_1)\sum_{t=1}^{T}\delta_A^{t-1}(1+d_B)}{\sum_{t=1}^{T}(C_{A,t}+C_{B,t}+D_t)}=0$$

$$\frac{(1-\theta_1)d_A+\theta_1 d_B}{D_1} - \frac{\theta_1\sum_{t=1}^{T}\delta_B^{t-1}(1+d_A)+(1-\theta_1)\sum_{t=1}^{T}\delta_A^{t-1}(1+d_B)}{\sum_{t=1}^{T}(C_{A,t}+C_{B,t}+D_t)}=0$$

such that

$$C_{A,1} + C_{B,1} + D_1 = W_1 \frac{1 + (1-\theta_1)d_A + \theta_1 d_B}{(1-\theta_1)\sum_{t=2}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=2}^{T} \delta_B^{t-1}(1+d_B)}$$

and for any period t

$$C_{A,t} + C_{B,t} + D_t = W_1 \frac{(1-\theta_1)\delta_A^{t-1}(1+d_A) + \theta_1 \delta_B^{t-1}(1+d_B)}{(1-\theta_1)\sum_{t=1}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=1}^{T} \delta_B^{t-1}(1+d_B)}$$

such that

$$C_{A,t} = W_1 \frac{(1-\theta_1)\delta_A^{t-1}}{(1-\theta_1)\sum_{t=1}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=1}^{T} \delta_B^{t-1}(1+d_B)}$$

$$C_{B,t} = W_1 \frac{\theta_1 \delta_B^{t-1}}{(1-\theta_1)\sum_{t=1}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=1}^{T} \delta_B^{t-1}(1+d_B)}$$

$$D_t = W_1 \frac{(1-\theta_1)\delta_A^{t-1} d_A + \theta_1 \delta_B^{t-1} d_B}{(1-\theta_1)\sum_{t=1}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=1}^{T} \delta_B^{t-1}(1+d_B)}.$$

In turn, noting that $W_t = W_1 - \sum_{x=1}^{t-1}(C_{A,x} + C_{B,x} + D_x)$ we can combine

$$W_t = W_1 \frac{\sum_{x=t}^{T}((1-\theta_1)\delta_A^{x-1}(1+d_A) + \theta_1 \delta_B^{x-1}(1+d_B))}{(1-\theta_1)\sum_{t=1}^{T} \delta_A^{t-1}(1+d_A) + \theta_1 \sum_{t=1}^{T} \delta_B^{t-1}(1+d_B)}$$

with the optimal consumption functions to obtain

$$C^*_{A,t} + C^*_{B,t} + D^*_t = W_t \frac{(1-\theta_1)\delta_A^{t-1}(1+d_A) + \theta_1 \delta_B^{t-1}(1+d_B)}{(1-\theta_1)\delta_A^{t-1}(1+d_A) + \theta_1 \delta_B^{t-1}(1+d_B) + \delta_A^{t-1}\sum_{x=1}^{T-t}(1-\theta_1)\delta_A^{x}(1+d_A) + \delta_B^{t-1}\sum_{x=1}^{T-t}\theta_1 \delta_B^{x}(1+d_B))}.$$

Proof of Proposition 1

Proof. We want to show that

$$\frac{1 + (1-\theta_t)d_A + \theta_t d_B}{1 + (1-\theta_t)d_A + \theta_t d_B + (1-\theta_t)a + \theta_t b} > \frac{(1-\theta_1)\delta_A^{t-1}(1+d_A) + \theta_1 \delta_B^{t-1}(1+d_B)}{(1-\theta_1)\delta_A^{t-1}(1+d_A) + \theta_1 \delta_B^{t-1}(1+d_B) + (1-\theta_t)\delta_A^{t-1} a + \theta_t \delta_B^{t-1} b}$$

$$\text{with } a = \sum_{x=1}^{T-t} \delta_A^x (1+d_A) \text{ and } b = \sum_{x=1}^{T-t} \delta_B^x (1+d_B)$$

$$\frac{-\theta_1)(1+d_A)+\theta_1(1+d_B)+(1-\theta_t)a+\theta_t b}{(1-\theta_1)(1+d_A)+\theta_1(1+d_B)} < \frac{(1-\theta_1)\delta_A^{t-1}(1+d_A)+\theta_1\delta_B^{t-1}(1+d_B)+(1-\theta_t)\delta_A^{t-1}a+\theta_t\delta_B^{t-1}b}{(1-\theta_1)\delta_A^{t-1}(1+d_A)+\theta_1\delta_B^{t-1}(1+d_B)}$$

which can be rewritten as

$$(1-\theta_1)\delta_A^{t-1}(1+d_A)\theta_t b+\theta_1\delta_B^{t-1}(1+d_B)(1-\theta_t)a-((1-\theta_1)(1+d_A)\theta_t\delta_B^{t-1}b+\theta_1(1+d_B)((1-\theta_t)\delta_A^{t-1}a) < 0$$

$$(1-\theta_1)\delta_A^{t-1}(1+d_A)\theta_t b-\theta_1(1+d_B)((1-\theta_t)\delta_A^{t-1}a-(1-\theta_1)(1+d_A)\theta_t\delta_B^{t-1}b+\theta_1\delta_B^{t-1}(1+d_B)(1-\theta_t)a < 0$$

$$(1-\theta_1)\theta_t(\delta_A^{t-1}-\delta_B^{t-1})((1+d_A)b-(1+d_B)a) < 0$$

The condition $\frac{C^*_{A,t}+C^*_{B,t}+D^*_t}{W_t} < \frac{C_{A,t}+C_{B,t}+D_t}{W_t}$ boils down to

$$(1-\theta_1)\theta_t(1+d_A)(1+d_B)(\delta_A^{t-1}-\delta_B^{t-1})(\sum_{x=1}^{T-t}\delta_B^x-\sum_{x=1}^{T-t}\delta_A^x) < 0$$

which is true whenever $\delta_A \neq \delta_B$. □

Proof of Proposition 2

Proof. Wlog suppose $\theta_t \downarrow$ and $d_A > d_B$ then $D_t \uparrow$ as

$$D_t = \frac{(1-\theta_t)d_A+\theta_t d_B}{(1+(1-\theta_t)d_A+\theta_t d_B)+(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B))}W_t$$

and

$$\frac{\partial D_t}{\partial\theta_t} = \frac{(-d_A+d_B)\text{pos const}+((1-\theta_t)d_A+\theta_t d_B)(\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)-\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B))}{(1+(1-\theta_t)d_A+\theta_t d_B+(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B))^2}$$

$$\frac{d_B\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)-d_A\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B)}{(1+(1-\theta_t)d_A+\theta_t d_B+(1-\theta_t)\beta_A\sum_{x=1}^{T-t}\delta_A^x(1+d_A)+\theta_t\beta_B\sum_{x=1}^{T-t}\delta_B^x(1+d_B))^2} < 0.$$

□

Proof of Proposition 3

Proof. Wlog suppose $\eta_t \uparrow$, i.e., the bargaining power of member A increases, and $\delta_A = \delta_B$ and $\beta_A < \beta_B$. In turn, $\theta_t \downarrow = \gamma_B + \eta_t \underbrace{(1 - \gamma_A - \gamma_B)}_{<0 \text{ as } \gamma_i > \frac{1}{2}}$ and

$$\frac{\partial C_{A,t}}{\partial \theta_t} = \frac{-\text{pos const} - (1-\theta_t)(-d_A + d_B - \beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B))}{((1+(1-\theta_t)d_A + \theta_t d_B) + (1-\theta_t)\beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \theta_t \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B))^2} W_t < 0$$

$$\text{as } (-d_A + d_B - \beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B)) > 0$$

Additionally, consumption of the public good increases

$$\frac{\partial D_t}{\partial \theta_t} = \frac{d_B \beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) - d_A \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B)}{((1+(1-\theta_t)d_A + \theta_t d_B) + (1-\theta_t)\beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \theta_t \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B)))^2} W_t < 0$$

and total household consumption increases

$$\frac{\partial (C_{A,t} + C_{B,t} + D_t)}{\partial \theta_t}$$

$$= \frac{-(1+(1-\theta_t)d_A + \theta_t d_B)(-\beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B))}{((1+(1-\theta_t)d_A + \theta_t d_B) + (1-\theta_t)\beta_A \sum_{x=1}^{T-t} \delta_A^x (1+d_A) + \theta_t \beta_B \sum_{x=1}^{T-t} \delta_B^x (1+d_B))^2} W_t < 0.$$

Finally, household member A's consumption share is

$$\frac{C_{A,t}}{C_{A,t} + C_{B,t} + D_t} = 1 - \theta_t$$

which necessarily increases. □

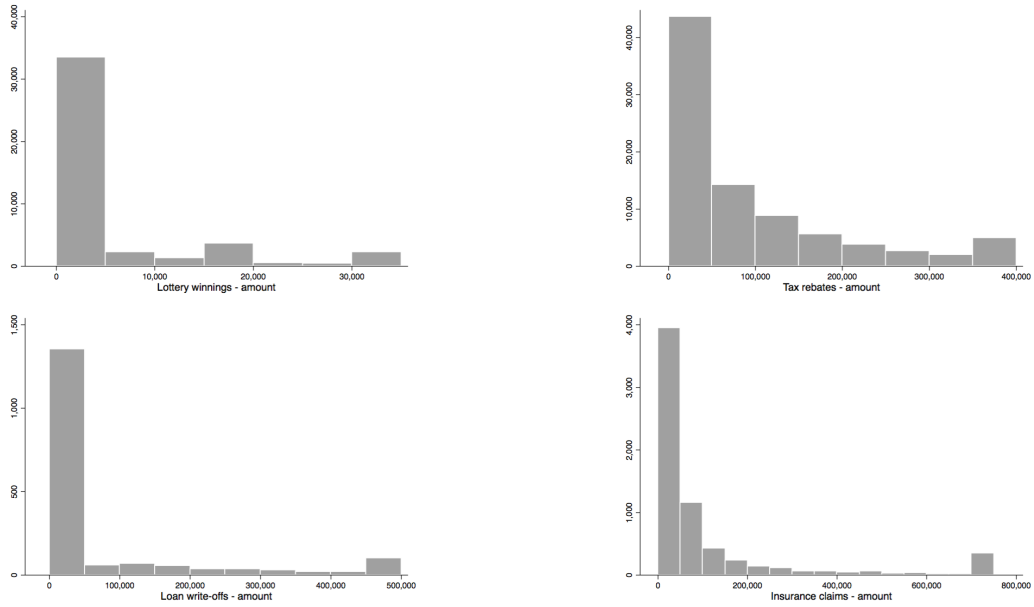


Figure 2: Distributions of exogenous income payments

This figure shows the distribution of the payments in our four income categories that we consider plausibly exogenous.

Figure 3: Distribution of spender's share in total household income

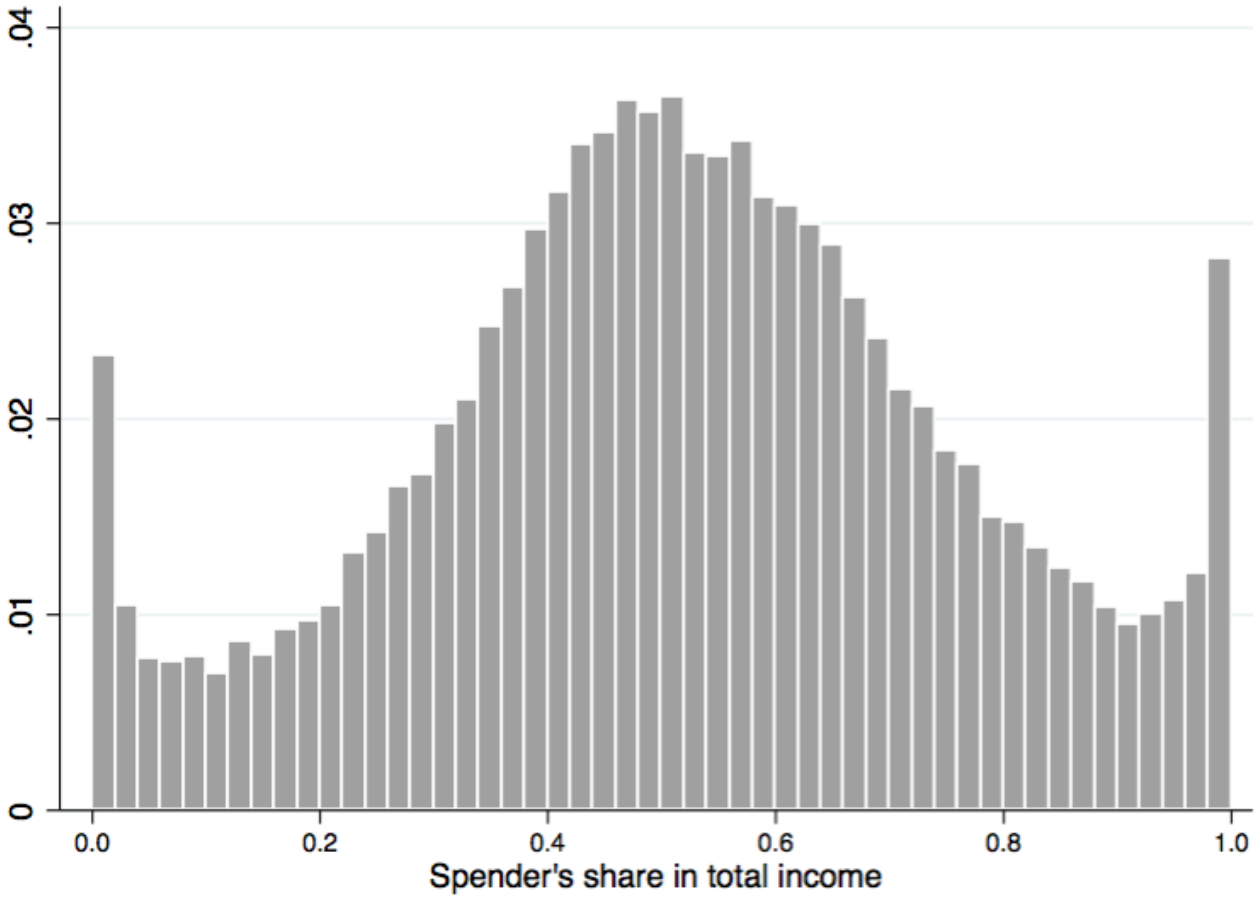


Figure 4: Spender's share in household income and discretionary spending

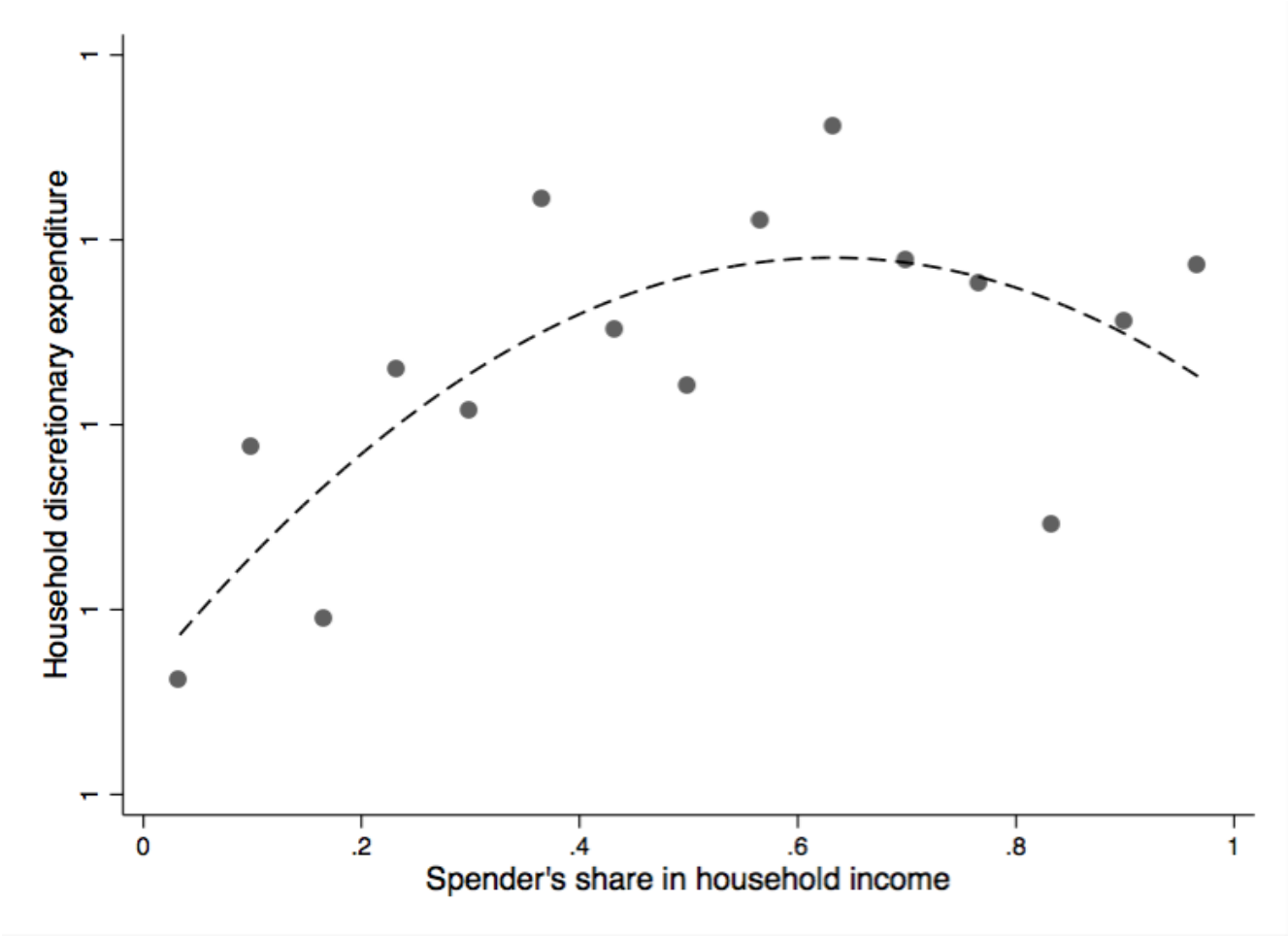


Table 4: The impact of the income share of the household spender on discretionary expenditures

	(1)	(2)	(3)	(4)	(5)
	First Stage	OLS	IV	IV	IV
Income share		0.0091	0.1607**	0.1169**	0.3525**
		(0.0069)	(0.0788)	(0.0870)	(0.1584)
SD effect		0.01	0.09	0.07	0.20
Spender tax refund	0.4310***		✓	✓	
	(0.0212)				
Saver tax refund	-0.4960***		✓	✓	
	(0.0215)				
Spender debt write-off	0.4410***		✓	✓	✓
	(0.1400)				
Saver debt write-off	-0.3000***		✓	✓	✓
	(0.0993)				
Spender lottery	1.7700***		✓	✓	✓
	(0.3330)				
Saver lottery	-1.6800		✓	✓	✓
	(0.4350)				
Spender insurance payment	0.3860***		✓		✓
	(0.0353)				
Saver insurance payment	-0.4880***		✓		✓
	(0.0703)				
Individual fixed effects		✓	✓	✓	✓
Month and year fixed effects		✓	✓	✓	✓
First stage F statistic			115.2	125.3	38.4
#Obs.		120,728	120,728	120,728	120,728
#Individuals		2,001	2,001	2,001	2,001

Notes: Standard errors are clustered at the individual level and are within parentheses. Each entry is separate regression and all specifications control for total household income. The first stage shows the effect of receiving 1m ISK from the type of income under consideration on the income share of the spender in the household. SD effect refers to the effect of a one standard deviation change in the spender's income share on unnecessary spending, measured in standard deviations. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Figure 5: Less patient spouse's share in household income and total spending

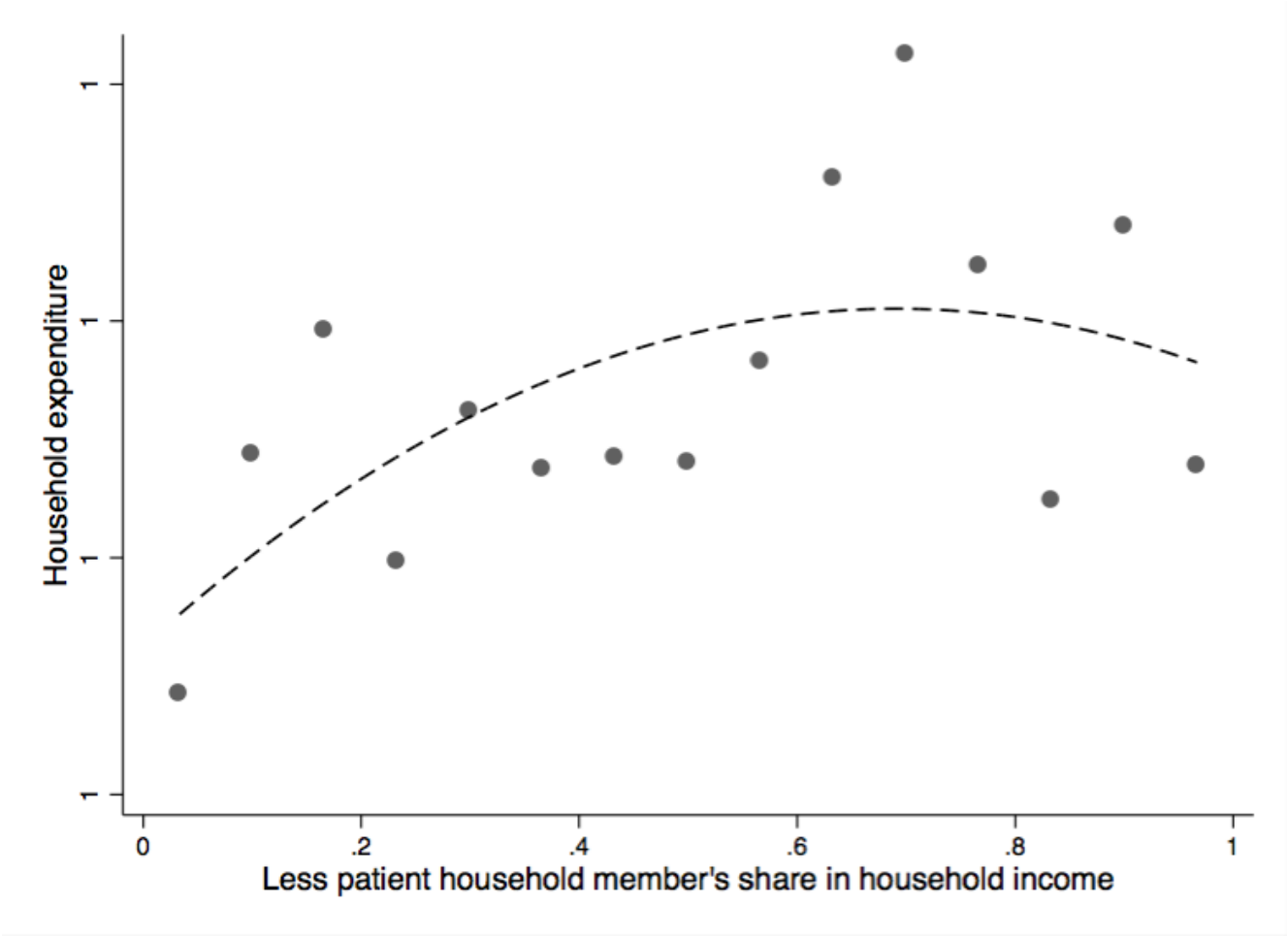
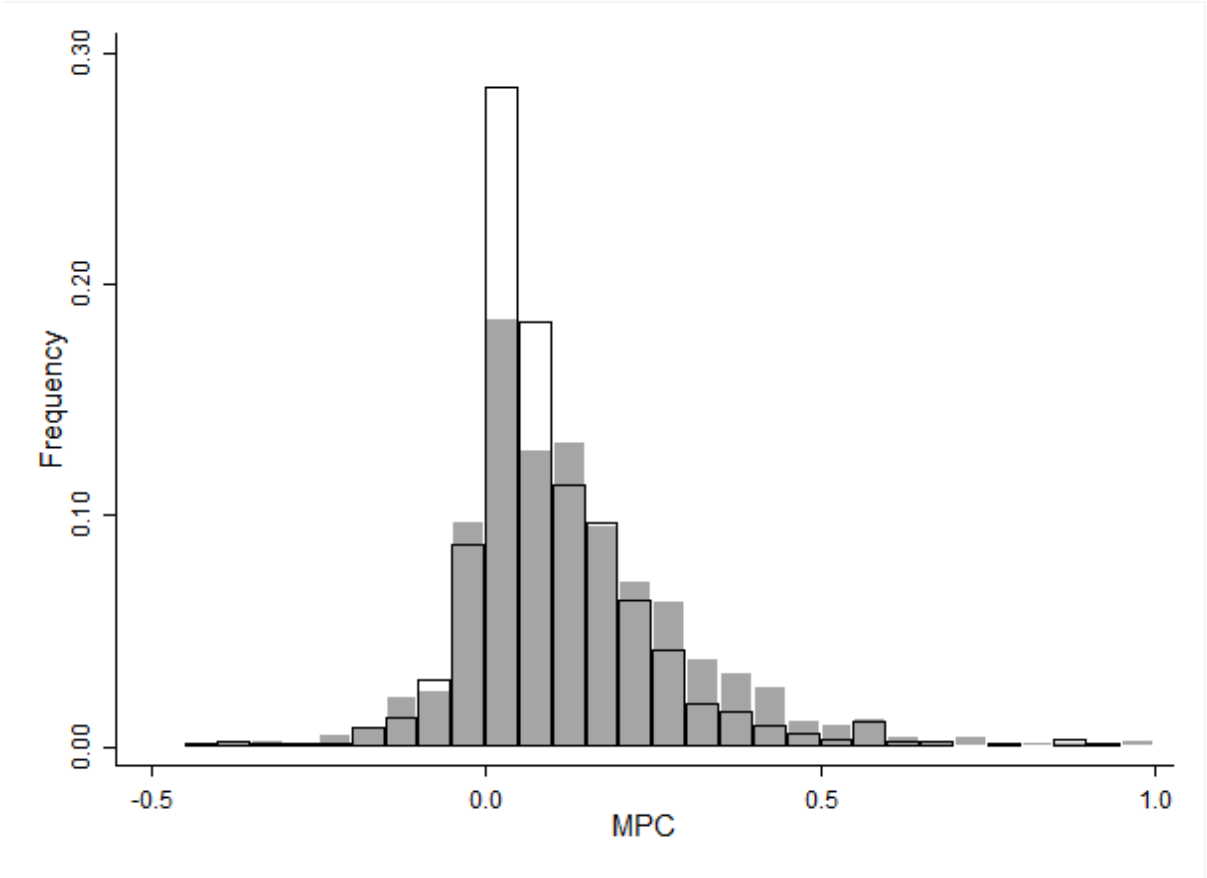


Table 5: The impact of the income share of the less patient household member on household expenditure

	(1)	(2)	(3)	(4)	(5)
	First Stage	OLS	IV	IV	IV
Income share		0.0854***	1.021***	0.8632***	0.8169**
		(0.0107)	(0.2805)	(0.2809)	(0.4280)
SD effect		0.05	0.57	0.48	0.45
Impatient tax refund	0.0840***		✓	✓	
	(0.0097)				
Patient tax refund	-0.0005***		✓	✓	
	(0.0001)				
Impatient debt write-off	0.4080***		✓	✓	✓
	(0.1350)				
Patient debt write-off	-0.1550***		✓	✓	✓
	(0.0361)				
Impatient lottery	0.1190***		✓	✓	✓
	(0.0429)				
Patient lottery	-0.0166		✓	✓	✓
	(0.0029)				
Impatient insurance payment	0.0097*		✓		✓
	(0.0057)				
Patient insurance payment	-0.0072		✓		✓
	(0.0071)				
Individual fixed effects		✓	✓	✓	✓
Month and year fixed effects		✓	✓	✓	✓
First stage F statistic			20.9	27.2	11.6
#Obs.		109,653	109,653	109,653	109,653
#Individuals		1,910	1,910	1,910	1,910

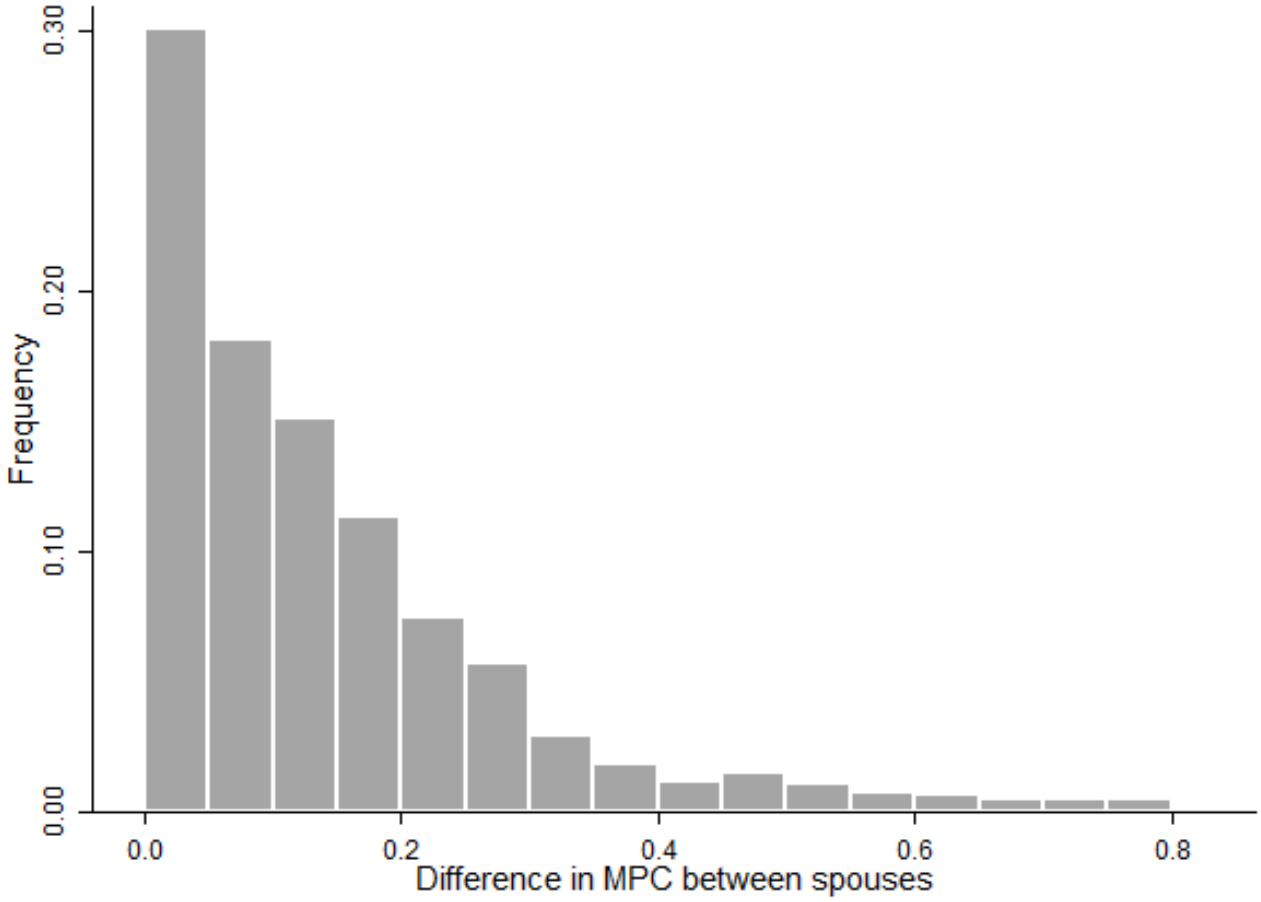
Notes: Standard errors are clustered at the individual level and are within parentheses. Each entry is separate regression and all specifications control for total household income. The first stage shows the effect of receiving 1m ISK from the type of income under consideration on the income share of the more debt-reluctant spouse. SD effect refers to the effect of a one standard deviation change in the debt reluctant individual's income share on bank fees, measured in standard deviations.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Figure 6: MPC by gender



Notes: This figure shows the distribution of MPCs for men (white bars) and women (gray bars).

Figure 7: Intra-household MPC heterogeneity



Notes: This figure shows the distribution of intra-household differences in MPCs.

Table 6: The Impact of the absolute difference in spouse's MPCs on the household's financial fees

	(1)	(2)	(3)
MPC difference	-276.5***	-241.8***	-234.4***
	(15.49)	(16.04)	(18.34)
Mean household financial fees	2,648	2,648	2,648
Month-by-year fixed effects	✓	✓	✓
Municipality fixed effects		✓	✓
Age		✓	✓
Household income			✓

Notes: Standard errors are within parentheses. Each entry is separate regression.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.