Gender Differences in Reactions to Income Shocks

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Abstract

Do women respond differently to income shocks than men? We use questions from the NY Fed Survey of Consumer Expectations that ask how women and men would adjust to an unexpected 10% change in income. Women are more likely to repay debt after an unexpected increase in income, where men have a larger marginal propensity to consume. When asked about how to buffer a decrease in income, both men and women report large reductions in spending, but women reduce spending more than men. Differences in debt adjustment are related to gender differences in the debt-to-income ratio, the degree of discouraged borrowing and liquidity constraints, where women are more likely to be constrained. Together these three variables explain about 40% of the gender differences in the marginal propensity to repay debt, and 75% of differences in the marginal propensity to borrow. A simple model with occasionally binding borrowing constraints can rationalize the gender differences in the marginal propensities to consume and adjust debt.

Keywords: Gender differences; Loan repayment; Marginal Propensity to Consume; Subjective expectations; Household debt; Financial literacy.
JEL classification: C81, C83, D12, D14, E21, G51

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1 Introduction

How do men and women respond to changes in income? Along the margins of change are adjusting consumption, debt and saving. Most studied is the margin to adjust spending– the marginal propensity to consume (MPC) is an important parameter for both economic modeling and economic policy. On the theory side empirical estimates of the MPC are used to distinguish between competing explanations of consumer behavior. On the policy side the MPC is a relevant parameter to assess the effectiveness of stimulus policies (see for example Broda and Parker (2014)). In this context, it has been documented that MPCs are sizable, that there is considerable heterogeneity (e.g. Parker et al. (2013)), and that MPCs are positively correlated to measures of liquidity constraints and other balance sheet measures (Misra and Surico, 2014; Bunn et al., 2018). What received much less attention is how consumers behave with respect to debt in case of unexpected transitory income changes: the marginal propensity to repay debt (MPD) or to borrow (MPB). These are however important parameters for design of the stimulus policies. On the one hand, a higher MPD could imply a lower MPC, which would dampen the immediate effect of stimulus measures. This aspect of the relation between propensities to consume or pay down debt became especially notable during the recent pandemic-related crises, as US households have used more than a third of the stimulus payment checks to repay consumer debt Armantier et al. (2020). On the other hand, highly indebted households could have higher MPCs in the future, if they repay debt now and relax their current borrowing constraint in order to create "breathing room".

In this paper we study the marginal propensity to consume and the marginal propensity to adjust debt for the same household, for both positive and negative income changes. In particular, we focus on differences between women and men, which is the main contribution. Potential causes for gender differences are because of different endowments/constraints, ex-

pectations, or preferences. We use data of the NY Fed Survey of Consumer Expectations, and especially, the module on household's spending, where households are asked how they would adjust spending, debt and saving in response to a 10% increase in income, as well as a 10% decrease in income. We report several findings.

Our main descriptive findings are that men and women differ in the following three ways. First, women have a larger propensity to repay debt after a positive income change. That begs the question whether women are more likely to borrow after a negative change in income. Though both men and women on average do not adjust borrowing much after a decrease in income, women borrow a bit more–our second finding. The third gender difference we find is that women reduce spending (even) more than men after a negative income change.

There are several reasons why there could be gender differences in responding to positive and negative income changes as we find. It has been documented that women are more risk-averse (Borghans et al., 2009), live longer on average and appear to be less financially literate (Lusardi and Mitchell, 2017).[1] In a decomposition analysis we find that gender differences in marginal propensities to consume and adjust debt are related to differences in unsecured debt holdings, borrowing and liquidity constraints.

We document that women indeed have more unsecured debt (13% higher), and have a higher ratio of debt-to-income (about 60% higher), are almost twice as likely to be discouraged borrower, and more than 25% likely to be liquidity constrained. The gender gap in (unsecured) debt holding is not documented very well, Li (2018); Dunn and Mirzaie (2023) are two exceptions. In Oaxaca-Blinder decomposition we find that these three variables explain 40% of the gender differences in the MPD and 75% of differences in the MPB. Adding financial literacy, numeracy, risk aversion and other variables including cash-at-hand allow us to explain around 67% of differences in the MPD, and 89% of differences in the MPB. The set of variables we have explains between 30%-42% of gender differences in the MPC. Interestingly enough we find that though borrowing and liquidity constraints are impor-

[1] At the same time, in some financial matters such as understanding of fees and insurances, women are at least as knowledgeable as men (Lusardi, Mitchell and Curto, 2009)

tant determinants of MPCs, they do not help explain gender *differences*. The exception is debt-to-income in explaining gender differences in the MPC after positive income changes. We also document that gender differences in financial literacy and numeracy explain much of the differences in spending changes, but not much in debt adjustment. Finally, a simple model with occasionally binding borrowing constraints can qualitatively explain gender differences in the marginal propensity to consume and adjust spending, as long as women are more risk averse than men and have higher debt-to-income ratios.

Literature This paper is related to several strands of literature. The first strand studies how households adjust consumption and spending in response to income shocks. Here we find ourselves in the sub-strand of literature estimating the MPC using hypothetical survey questions. Some studies use qualitative responses (Shapiro and Slemrod, 1995, 2003), using for example response categories like: "mostly spend", "mostly save", and "save and spend". Other surveys ask respondents to allocate percentage points to spending after a positive income shock (Jappelli and Pistaferri, 2014; Christelis et al., 2024), or distinguish between small and large hypothetical income shocks (Christelis et al., 2019; Fuster, Kaplan and Zafar, 2020). The latter two studies also take into consideration household responses to positive and negative income shocks of the same size. The idea is that asymmetry in spending responses– in particular a small MPC out of positive and a large MPC out of negative income shocks–points to liquidity constraints. We use the answers to the NY FED Consumer's Survey to two hypothetical scenarios of unexpected income increase as well as decrease of the same magnitude, where respondents allocate percentage points to adjust spending, debt and savings. The advantages of such a setting are numerous. First, it presents the complete description of spending, debt adjustment and saving responses for the same household, which is impossible to observe otherwise. Second, it allows to study asymmetry in responses to positive and negative income changes. Third, the relations to household's balance sheets, borrowing constraints as well as individual characteristics and beliefs can be studied.

A challenge for studies using reported effects is the external validity: Do households have similar MPCs when faced with an income change as they reported they would? So far

the evidence is promising. Parker and Souleles (2019) studies both reported and revealed spending responses to the 2008 tax rebates in the United States, and finds that reported spending responses match the actual spending decisions. Bunn et al. (2018) studies a variety of realized income changes in the UK, and matches the data to the reported MPCs to find that the reported effects are related to actual MPCs.[2] Colarieti, Mei and Stantcheva (2024) is a recent study showing that hypothetical spending and debt adjustment correlates highly with past how respondents used Economic Impact Payments during Covid-19. We build on these results and extend the analysis by providing a more complete description of household behavior studying joint spending and debt adjustment responses after income shocks. To the best of our knowledge we are the first to document and explain heterogeneity in the MPC, MPD and MPB by gender.

Though several studies have reported that MPCs differ by observable heterogeneity, this is mainly in the terms of the income respectively cash-at-hand distribution (e.g. Jappelli and Pistaferri (2014)). Other measures of relevant observable heterogeneity that have been used are home-ownership (e.g. Misra and Surico (2014)), or debt-to-income ratios (e.g. Bunn et al. (2018)). Surprisingly gender differences have not been studied in the context of MPCs (nor is gender always included as a control variable).

The second strand of literature is much smaller and studies how households repay debt (or borrow) after income changes. Agarwal, Liu and Souleles (2007) track credit card spending after the 2001 tax rebates. They find that credit card holders initially pay more debt down (=save) after receiving a tax rebate, but after a couple of months start to increase spending. When the sample is split by low/high borrowing limits, it is the households with low borrowing limits who spend more and the households with high borrowing limits who pay down debt. A similar pattern is observed when the sample is split by a measure of liquidity constraints (being close to the borrowing limit or not): more liquidity constrained households spend, less liquidity constrained households pay down debt. Cookson, Gilje and Heimer (2022) use receipts from shale gas explorations as unexpected

[2]An open question still is whether households' reported and realized responses are similar with respect to repaying debt, or borrowing in response to a negative income shock.

windfall income and find that indebted households repay more debt. Olafsson and Pagel (2019) is an interesting study that documents how some households borrow *more* after *positive* income shocks, which unfortunately is not being asked in the survey we use. Our contribution is to empirically model the joint spending and paying down of debt (or borrowing in the case of negative income changes). We also show how unsecured debt holdings and liquidity/borrowing constraints are important for understanding spending and debt repayment patterns in general and gender differences in particular.

We document our results in the following way. First we describe the data (Section 2) – the NY Fed Survey of Consumer Expectations, and provide descriptive statistics of the outcome variables in this study: spending, repayment of debt/borrowing and (dis)saving. The main analysis in Section 3 progresses in two steps. First we show the importance of unsecured debt, liquidity and borrowing constraints for the gender gap in spending and debt responses. Second, we quantify the importance of these three variables in explaining the gender gap. In a brief extension the issue of couples and singles is addressed. In Section 4 we show how a simple model with occasionally binding liquidity constraints can qualitatively explain the marginal propensity to consume and adjust debt as a function of risk aversion and the debt-to-income ratio. Section 5 concludes.

2 Data and Empirical Strategy

2.1 The NY Fed Survey of Consumer Expectations

We use the data from the NY Fed's Survey of Consumer Expectations (SCE), a nationally representative internet-based survey. The core of the survey is the monthly module of households' expectations about various economic outcomes. In addition to the monthly core questionnaire, several modules are run on a quarterly basis. The data has been collected since June 2013, and we use data from August 2015-December 2018 due to availability of variables. The NY FED Survey of Consumers is a rotating panel of about 1,300 household heads per wave. The household head is defined in the survey as a person who owns or rents the home. New survey participants are drawn each month and stay in the

panel for a maximum of 12 months. The median tenure in the panel is 7 months.

2.2 The Survey Questions

The main outcome variables are survey-based responses to hypothetical increases and decreases of income. Respondents are presented with two scenarios. First a scenario is presented where next year respondents would find themselves with 10 percent more household income than they currently expect, followed by a scenario with 10 percent less income than expected. For each scenario respondents can allocate a 100 points over spending, repaying debt and saving, respectively decreasing spending, borrowing and dissaving in case of the income decrease.[3] The format is such that it is made sure that the points allocated to the categories sum to a 100. The exact wording of the questions for the income increases is given here:

- **QSP12n**: Suppose next year you were to find your household with **10 percent more** income than you currently expect.[4] What would you do with the extra income?

  - Save or invest all of it (1)
  - Spend or donate all of it (2)
  - Use all of it to pay down debts (3)
  - Spend some and save some (4)
  - Spend some and use part of it to pay down debts (5)
  - Save some and use part of it to pay down debts (6)
  - Spend some, save some and use some to pay down debts (7).

  If items 4,5,6, or 7 of QSP12n are selected:

- **QSP12a**: Please indicate what share of the extra income you would use to... (Please note that the three proportions need to add up to 100 percent)?

[3] The response categories do not allow for distinguishing non-durable from durable spending. However, Fuster, Kaplan and Zafar (2020) use the same sample (but a different survey) and allow for both response categories. They find that most of the points are allocated to non-durable spending. We will interpret the points allocated to spending in our analysis as non-durable spending.

[4] Emphasis in original.

– Save or invest () percent (1)
– Spend or donate () percent(2)
– Pay down debts () percent (3)

We combine the responses to both questions into three separate variables for spending, debt adjustment and saving, each on a scale from 0 to 100 (and the sum of the three variables is 100). These two questions are followed by two questions about an unexpected 10% income *decrease*. Response categories are then respectively "Reducing spending", "Increasing borrowing", and "Reducing savings". We construct three additional variables to capture these responses after an unexpected *decrease* in income. These questions are fielded as part of the quarterly survey on household spending.

The format of the question and response categories has several advantages. First, the magnitude of the unexpected income change is held constant relative to income of the household. Some other surveys use a fixed dollar amount (e.g. Fuster, Kaplan and Zafar (2020)), which complicates comparisons between households with different household income. A 10% income change is roughly a month's worth of income, and would be considered a "small" income change compared to other surveys (e.g. Christelis et al. (2019) studies hypothetical income changes of one month and three months worth of income). Second, the responses in the SCE survey provide a quantitative measure of the response to the income change. This allows us to study a more complete allocation into spending, debt adjustment and saving responses. Qualitative response categories are not easy to compare or aggregate. A third advantage is that the survey asks for hypothetical allocations for both positive and negative income changes of the same relative magnitude. This allows for studying potential asymmetries in responses within household, as Christelis et al. (2019); Bunn et al. (2018) did in the case of MPC.

The most important advantage of using responses to hypothetical income changes is the ease of use in empirical analysis. Studies using realized outcomes typically need to make assumptions about the nature of the income shock (expected/unexpected), whether consumers respond to the news or the actual receipt of income, and measurement error

in income and/or spending among other issues. With realized outcomes typically only one outcome is available (e.g. only spending), where we can describe more variation in the allocation of spending, saving and debt, which turns out to be important. Another advantage is control of the shock size. Though there is some debate what the best way to survey hypothetical responses is (nominal money amounts are easier to understand (Fuster, Kaplan and Zafar, 2020), percentage income changes are easier to scale among the income distribution (Jappelli and Pistaferri, 2014; Christelis et al., 2019)), a main advantage of hypothetical questions is that the surveyor has control over the shock size, and can potentially experiment (as in Fuster, Kaplan and Zafar (2020) and Christelis et al. (2019)). Also the availability of responses to both positive and negative income changes within household cannot be overstated. Up to date it is rare for studies using actual outcomes to have spending changes after increases in income and decreases in income available *for the same* household. The challenge for using hypothetical outcomes or intentions/readiness to spend is whether respondents would actually behave as they say they would, e.g. Jappelli and Pistaferri (2014); Christelis et al. (2019); Duca-Radu, Kenny and Reuter (2021); Colarieti, Mei and Stantcheva (2024) all share this challenge. However, Parker and Souleles (2019) using both hypothetical and realized outcomes reports that realized outcomes are qualitatively similar to hypothetical responses, and also Bunn et al. (2018); Colarieti, Mei and Stantcheva (2024) find similar responses to realized and hypothetical income shocks.

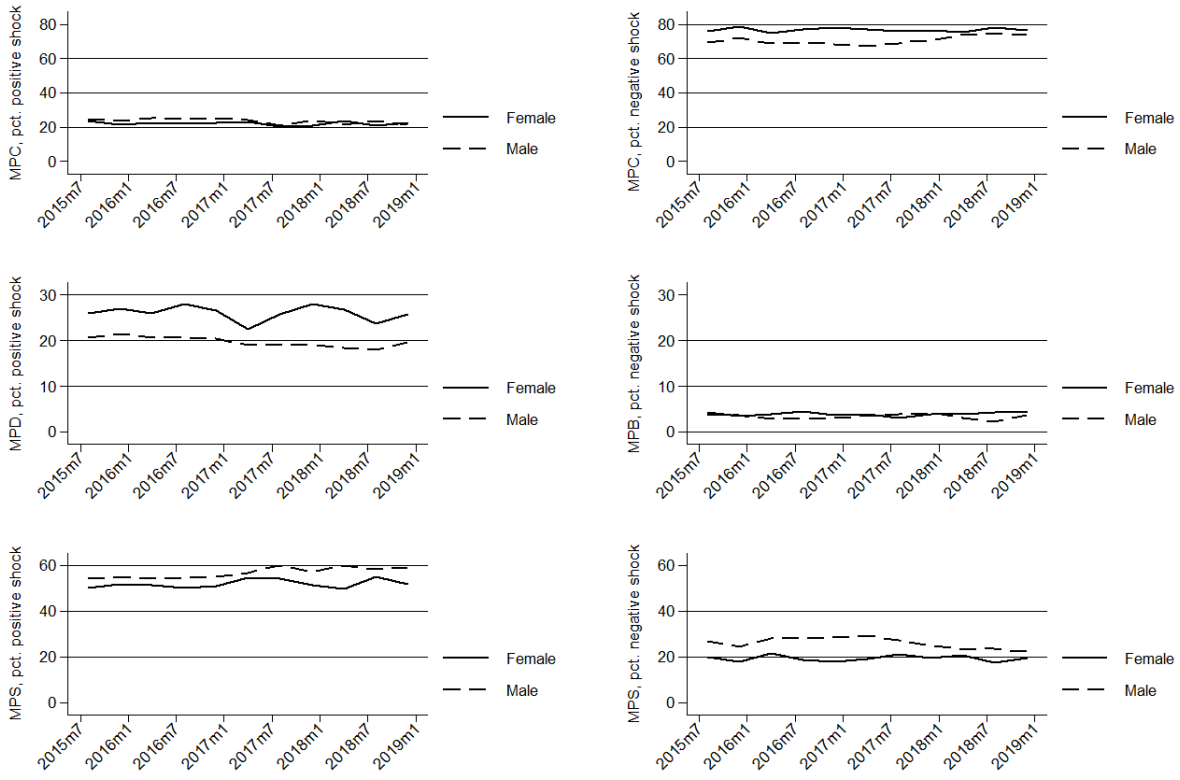


Figure 1: Stated Responses to a 10% Change in Income

Figures on the left show the stated responses to a 10% increase in income, figures on the right answers to a 10% decline. Figures on the top are the percent increase in consumption (MPC), respectively decrease in consumption. Figures in the middle are the Marginal Propensity to repay Debt (MPD), and the Marginal Propensity to Borrow (MPB). Figures at the bottom are the Marginal Propensities to (dis)Save (MPS).

Figure 1 shows the time series for women and men for the years in our data. Figures on the left are responses to a 10% increase in income, figures on the right to a 10% decrease. The figures on the top are the marginal propensity to spend, in the middle the marginal propensity to adjust debt, and figures at the bottom is the marginal propensity to save . Overall the time series patterns are quite stable over time (though we will include time fixed effects in all the empirical analysis).

There are some caveats to consider. The formulation of the question itself as well as answering the questions requires that respondents understand and can perform some basic arithmetical calculations, specifically, use percentages. In this case, it is possible that

respondents would then choose rule-of-thumb answers, resulting in the significant share of the answers concentrated around such points as 50 percent. However, in the data we see a relatively large share of responses around non-focal points (see Figure A1 in the Appendix). In addition, survey responses may be affected by the financial sophistication of the households. In the multivariate analysis we control for financial literacy as well as numeracy skills using the measures derived from the SCE survey. From a theory point of view a relevant factor is whether the income change is permanent or transitory. The framing of the question is relatively silent on this distinction, though the mention of the time frame of "the next twelve months" suggests a transitory shock. What matters for our analysis is the assumption that men and women have a similar interpretation of the nature of the income change. With the interpretation that the income changes are transitory, the income changes in the survey can be classified as small, unexpected, transitory income changes in the taxonomy of Jappelli and Pistaferri (2010).

Table 1: Summary Statistics

	All	Female	Male	Difference	t-Stat
	(1)	(2)	(3)	(4)	(5)
Female	0.469				
Age/10	5.121	4.897	5.319	-0.422^{***}	-13.680
Couple	0.649	0.548	0.738	-0.191^{***}	-20.192
Children present	0.374	0.402	0.349	0.053^{***}	5.387
Education: high	0.550	0.520	0.577	-0.056^{***}	-5.623
Full-time employed	0.550	0.525	0.573	-0.047^{***}	-4.728
Part-time employed	0.133	0.162	0.107	0.055^{***}	8.048
Unemployed	0.034	0.038	0.030	0.009^{*}	2.376
Self-employed	0.087	0.070	0.102	-0.032^{***}	-5.696
Home-maker	0.037	0.070	0.007	0.063^{***}	16.703
Retired	0.248	0.204	0.286	-0.082^{***}	-9.442
Own home	0.731	0.664	0.791	-0.127^{***}	-14.280
Gross household income (1,000)	81.135	69.435	91.426	-21.991^{***}	-20.333
Liquid financial assets (1,000)	56.516	39.854	71.375	-31.521^{***}	-13.182
Risk aversion financial matters [1-7]	4.558	4.895	4.261	0.633^{***}	19.859
Financial literacy [0-1]	0.770	0.692	0.838	-0.146^{***}	-25.981
Numeracy [0-1]	0.877	0.837	0.912	-0.075^{***}	-19.310
N Observations	9,832	4,613	5,219		

*/**/*** correspond to 10%/5%/1% significance level.

In the multivariate analyses we control for the variables mentioned in Table 1. Female-led households have lower household income than men, as well as fewer financial assets. We control for self-assessed risk aversion in financial matters (women are more risk-averse than men), as well as standardized measures of financial literacy and numeracy. The exact wording of the questions can be found in the Appendix.

3 Empirical Evidence

We report three sets of empirical results. First we show gender differences in the MPC^{+} and MPD for income increases, followed by gender differences in the MPC^{-} and MPB for income declines. Second, we present evidence of gender differences in holding of unsecured debt, the probability of being a discouraged borrower and being liquidity constrained. Third, we use Oaxaca-Blinder decompositions to relate the differences in outcomes to differences in unsecured debt and borrowing constraints.

3.1 Gender Differences in the Marginal Propensities to Consume and Adjust Debt

We start by describing gender differences in spending, adjusting debt and saving after income changes. Table 2 shows the average allocation and the extensive margin, which is the probability that the response category is mentioned. A lot can be learned from the distinction between extensive and intensive margin, see e.g. Fuster, Kaplan and Zafar (2020). In the survey, more than one response category can be chosen, so the sum of the average probabilities does not sum to 100%.[5] From Panel A some pronounced gender differences become clear: women are more likely to repay debt after an unexpected increase in income. Women are also more likely to mention repaying debt as a response category. Men are more likely to increase spending and saving, and more likely to mention saving as a response category. In Panel B responses to unexpected income decreases are summarized. Both men and women state that they will absorb most of a negative income change by

[5]Using a different sample and surveyColarieti, Mei and Stantcheva (2024) describes how households adjust multiple variables to buffer income shocks, which is similar to what we find.

reducing spending (on average 73.6 percent), where women reduce spending even more than men (76.7 versus 70.6 percent). The magnitude of the spending reduction may seem surprising, but has also been found for the UK (Bunn et al., 2018). When it comes to borrowing, very few households report they would borrow to smooth consumption (though women are more likely to do so). This is in line what (Hundtofte, Olafsson and Pagel, 2019) find for Iceland and the United States. They find that few households increase credit card borrowing when faced with an unemployment shock, despite the possibility to borrow– we report similar patterns in the multivariate analysis. Almost all differences in mean outcomes between women and men are statistically significant, but are also economically relevant. For example, the relative difference in the MPD after an increase in income is 24% (6.3/25.9 percentage points), and about 8% for the MPC^{-} after income declines (6.1/76.8 percentage points). The asymmetry in MPCs between income increases and decreases is similar to what Bracha and Cooper (2014) find for MPCs to payroll tax increases and tax refunds, and what Christelis et al. (2019); Fuster, Kaplan and Zafar (2020) find for hypothetical income changes and MPCs.[6] Taken together, Figure 1 and Table 2 show that (i) both men and women exhibit a large asymmetry in their response to income increases versus decreases; that (ii) women are more likely to repay debt after positive income changes, and (iii) women are more likely to decrease spending in response to negative income changes.

[6]Baugh et al. (2021) find a different asymmetry using comprehensive wealth data. They report a relatively large MPC out of tax rebates, and no change in spending for taxed owed. These findings agree with the response to income increases found in hypothetical studies, but seem to pose a puzzle for income decreases. A possible explanation for this puzzle is that survey respondents understand the hypothetical question as a sudden, unexpected negative shock, like the loss of one's wallet.

Table 2: Descriptive Statistics

A. Unexpected 10% *Increase* in Income	All	Female	Male	Difference	t-Stat
	(1)	(2)	(3)	(4)	(5)
Marginal Propensity to Consume (MPC^+)					
$E(MPC^+)$	22.861	22.098	23.536	-1.437^{**}	-2.963
$Pr(MPC^+>0)$	0.509	0.503	0.513	-0.010	-1.081
$E(MPC^+\|MPC^+>0)$	36.103	34.198	37.832	-3.634^{***}	-6.364
Marginal Propensity to Repay Debt (MPD)					
E(MPD)	22.609	25.935	19.669	6.266^{***}	11.705
Pr(MPD>0)	0.498	0.543	0.456	0.087^{***}	9.669
E(MPD|MPD>0)	48.402	49.620	47.067	2.552^{***}	4.124
Marginal Propensity to Save (MPS)					
E(MPS)	54.530	51.967	56.795	-4.829^{***}	-7.268
Pr(MPS>0)	0.736	0.720	0.751	-0.031^{***}	-3.930
E(MPS|MPS>0)	59.963	57.009	62.572	-5.562^{***}	-8.552

B. Unexpected 10% *Decrease* in Income	All	Female	Male	Difference	t-Stat
	(1)	(2)	(3)	(4)	(5)
Marginal Propensity to Consume (MPC^-)					
$E(MPC^-)$	73.591	76.761	70.647	6.114^{***}	10.670
$Pr(MPC^->0)$	0.911	0.926	0.897	0.030^{***}	5.736
$E(MPC^-\|MPC^->0)$	77.418	79.545	75.383	4.162^{***}	8.170
Marginal Propensity to Borrow (MPB)					
E(MPB)	3.606	3.901	3.331	0.570^{*}	2.547
Pr(MPB>0)	0.108	0.116	0.101	0.015^{**}	2.737
E(MPB|MPB>0)	28.115	28.059	28.175	-0.116	-0.084
Marginal Propensity to (dis)Save (MPS)					
E(MPS)	22.803	19.338	26.022	-6.685^{***}	-12.440
Pr(MPS>0)	0.461	0.417	0.501	-0.085^{***}	-9.401
E(MPS|MPS>0)	46.811	43.711	49.183	-5.472^{***}	-8.054
N Observations	12,197	5,873	6,324	12,197	

Respondents can mention more than one category, so the sum of the three probability averages is not equal to one.
*/**/*** correspond to 10%/5%/1% significance level.

Cross-Study Validation To check the sensitivity of the survey format we use the scientific use file of Fuster, Kaplan and Zafar (2020), which uses the same population, but a different survey. One advantage of their survey is that they randomize "shocks" differing in size, sign and timing, another difference is that they use dollar values instead of relative changes. We add the marginal propensity to adjust debt and compare sample means of

men and women using t-statistics. The first four columns allow us to compare positive and negative income changes. For small income changes women have a smaller MPC and a larger propensity to repay debt, though these differences are smaller for larger gains. Women do adjust spending much more than men after a negative income shock (column (2)).[7] Strikingly similar are the gender differences in adjusting any debt (last row), where women are more likely to adjust debt for any windfall. In columns (3) and (4) are the results of treatments of spending and debt adjustment out of news, and in column (5) to gender differences out of a temporary liquidity shock (an interest free loan that needs to be repaid in a year). We do not have similar variables in our main data, but looking at columns (3)-(5) in Table 3 shows some statistics that will independently support our main analysis. Column (3) shows that respondents do not really respond to positive news of future income gains, which points to borrowing constraints. That corroborates column (4), where households will already adjust spending today when faced with the news of a future income loss, where women adjust spending much more than men. Finally the last column shows the value of liquidity: spending is not adjusted, but loan repayment is, where women are much more likely to restructure loan repayments from current loans to future loans. The remainder of our study will use the main analysis sample described before, and it is reassuring that many of the gender differences hold up in a different survey with a different survey format and additional shocks.

[7] In general the MPCs they report are smaller compared to the literature asking for proportions, which could be a survey-mode effect.

Table 3: Cross-Study Validation: Gender Differences in the Marginal Propensities to Adjust Spending and Debt (Fuster et al., 2020)

	(1) Gain			(2) Loss	(3) News-Gain in 3 Months		(4) News-Loss of $500		(5) Loan
	$500	$2,500	$5,000	$500	$500	$5,000	in 3 months	in 2 years	$5,000
E(MPC)									
Female	0.07	0.12	0.13	0.34	−0.01	0.05	0.33	0.17	0.01
Male	0.09	0.11	0.15	0.26	−0.00	0.03	0.22	0.12	0.01
Difference	−0.02*	0.01	0.02**	0.12***	−0.01	0.020*	0.11***	0.05**	0.00
Pr(MPC>0)									
Female	0.179	0.294	0.369	0.579	0.063	0.171	0.511	0.338	0.087
Male	0.193	0.257	0.358	0.415	0.049	0.122	0.368	0.235	0.077
Difference	−0.014	0.037	0.012	0.164***	0.014	0.050*	0.144***	0.103**	0.010
E(MPD)									
Female	0.28	0.30	0.30	−0.09	0.11	0.14	−0.03	0.03	0.23
Male	0.24	0.29	0.28	−0.06	0.10	0.13	0.01	0.05	0.17
Difference	0.04**	0.01	0.02	0.03	0.01	0.01	0.04	−0.02	0.06**
Pr(MPD>0)									
Female	0.418	0.569	0.606	0.092	0.194	0.305	0.101	0.127	0.405
Male	0.344	0.484	0.516	0.063	0.163	0.270	0.081	0.105	0.279
Difference	0.074***	0.083**	0.090***	0.029**	0.031	0.035	0.020	0.022	0.122***
N observations	1,673	540	2,029	1,531	359	590	586	586	538

Own calculations based on scientific use file of Fuster, Kaplan and Zafar (2020). Column (1) is one of three different gain treatments with getting a hypothetical one-off payments of $500, $2,500, respectively $5,000. Column (2) is a one off loss of $500. Treatments in column (3) are whether the respondent changes spending immediately when a sure windfall of $500 will be received in three months, respectively $5,000. Column (4) is the immediate spending response to a loss of $500 in 3 months, respectively 2 years, and column (5) is whether the respondent changes spending when it receives an interest-free loan of $5,000 that needs to be repaid with certainty in 12 months. MPC is the marginal propensity to consume, MPD the marginal propensity to adjust debt (either repay or borrow). First and third couple of rows refer to the average value, second and fourth to the probability of using a particular category.
*/**/*** correspond to 10%/5%/1% significance level.

3.2 Gender Differences in Unsecured Debt and Borrowing and Liquidity Constraints

In the previous subsection we documented differences between men and women in allocation over consumption spending, debt and savings categories, as well as asymmetry in responses to unexpected increases and decreases in income. We now turn to explaining these differences, in particular the finding that women are more likely to repay debt in response to positive income shocks, but are not more likely to borrow in response to negative shocks. This could potentially be explained if women have higher debt holdings and are more borrowing constrained than men. We look at three variables available in the survey: unsecured debt, the degree of discouraged borrowing and subjective liquidity constraints.

Figure 2 shows the evolution over the years in the sample of these variables, Table 4 shows summary statistics, and Appendix A.1 gives the text of the wording of the questions.

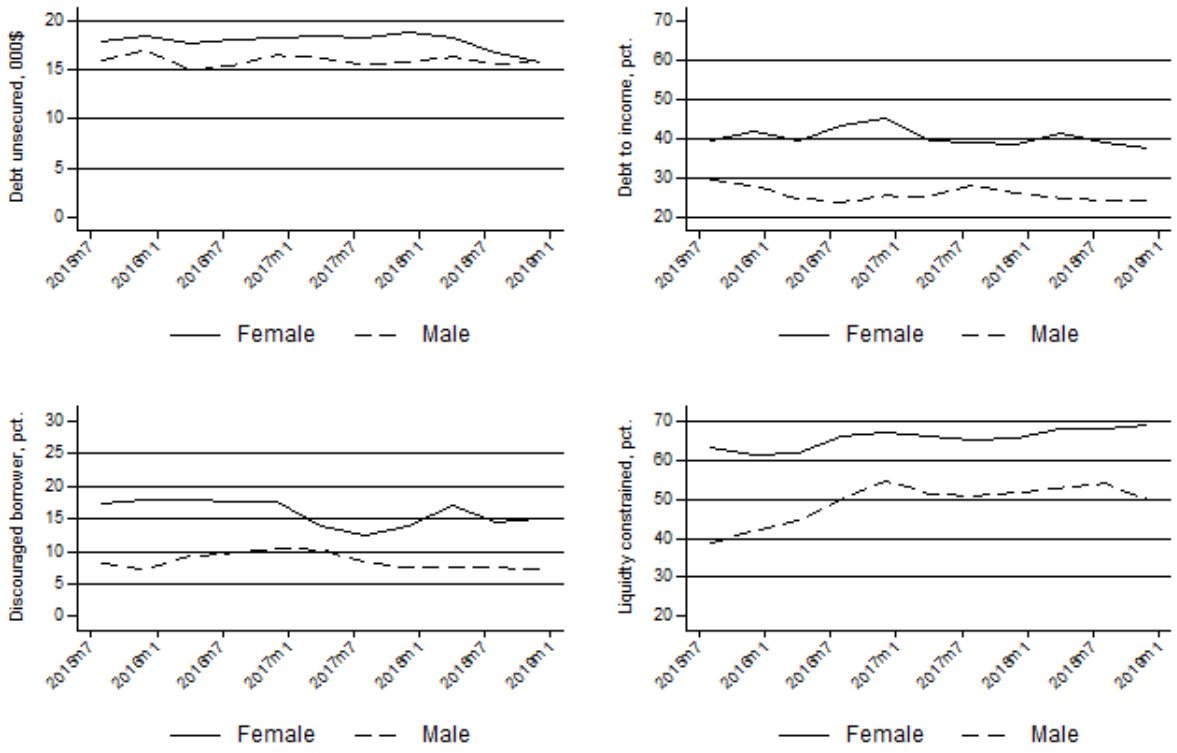


Figure 2: Unsecured Debt, Discouraged Borrowing and Liquidity Constraints

Figure on the top-left is the average amount of unsecured debt in 1,000s of USD, on the right is the debt-to-income ratio. Bottom-left is "Discouraged borrower", measured as the percentage answering "No" to the question if the respondent believes they could have gotten a loan in the last 12 months. Bottom right figure shows the fraction of individuals who state that they cannot cover an unforeseen and immediate expense of $2,000.

Table 4: Summary Statistics Debt, Discouraged Borrowing and Liquidity Constraints

	All	Female	Male	Difference	t-Stat
	(1)	(2)	(3)	(4)	(5)
Have unsecured debt (0/1)	0.770	0.794	0.750	0.044***	4.934
Unsecured debt (1,000)	15.148	16.298	14.146	2.152***	5.069
Debt-to-income ratio	0.292	0.366	0.227	0.139***	10.640
Debt to income above median (0/1)	0.453	0.502	0.411	0.092***	8.656
Discouraged borrower (0/1)	0.106	0.140	0.077	0.063***	9.910
Liquidity constrained (0/1)	0.536	0.623	0.459	0.164***	15.763
Observations	9,832	4,613	5,219		

*/**/*** correspond to 10%/5%/1% significance level.

The first observation is that women are more likely to have unsecured debt (defined as the sum of credit card loans, car loans and student loans), but hold about $2,100 more unsecured debt on average.[8] Women on average are almost twice as likely to be discouraged borrowers and are much more likely to state not being able to come up with $2,000 to cover unexpected expenses. The degree of being a discouraged borrower is likely to capture more than objective measures of borrowing constraints, since it includes subjective beliefs whether one could obtain a loan or not (Jappelli, 1990). The question whether the household is able to cover unexpected expenditures of $2,000 has been used to capture liquidity constraints by Crump et al. (2022). Figure 2 shows some time variation in these three variables, and that the gender gap is sizable. In Appendix Table A3 we show regression results with the Debt-to-Income ratio (DTI), a binary variable whether the DTI is above the median and binary variables for being discouraged borrower and liquidity constrained. All regressions include a full set of covariates of Table 1 and time fixed effects. As expected, risk aversion, financial literacy and numeracy, financial wealth, household income and other covariates explain quite a bit of the gender differences in the variables, though there is a residual gender gap. For example, the raw difference in the DTI is 0.139 (column

[8]Li (2018) uses credit card data and finds that women hold more credit card debt than men, and are more likely to revolve credit. Our definition of unsecured debt includes car loans and education loans in addition to credit card loans.Dunn and Mirzaie (2023) show that women also have a larger ratio of total debt-to-income (including mortgage debt).

(4) in Table 4), and reduces in the regression to 0.035 (column (1) in Table A3).

We are not the first ones to point out that balance sheet variables and liquidity constraints explain heterogeneity in MPCs, see for example Jappelli and Pistaferri (2014); Bunn et al. (2018); Fuster, Kaplan and Zafar (2020). However, we relate the gender differences in debt-to-income, borrowing and liquidity constraints to gender differences in the marginal propensities to spend and adjust debt.

3.3 Oaxaca-Blinder Decompositions

In this subsection we combine the previous two subsections, and show how gender differences in the MPC^+, MPD, MPC^- and MPB can be related to gender differences in unsecured debt, borrowing and liquidity constraints. We proceed in two steps. First we regress the MPC^+, MPD, MPC^- and MPB on a dummy for female, a rich set of covariates and time fixed effects, as well as unsecured debt, borrowing and liquidity constraints. These regressions provide the input for the Oaxaca-Blinder decomposition in the second step.

Specifically, we estimate the following equation for the pooled sample of men and women:

$$y_{it} = \beta_0 + \beta_1 FEMALE_{it} + X'_{it}\beta^* + \lambda_t + e_{it} \tag{1}$$

We estimate this regression separately with MPC^+, MPD, MPC^- and the MPB as dependent variables. In each regression we include the same set of covariates as in Table 1, and following Jappelli and Pistaferri (2014); Christelis et al. (2019), we discretize liquid assets into quintiles. We also include a full set of time fixed effects (λ_t). In some specifications we add three binary variables: whether the debt-to-income ratio is above the median, for discouraged borrower and for being liquidity constrained. For the debt-to-income ratio we experimented with other variable transformations, and results are very similar. We denote the parameters with β^* since we will use the estimates from the pooled regressions for the Oaxaca-Blinder decompositions (which will be explained below). We estimate (1) with

OLS with robust standard errors.[9]

Table 5: Regression Analysis

	Increase in Income		Increase in Income		Decrease in Income		Decrease in Income	
	MPC^+	MPC^+	MPD	MPD	MPC^-	MPC^-	MPB	MPB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	-1.172^*	-1.138^*	2.459^{***}	2.050^{***}	3.189^{***}	3.217^{***}	0.148	0.078
	(0.661)	(0.660)	(0.718)	(0.678)	(0.778)	(0.778)	(0.292)	(0.290)
Debt-to-income above median		-2.843^{***}		14.178^{***}		0.944		1.323^{***}
		(0.629)		(0.689)		(0.759)		(0.286)
Discouraged borrower		2.929^{***}		3.967^{***}		−1.264		1.206^{**}
		(1.069)		(1.210)		(1.208)		(0.614)
Liquidity constrained		0.855		5.947^{***}		−1.240		2.103^{***}
		(0.662)		(0.695)		(0.812)		(0.274)
Financial literacy	6.304^{***}	6.503^{***}	2.347	3.632^{**}	-4.395^{***}	-4.557^{***}	1.536^{**}	1.876^{***}
	(1.375)	(1.374)	(1.518)	(1.456)	(1.575)	(1.577)	(0.644)	(0.646)
Numeracy	6.818^{***}	6.981^{***}	1.861	2.588	-5.418^{***}	-5.672^{***}	0.935	1.222
	(1.746)	(1.744)	(1.928)	(1.838)	(2.075)	(2.077)	(0.891)	(0.889)
Risk aversion financial matters	0.887^{***}	0.898^{***}	0.618^{***}	0.634^{***}	0.211	0.207	−0.014	−0.011
	(0.207)	(0.207)	(0.221)	(0.211)	(0.252)	(0.252)	(0.093)	(0.092)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R^2	0.058	0.062	0.125	0.203	0.033	0.033	0.027	0.038
Fraction dependent variable zero	0.317	0.317	0.471	0.471	0.046	0.046	0.857	0.857
Mean dependent variable	22.934	22.934	23.312	23.312	73.918	73.918	3.410	3.410
N observations	6,071	6,071	6,071	6,071	7,124	7,124	7,124	7,124

All equations are estimated with OLS. Robust standard errors in parentheses. Covariates include the same set of variables as in Table 4. MPD is the marginal propensity to repay debt, MPB is the marginal propensity to borrow.
*/**/*** correspond to 10%/5%/1% significance level.

Table 5 shows the results. Focusing on the first row, we find similar gender differences as in the raw averages in Table 2, though smaller, and no longer statistically significant from zero for the MPB. Looking at the quintiles for financial assets some interesting patterns can be seen. Looking at columns (3) and (4), there is a clear pattern that households with fewer financial assets have larger MPD after a positive income change, and the coefficients are economically large. For example, households in the first financial assets quintile report an MPD of 21.313 points larger than households in the fifth quintile (respectively 17.320 in column (4) which includes the three debt variables). A similar pattern can be observed in columns (5) and (6) for the MPC^-, households in the lower financial assets quintiles report a larger spending reduction when faced with a 10% income decline. These patterns provide some support for the use of hypothetical MPC questions.

[9]We also estimate Tobit and fractional regression models since the dependent variable is bounded between 0 and 100, and the proportion of zeroes is large for especially paying down debt and borrowing. Results are very similar.

Concentrating on the first row, we find that adding the debt-to-income ratio, being a discouraged borrower and being liquidity constrained decrease the gender gap in almost all cases, but not entirely. Women are still more likely to repay debt after an income increase (column (4)), and decrease spending more after an income decrease (column (6)). Looking at unsecured debt, we find that households with more unsecured debt have a smaller MPC^+, a larger MPD after an income increase, and reduce spending more after an income decline (the MPC^-), though this is not statistically significant. Interestingly enough they report borrowing more after an income decrease (a positive MPB in column (8)). One interpretation is that these households have few liquid assets and use unsecured debt to smooth negative shocks. A similar pattern is visible when looking at the financial assets quintiles, in columns (7) and (8) households in the lower financial asset quintiles borrow more.

With respect to discouraged borrowing and being liquidity constrained, a couple of interesting findings can be noted. First, in column (2) it can be seen that discouraged borrowers and liquidity constrained households have a larger MPC^+ compared to unconstrained households, which is in line with standard theories of consumption behavior. However, column (4) shows that constrained households also have a larger Marginal Propensity to repay Debt (MPD). Taken together, these findings show a basic tension for constrained households after an income increase: increase spending versus repaying debt, which may allow for more spending possibilities in the future. The third finding is that constrained households seem somewhat less likely to reduce spending after an income decline (column (6)), but more likely to borrow (column (8)). The latter finding may seem counter-intuitive, but can be rationalized by the finding that these households have fewer liquid assets, which only leaves reducing spending and borrowing as available avenues.

Taken together there are gender differences in the MPC^+, MPD and the MPC^- after controlling for background characteristics, measures of liquid financial wealth, risk aversion, financial literacy and numeracy. The patterns found give credence to the use of hypothetical MPC questions. Most interestingly we find evidence of asymmetries: the difference in MPC^+ and MPC^- has been reported before (e.g. Bunn et al. (2018); Christelis et al.

(2019)). The finding that households use windfall income to repay debt, but do not borrow when faced with negative income changes is also documented in Colarieti, Mei and Stantcheva (2024); Koşar et al. (2023). In order to quantify how much debt, constraints and expectations explain of the gender gap in spending intentions, we turn to decompose the differences using Oaxaca-Blinder decompositions (Oaxaca, 1973; Blinder, 1973). This decomposition accounts for the difference in outcomes between two groups, and attributes this to differences in group characteristics and coefficients. Christelis, Georgarakos and Haliassos (2013) is an early use of Oaxaca-Blinder decompositions in household finance. Formally, we specify separate regression equations for women and men, for example for the MPC after an unexpected increase in income in (2), denoting MPC_f^+ for females and MPC_m^+ for men.

$$\begin{aligned} MPC_f^+ &= X_f'\beta_f + \epsilon_f \\ MPC_m^+ &= X_m'\beta_m + \epsilon_m \end{aligned} \tag{2}$$

We define a common regression coefficient β^* for each observable characteristic x in a pooled regression for men and women, as we did in equation (1).[10] Subtracting the two equations in (2), one can decompose the difference in mean outcomes between the two groups into an explained part – as explained by differences in characteristics times β^*, and an unexplained part, see equation (3).[11]

$$E(MPC_f^+) - E(MPC_m^+) = \underbrace{[E(X_f') - E(X_m')]\beta^*}_{Explained} + \underbrace{E(X_f')[\beta_f - \beta^*] + E(X_m')[\beta_m - \beta^*]}_{Unexplained} \tag{3}$$

The explained part is the difference in observable differences between the two groups weighted by the common regression coefficient β^*. The unexplained part is difference of the group coefficient with the common coefficient (i.e. $\beta_f - \beta^*$), weighed by average group characteristic. In some applications the unexplained part is given an interpretation (e.g.

[10] We include a dummy for women in the pooled regression, following the recommendation in Jann (2008).

[11] Other decompositions have been proposed, for example a threefold decomposition into "characteristics", "coefficients" and an "interaction". The main finding remains unchanged that differences in characteristics are the main driver of differences in outcomes.

discrimination against one group or the other), but that is not an obvious interpretation in our setting. We therefore refrain from giving meaning to the unexplained part and focus on the differences in characteristics between men and women. We estimate the decomposition and standard errors using the Stata package oaxaca (Jann, 2008)[12].

Table 6: Oaxaca-Blinder Decomposition of Responses to Unexpected Increases in Income

	A. Marginal Propensity to Consume			B. Marginal Propensity to Repay Debt		
	MPC^+	Explained	Unexplained	MPD	Explained	Unexplained
	(1)	(2)	(3)	(4)	(5)	(6)
Women: Predicted outcome	22.073***			26.457***		
	(0.428)			(0.517)		
Men: Predicted outcome	23.695***			20.531***		
	(0.431)			(0.449)		
Difference	−1.622***	−0.498	−1.124*	5.927***	3.946***	1.981***
	(0.607)	(0.318)	(0.659)	(0.684)	(0.419)	(0.676)
	100%	30.7%	66.3%	100%	66.6%	33.4%
Debt-to-income above median		−0.257***	0.276		1.278***	0.924
		(0.067)	(0.605)		(0.192)	(0.669)
Discouraged borrower		0.176***	−0.305		0.236***	−0.047
		(0.068)	(0.226)		(0.079)	(0.249)
Liquidity constrained		0.120	1.558**		0.880***	0.721
		(0.102)	(0.739)		(0.129)	(0.796)
Risk aversion financial matters		0.543***	−2.989		0.376***	2.560
		(0.130)	(1.922)		(0.130)	(1.980)
Financial literacy		−0.879***	−2.499		−0.501**	5.560**
		(0.188)	(2.229)		(0.196)	(2.341)
Numeracy		−0.497***	1.569		−0.184	−4.559
		(0.129)	(3.165)		(0.132)	(3.259)
Other Covariates		0.295	−18.685		1.862***	19.705
		(0.286)	(20.835)		(0.309)	(21.425)
Constant			19.950			−22.883
			(20.837)			(21.549)
N Observations		6,071			6,071	
N Women		2,849			2,849	
N Men		3,222			3,222	

Robust standard errors in parentheses.
*/**/*** correspond to 10%/5%/1% significance level.

Looking at the Oaxaca-Blinder decomposition for positive changes in Table 6, we find a predicted MPC^+ of 22.073 points for women and 23.695 for men in column (1). These numbers differ slightly from the raw averages in columns (2) and (3) of panel A, Table 2 because here the regression sample is used. About a third (-0.498) of the gender differences

[12]For the decomposition we strongly rely on linear models. Though there have been some attempts to estimate Oaxaca-Blinder decompositions for limited dependent variables, so far they do not allow the detailed decomposition in explained and unexplained parts as in (2).

in the MPC$^+$ can be explained by differences in characteristics presented in the table. The rest of the difference (-1.124) is "unexplained", and is a combination of differences of coefficients weighed by male and female averages, see equation (3). In column (2) differences in debt-to-income, financial literacy and numeracy all three contribute to explaining gender differences in the MPC$^+$, the contributions of the three variables have the same sign as the difference (negative). Where women have on average more unsecured debt than men and lower household income (a positive gap), it is multiplied with a negative coefficient–a higher debt-to-income ratio is associated with a smaller MPC$^+$ (see Table 5, column 2). For financial literacy and numeracy a similar logic holds: women appear to have lower scored for financial literacy and numeracy (a negative gap), but both are multiplied with positive coefficients. Turning to discouraged borrowing, liquidity constraints and risk aversion, these three variables have a positive contribution to the explained part, and hence *increases* the gap to be explained. While women are more likely to state that they did not apply for a loan in the past 12 months (which is a positive difference in characteristics), being a discouraged borrower is also associated with a larger MPC$^+$ (a positive β^*), effectively *increasing* the gender gap to be explained. The same is true for liquidity constraints and risk aversion.

In Panel B of Table 6 we explain the difference in repaying debt. As noted before, this gap is sizable: women on average allocate 5.9 points more to repaying debt. Most of this gap (3.9/5.9=66%) can be explained by differences in unsecured debt, discouraged borrowing, liquidity constraints, risk aversion and other covariates (column 5). Differences in debt-to-income, discouraged borrowing and liquidity constraints together explain about 40% of the MPD (1.278 + 0.236 + 0.880 = 2.394, which is 40% of the gap of 5.927 to be explained). This points to the importance of the debt-to-income ratio, discouraged borrowing and liquidity constraints in explaining gender differences in the MPD.

Table 7: Oaxaca-Blinder Decomposition of Responses to Unexpected Decreases in Income

	A. Marginal Propensity to Consume			B. Marginal Propensity to Borrow		
	MPC^-	Explained	Unexplained	MPB	Explained	Unexplained
	(1)	(2)	(3)	(4)	(5)	(6)
Women: Predicted outcome	76.867***			3.750***		
	(0.498)			(0.209)		
Men: Predicted outcome	71.142***			3.090***		
	(0.519)			(0.178)		
Difference	5.725***	2.435***	3.291***	0.660**	0.587***	0.072
	(0.719)	(0.364)	(0.778)	(0.275)	(0.143)	(0.290)
	100%	42.5%	57.5%	100%	88.9%	11.1%
Debt-to-income above median		0.077	1.035		0.108***	−0.106
		(0.063)	(0.795)		(0.028)	(0.301)
Discouraged borrower		−0.089	0.388		0.087*	−0.075
		(0.088)	(0.278)		(0.045)	(0.137)
Liquidity constrained		−0.164	−0.491		0.305***	−0.472
		(0.121)	(0.965)		(0.047)	(0.321)
Risk aversion financial matters		0.118	−4.442*		−0.010	0.582
		(0.160)	(2.337)		(0.058)	(0.859)
Financial literacy		0.624***	2.764		−0.257***	−0.335
		(0.217)	(2.559)		(0.089)	(1.013)
Numeracy		0.396***	−3.928		−0.088	−1.521
		(0.152)	(3.758)		(0.065)	(1.479)
Other Covariates		1.474***	−6.223		0.442***	12.003
		(0.324)	(24.867)		(0.129)	(10.056)
Constant			14.189			−10.004
			(25.205)			(10.382)
N Observations		7,124			7,124	
N Women		3,454			3,454	
N Men		3,670			3,670	

Robust standard errors in parentheses.
*/**/*** correspond to 10%/5%/1% significance level.

In Table 7 we report the Oaxaca-Blinder decompositions for spending and borrowing responses to unexpected decreases in income. Where both men and women report that they adjust a reduction in income by reducing spending, women state they will reduce spending by 5.7 percentage points more than men (column 1). Half of this difference can be explained by differences in characteristics, and mostly differences in control variables. Where differences in unsecured debt were important for explaining the gap in spending after an income increase, that is not the case for decreases in income. The positive contribution of interest rate expectations may seem surprising, but can be explained by noting that men are more likely to expect increases in interest rates (resulting in a negative difference). Households who expect interest rates to increase, reduce spending less in response to a

decrease in income (a negative β^*). Differences in financial literacy and numeracy are also important to explain the gender gap in the MPC. With respect to borrowing in response to decreases in income (Panel B), we find that the differences in unsecured debt holdings, subjective expectation of delinquency and liquidity constraints explain a little more than the gap of 0.652 points. Here we find that households holding more unsecured debt, more likely to expect to be delinquent and more likely to be liquidity constrained turn to borrowing (partially) as a means to smooth a negative shock. Since women report higher values on all three characteristics, these three variables explain most of the gap. A reason that the gap is slightly overexplained could be that the empirical model (OLS) is only an approximation explaining the marginal propensity to borrow, given the large proportion of zeroes of the dependent variable.

Overall we find that a relatively small number of variables explain gender differences in the MPC, MPB and MPD quite well. These findings are reassuring for the use of hypothetical MPCs, and our contribution, the MPD and MPB as well. In addition to risk aversion, financial literacy and numeracy, variables pointing to current and future liquidity constraints explain the gender gap. Especially for the MPCs (after both income increases and decreases) there is still a sizable part of the gap to be left explained. Focusing on the asymmetric responses in gender–that women are more likely to pay down debt and reduce spending more–the only variable contributing to the explained part in both findings is differences in expecting higher interest rates. A fuller explanation of the gender gap requires different sets of variables.

Taken together, we conclude that differences in financial literacy and numeracy explain the gender gap in the MPC^+ and MPC^-, and differences in debt-to-income, borrowing and liquidity constraints help explain the gender gap in the MPD and MPB.

3.4 Extension: Singles and Couples

One concern to our results is that our findings might be confounded by intra-household bargaining. It is important to note that by construction, all men and women in the survey data are household heads. One possibility is that men and women in couples behave

differently than singles. We control in all of the multivariate analysis for a variable whether the respondent is part of a couple or not (this variable is included in the Oaxaca-Blinder decompositions in the controls). Another possibility is that male heads and female heads who are part of a couple have different bargaining power or specialization *within* their respective couples. Though we do not have measures of intra-household specialization (e.g. into savers and spenders, see Bertaut, Haliassos and Reiter (2009)), we show that our main findings are not driven by differences in relationship status.

Table 8: Extension: Couples and Singles

	All	Male, Single	Male, Couple	Female, Single	Female, Couple
	(1)	(2)	(3)	(4)	(5)
Unexpected 10% Increase in Income					
Marginal Propensity to Consume (MPC^{+})	22.861	24.138	23.323	23.493	$20.946^{***,\dagger\dagger\dagger}$
Marginal Propensity to Repay Debt (MPD)	22.609	19.720	19.651	25.387^{***}	26.387^{***}
Marginal Propensity to Save (MPS)	54.530	56.142	57.027	51.120^{***}	52.667^{**}
Unexpected 10% Decrease in Income					
Marginal Propensity to Consume (MPC^{-})	72.585	71.100	69.230	76.304^{***}	75.407^{***}
Marginal Propensity to Borrow (MPB)	2.917	2.641	2.645	2.893	3.492^{*}
Marginal Propensity to (dis)Save (MPS)	24.498	26.259	28.125	20.803^{***}	21.101^{***}
Unsecured Debt, Borrowing and Liquidity Constraints					
Have unsecured debt (0/1)	0.770	0.699	0.768^{***}	0.764^{***}	$0.820^{***,\dagger\dagger\dagger}$
Unsecured debt (1,000)	15.148	11.206	15.207^{***}	13.201^{**}	$18.968^{***,\dagger\dagger\dagger}$
Debt-to-income ratio	0.292	0.307	0.198^{***}	0.428^{***}	$0.313^{\dagger\dagger\dagger}$
Discouraged borrower (0/1)	0.106	0.123	0.060^{***}	0.170^{***}	$0.115^{\dagger\dagger\dagger}$
Liquidity constrained (0/1)	0.536	0.570	0.420^{***}	0.652^{***}	$0.598^{\dagger\dagger\dagger}$
N Observations	9,832	1,365	3,854	2,087	2,526

Each comparison of means is made with respect to the reference category of single men.
*/**/*** correspond to 10%/5%/1% significance level.
Daggers (†) denote statistical significance for the comparison between single women and women in couples.
†/††/††† correspond to 10%/5%/1% significance level.

First we document differences in outcomes and debt characteristics, separated by single men, single women, married men and married women. Single men in Table 8 is the baseline, and t-tests on differences in the mean are all compared to single men. Comparing men in couples and single men (columns 2 and 3) we find that single men and men in couples have very similar spending, saving and debt attitudes: none of the differences are statistically significant. That implies that in terms of *outcomes* relationship status is not relevant for men. Single women and women in couples also have very similar averages for MPC, MPD

and MPS, with the exception of the MPB. Looking at the bottom half of Table 8 it is true that there are significant differences in debt holding, constraints and expectations between singles and couples. For example, both men and women in couples hold more debt than their single counterparts, which can be rationalized by higher household income. Single men and single women on average differ on each variable in the table: single women hold more debt, are more likely to be constrained, are equally likely to be discouraged borrowers, liquidity constrained and have similar expectations of delinquency. However, given that the single men and men in couples look similar on average in outcomes, and the same is true for single women and women in couples, there is not much of a gender gap to be explained. Formally we show this by including an interaction between women and couples into regression equation (1), where it should be emphasized that the dummy variable for couples was always included in regressions.

Table 9: Extension: Couples and Singles

	Unexpected Increase in Income				Unexpected Decrease in Income			
	MPC^+	MPC^+	MPD	MPD	MPC^-	MPC^-	MPB	MPB
Panel A.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	−0.453	−0.352	2.228**	1.775*	3.869***	3.868***	−0.236	−0.257
	(1.095)	(1.089)	(1.109)	(1.036)	(1.232)	(1.234)	(0.439)	(0.436)
Female x Couple	−1.153	−1.261	0.371	0.442	−1.093	−1.047	0.618	0.539
	(1.319)	(1.315)	(1.393)	(1.318)	(1.540)	(1.542)	(0.572)	(0.569)
Couple	−0.228	−0.062	2.035*	0.969	−0.854	−0.858	0.756*	0.668
	(1.066)	(1.064)	(1.057)	(0.999)	(1.246)	(1.247)	(0.421)	(0.416)
Debt, Borrowing and Liquidity Constraints	No	Yes	No	Yes	No	Yes	No	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R^2	0.058	0.062	0.125	0.203	0.033	0.033	0.027	0.038
Mean dependent variable	22.934	22.934	23.312	23.312	73.918	73.918	3.410	3.410
Fraction dependent variable zero	0.317	0.317	0.471	0.471	0.046	0.046	0.857	0.857
N observations	6,069	6,069	6,069	6,069	7,121	7,121	7,121	7,121

	Unexpected Increase in Income				Unexpected Decrease in Income			
Panel B.	MPC^+	MPC^+	MPD	MPD	MPC^-	MPC^-	MPB	MPB
Female	−1.172*	−1.138*	2.459***	2.050***	3.189***	3.217***	0.148	0.078
	(0.661)	(0.660)	(0.718)	(0.678)	(0.778)	(0.778)	(0.292)	(0.290)
Couple	−0.849	−0.740	2.235***	1.206	−1.454*	−1.432	1.096***	0.964***
	(0.747)	(0.746)	(0.792)	(0.755)	(0.882)	(0.882)	(0.342)	(0.340)
Debt, Borrowing and Liquidity Constraints	No	Yes	No	Yes	No	Yes	No	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R^2	0.058	0.062	0.125	0.203	0.033	0.033	0.027	0.038
Fraction dependent variable zero	0.317	0.317	0.471	0.471	0.046	0.046	0.857	0.857
Mean dependent variable	22.934	22.934	23.312	23.312	73.918	73.918	3.410	3.410
N observations	6,071	6,071	6,071	6,071	7,124	7,124	7,124	7,124

All equations are estimated with OLS. Robust standard errors in parentheses. Covariates include the same set of variables and transformations as in Table 4 MPD is the marginal propensity to repay debt, MPB is the marginal propensity to borrow. Panel B. is for reference and shows results from Table 5. */**/*** correspond to 10%/5%/1% significance level.

Panel A of Table 9 shows the results, while Panel B replicates the coefficients for female and couple from Table 5. Even columns include the same variables for unsecured debt, constraints and expectations. Looking at repaying debt (MPD) after an increase in income we see that the interaction term is not statistically significant in both columns (3) and (4). The main effect is still on women in general, though the inclusion of the interaction effect reduces the precision (compare column (4) in Panel A and Panel B). For the MPC after decreases in income, women in couples have a somewhat smaller reduction in spending, though the interaction effect is not statistically significant. None of the interaction effects in Panel A are statistically significant, giving credence to the idea that our main findings are not driven by relationship status. However, that is not to say that relationship status does not matter: it does, especially for paying down debt and borrowing (Panel B). It would be very interesting to study the effects of intra-household bargaining on the MPC, but we leave that to future research.

4 Theory

In the empirical part we document the following four findings: (i) a sizable MPC asymmetry between unexpected income increases and decreases; (ii) women have a smaller MPC^+ and a larger MPD after an income gain; (iii) women have a larger MPC^- after a decrease in income; and (iv) *differences* in unsecured debt-to-income, liquidity/borrowing constraints and risk aversion explain *differences* in the marginal propensities to spend and adjust debt. Several studies point out that borrowing constraints can explain the first finding of MPC asymmetry, see e.g. Bunn et al. (2018); Christelis et al. (2019); Fuster, Kaplan and Zafar (2020), so we will use a model of borrowers facing occasionally binding borrowing constraints.

We extend a simple model presented in Bunn et al. (2018) by adding the MPD and MPB as responses in addition to the MPC. Like Bunn et al. (2018) we use the toolkit developed by Guerrieri and Iacoviello (2015) that allows for occasionally binding borrowing

constraints. In addition to potentially binding borrowing constraints, we focus on the roles of the debt-to-income ratio and the risk aversion parameter.

Assume that lifetime preferences over consumption are given by:

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\gamma} - 1}{1-\gamma} \tag{4}$$

The household budget constraint is given by:

$$c_t + Rd_{t-1} = y_t(1-H) + d_t \tag{5}$$

Where d_{t-1} is end of period gross debt, household income is given by y_t, with H as a subsistence level (housing). Each period households choose consumption c_t and unsecured debt d_t.

The model has two regimes, one being governed by a borrowing limit. In the baseline the borrowing limit is given as a proportion M of income:

$$d_t \leq My_t \tag{6}$$

The income process is: $\log(y_t) = \rho\log(y_{t-1}) + \sigma\epsilon_t$, where ϵ is an i.i.d. normally distributed shock with mean zero and unitary standard deviation. We calibrate the model at an annual frequency to match the survey question setting, setting β equal to 0.98 and the real interest rate $R = 1.02$. With this calibration households are impatient, making this effectively a model of borrowers. Such a model suits our purposes given that we are interested in the question how households repay debt after positive income changes, and respond to negative income changes. For the income process, we use $\rho = 0.9$ for the persistence and $\sigma = 0.0131$, same for men and women. Though men and women have different income *levels* in the data, what matters in the model is the response to *shocks* to income. The survey questions ask about a 10% change in household income (positive and negative), which we interpret as a proportionate shock to income $\bar{\epsilon}$. In the baseline scenario we set the parameter of relative risk aversion $\gamma = 1$ and the maximum loan-to-income value $M = 0.227$, which is the average value for men in the data.

Following Bunn et al. (2018) we solve the model using the toolkit developed in Guerrieri

and Iacoviello (2015) which allows for occasionally binding borrowing constraints (the frequency of "occasionally" is determined by the calibration). The model essentially solves for two regimes, one where the borrowing constraint does not bind and the household smooths consumption optimally, borrowing if necessary:

$$\lambda_t = \frac{1}{c_t} - \frac{\beta R}{c_{t+1}} \tag{7}$$

In the regime where the borrowing constraint is binding, households can only borrow at the maximum loan-to-income value. We will then show the results of different scenarios where we allow men and women to have different borrowing limits and different levels of risk aversion.

Table 10 shows the results for this model calibration for different scenarios. The first scenario replicates the MPC-asymmetry that Bunn et al. (2018) report for the UK (finding (i)). The calibrated MPC out of an unexpected increase in income is around 19.4, and the MPC out of an unexpected decrease is around 82.7, which is close to the averages in the data (that would be the average of 22.1 and 23.4 for the MPC^+ and the average of 76.7 and 70.7 for the MPC^-.). Not reported in Bunn et al. (2018) are the marginal propensities to adjust debt. The calibrated values reflect that this is a model of borrowers, not savers: the sum of the MPC^+, MPD and H equals one.[13] That explains why the MPB is *negative*: when faced with a negative income shock, households' borrowing constraint tightens (since it is a function of income). In order to borrow in future periods, households repay debt right away and cut spending even more. This implies that the model limits us to explain gender differences in the MPC^+, MPD and MPC^-, since there is no borrowing after a negative income shock. Though that is a limitation, the model can still qualitatively explain gender *differences* in the MPD and the MPC^-.

In scenario (2) we allow women to have a higher DTI. Similar to Bunn et al. (2018),

[13]Models where households are allowed to save and borrow at the same time are much more complicated, see Fulford (2015) or Druedahl and Jørgensen (2018). Both studies look into the co-holding puzzle with a focus on the possibility that households suddenly lose access to credit. This gives rise to a precautionary borrowing motive in the sense that households borrow in order to keep access to future credit. This motive is absent in our study.

Table 10: Model Simulations

		Increase in Income		Decrease in Income	
		MPC^+	MPD	MPC^-	MPB
		(1)	(2)	(3)	(4)
Data	Female	22.09	25.94	76.76	3.90
	Male	23.54	19.67	70.65	3.33
	Difference	**-1.45**	**+6.27**	**+6.11**	**+0.57**
(1) Same risk aversion & DTI	Female	19.40	40.60	82.70	-22.70
$\gamma_M = \gamma_F = 1$, $DTI_M = DTI_F = 0.227$	Male	19.40	40.60	82.70	-22.70
	Difference	**0.00**	**0.00**	**0.00**	**0.00**
(2) Same risk aversion, different DTI	Female	19.37	40.63	96.60	-36.60
$\gamma_M = \gamma_F = 1$, $DTI_M = 0.227, DTI_F = 0.366$	Male	19.40	40.60	82.70	-22.70
	Difference	**-0.03**	**+0.03**	**+13.90**	**-13.90**
(3) Different risk aversion, same DTI	Female	13.65	46.35	82.70	-22.70
$\gamma_M = 1, \gamma_F = 3$, $DTI_M = DTI_F = 0.227$	Male	19.40	40.60	82.70	-22.70
	Difference	**-5.75**	**+5.75**	**0.00**	**0.00**
(4) Different risk aversion & DTI	Female	13.64	46.36	96.60	-36.60
$\gamma_M = 1, \gamma_F = 3$, $DTI_M = 0.227, DTI_F = 0.366$	Male	19.40	40.60	82.70	-22.70
	Difference	**-5.76**	**+5.76**	**+13.90**	**-13.90**

Data refers to the averages from Table 2. All scenarios have a subsistence level of $H = 0.4$, same for men and women, so that $MPC^+ + MPD + H = 1$ for positive income shocks, and $MPC^- + MPB + H = 1$ for negative shocks.

this largely affects the response to negative income shocks: women now decrease spending more than men when faced with a decrease in income. The intuition is that because women have a higher DTI, a negative shock to income affects their borrowing constraint more. In order to be able to borrow in the future, women cut spending and repay debt. Note that in the model simulations by construction the gender differences are of equal (opposite) size. In scenario (3) we give women and men the same DTI, but set a larger coefficient of risk aversion for women, $\gamma = 3$, where men have log utility ($\gamma = 1$).[14] Here we find that differences in risk aversion only matter for the response to positive income shocks: women have a smaller MPC^+ and a larger MPD than men. In scenario (4) we combine the parameter values of scenarios (2) and (3), and find that a combination of differences in risk aversion and debt-to-income is qualitatively consistent with findings (2)-(4). An interesting insight from this simple model is that risk aversion and debt-to-income ratio work on different types of income shocks. Risk aversion affects the response of households to positive income shocks, but not to negative income shocks. The reason for this asymmetry is that this is a model of potentially binding borrowing constraints. The debt-to-income mainly affects the response to negative income shocks.[15]

5 Conclusions

We use survey responses to hypothetical income changes how households would adjust spending, debt and saving. Our main contribution is documenting that men and women have different smoothing behavior with respect to relatively small increases or decreases of income (approximately one month's worth of income). Women are more likely to repay debt, and allocate more to paying down debt after an income increase. Women are also

[14] We choose these values to match the MPD differences in the data. We reported in the descriptive analysis that women are more risk averse than men, but there is no clear mapping from the scale used in the survey to coefficients of relative risk aversion in the model. A value of $\gamma = 3$ is in the range of values commonly used for the CRRA parameter.

[15] This leaves an interesting question open, why more risk-averse households (women) would have higher debt-to-income ratios. Two potential explanations that are outside the scope of the model are that there are non-linearities of borrowing over income (low income households tend to borrow more), and that female households might be more susceptible to past adverse expenditure shocks.

more likely to reduce spending, and reduce spending more than men after an unexpected decrease of income. Much of these gender differences can be explained by differences in unsecured debt, liquidity constraints and expectations over interest rate increases and debt delinquency, in addition to differences in financial literacy, numeracy and risk aversion.

Though the description and explanation of gender differences in the MPC is new, many of our results are qualitatively comparable to studies using realized spending data: in particular the high MPC after unexpected increases in income, the pattern of both increasing spending and paying down debt, and the role of liquidity and liquidity constraints. Our results are silent with respect to relatively larger income changes (as in Christelis et al. (2019) and Fuster, Kaplan and Zafar (2020)). Moreover, a general drawback of studies using hypothetical income changes is that any dynamics cannot be documented (e.g. Agarwal, Liu and Souleles (2007)).

There are three interesting avenues for future research that could follow our results. First is related to the larger literature on gender differences in household finance, ranging from knowledge, financial sophistication and use of financial advisers to differential targeting of women by banks and other lending institutions. Though we find that women hold more unsecured debt, we also find that women report being more liquidity constrained and have higher delinquency expectations. The missing variables here are the quality of debt and the price of debt. The second question pertains to policy, whether gender could be used as a variable to design more optimal stimulus packages, for example by targeting or by earmarking stimulus packages for debt relief. The third avenue would be to see whether gender norms and roles can explain the remainder of the gender difference in spending and debt behavior. In conclusion we point out the power of survey instruments in describing are more complete allocation of spending, saving and debt categories, but also that a lot can be learned from surveying both positive and negative income changes.

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Online Appendix–Not For Publication

%endtable

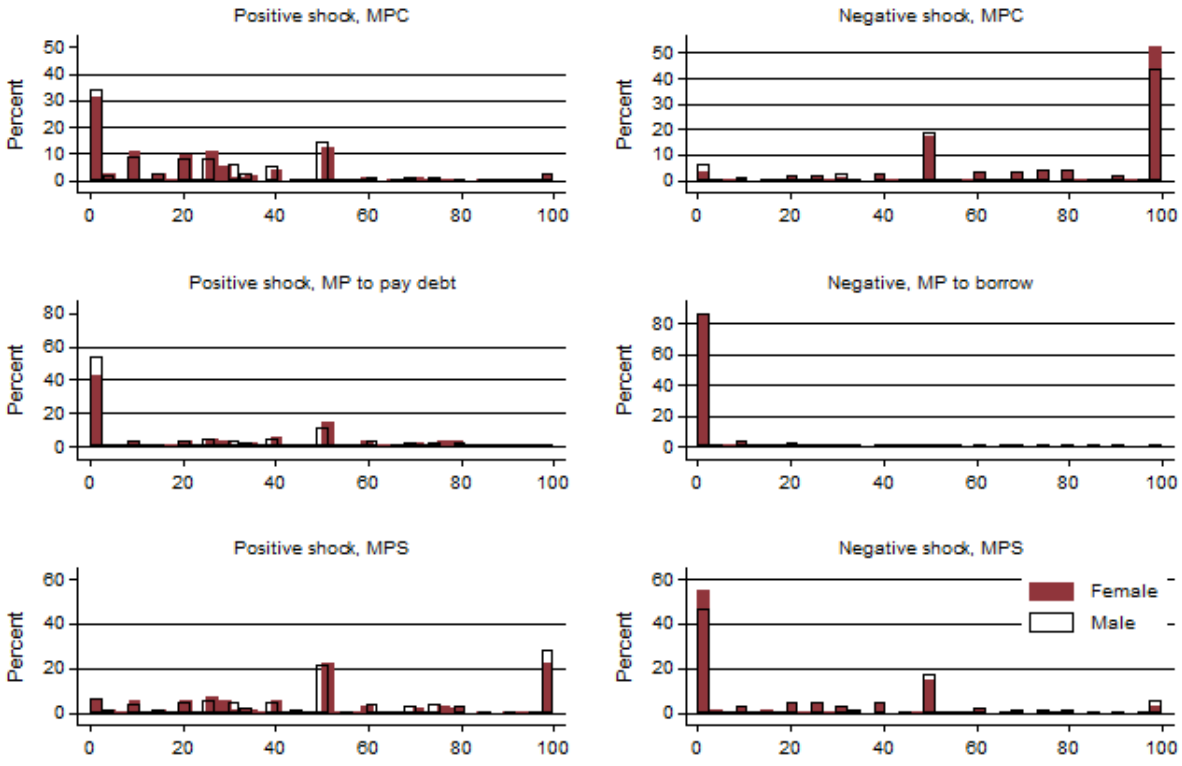


Figure A1: Histograms

Figures on the left show the stated responses to a 10% increase in income, figures on the right answers to a 10% decline. Figures on the top are the percent increase in consumption (MPC), respectively decrease in consumption. Figures at the bottom are the Marginal Propensity to Repay Debt (MPD), and the Marginal Propensity to Borrow (MPB).

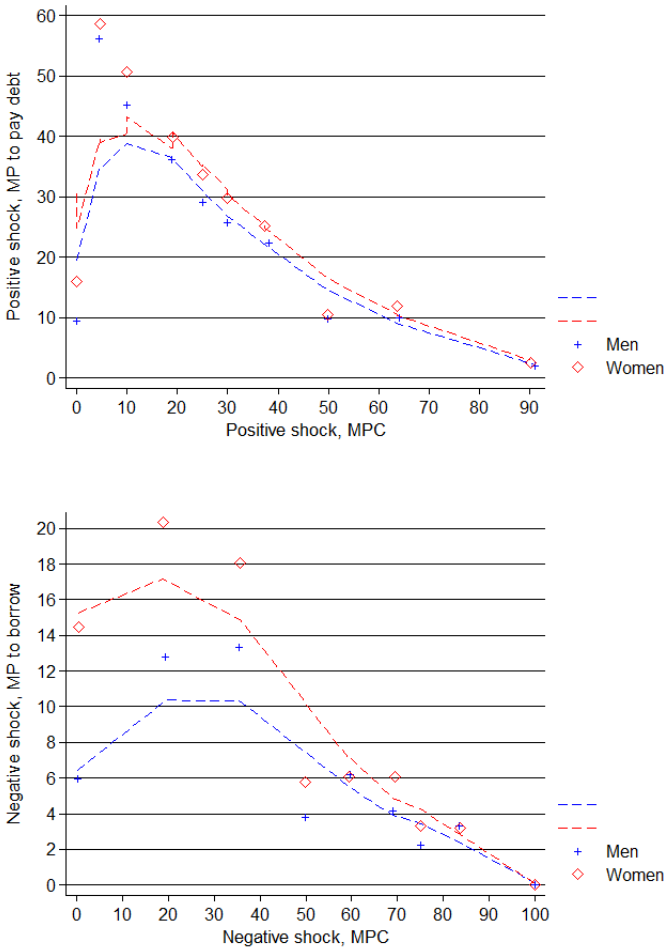


Figure A2: Joint Distribution of Marginal Propensity to Consume and to Marginal Propensity to Pay Down Debt

Figures show the joint consumption and loan repayment responses to a 10% change in income. Each dot is the average value in deciles, dashed lines are lowess smoothers. Omitted category is savings.

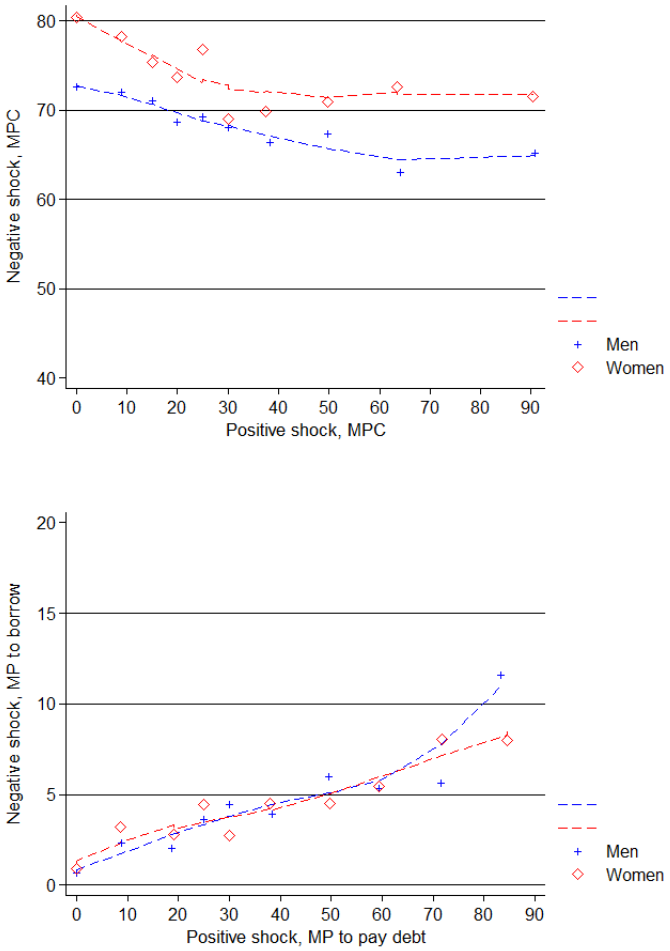


Figure A3: Asymmetry in Spending Propensities with Positive and Negative Income Changes

Figures show the joint distribution of the marginal propensity to consume out of positive and negative income changes.

Table A1: Extension: Allocation

	Increase in Income		Increase in Income		Decrease in Income		Decrease in Income	
	d_MPC^{+}	d_MPD	MPC^{+}	MPD	d_MPC^{+}	d_MPB	MPC^{-}	MPB
	(1A)	(1B)	(2A)	(2B)	(3A)	(3B)	(4A)	(4B)
Female	−0.001	0.017	−1.129*	2.431***	0.027***	−0.001	3.531***	−0.106
	(0.012)	(0.013)	(0.635)	(0.693)	(0.006)	(0.007)	(0.763)	(0.303)
I liquid financial assets quintile	−0.068***	0.458***	0.654	21.993***	0.038***	0.135***	8.712***	4.716***
	(0.019)	(0.020)	(0.977)	(1.065)	(0.009)	(0.012)	(1.160)	(0.460)
II liquid financial assets quintile	−0.053**	0.487***	−2.198**	24.261***	0.070***	0.136***	6.337***	3.959***
	(0.022)	(0.023)	(1.100)	(1.200)	(0.011)	(0.013)	(1.317)	(0.522)
III liquid financial assets quintile	−0.002	0.313***	−0.427	14.628***	0.049***	0.091***	4.316***	2.382***
	(0.019)	(0.020)	(0.930)	(1.014)	(0.010)	(0.012)	(1.150)	(0.456)
IV liquid financial assets quintile	0.005	0.181***	−1.604*	7.065***	0.043***	0.040***	3.457***	0.958**
	(0.018)	(0.019)	(0.876)	(0.955)	(0.009)	(0.013)	(1.101)	(0.437)
Risk aversion financial matters	0.005	0.009**	0.845***	0.548**	0.001	0.003	0.206	−0.043
	(0.004)	(0.004)	(0.196)	(0.214)	(0.002)	(0.002)	(0.237)	(0.094)
Financial literacy	0.126***	0.064**	5.947***	2.984**	0.034***	0.041***	−4.866***	1.757***
	(0.026)	(0.026)	(1.331)	(1.451)	(0.013)	(0.015)	(1.575)	(0.625)
Numeracy	0.069**	0.067**	6.387***	1.876	0.043***	0.047**	−4.898**	0.212
	(0.032)	(0.033)	(1.656)	(1.805)	(0.016)	(0.019)	(1.975)	(0.783)
$\hat{\rho}$	-0.165***		-0.155***		-0.044		-0.383***	
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dependent variable	0.510	0.523	22.844	23.920	0.918	0.111	73.834	3.683
N observations	8,092		6,487		8,092		7,677	

Point coefficients after system of equation estimation. MPD is the Marginal Propensity to Repay debt, MPB is the Marginal Propensity to Borrow. Variables Pr(MPC^{+}), Pr(MPD), Pr(MPC^{-}) and Pr(MPB) are the probabilities that a response category is mentioned. Column pairs (1A)-(1B) and (3A)-(3B) are estimated with bivariate probit. Column pairs (2A)-(2B) and (4A)-(4B) are estimated with seemingly unrelated regressions (OLS). Controls include all variables in Table 1.
*/**/*** correspond to 10%/5%/1% significance level.

Table A2: Extension: Allocation and Asymmetry

	Positive Income Change		Positive Income Change		Negative Income Change		Negative Income Change	
	Pr(MPC=1)	Pr(MPD=1)	MPC	MPD	Pr(MPC=1)	Pr(MPB=1)	MPC	MPB
Panel A. Allocation	(1A)	(1B)	(2A)	(2B)	(3A)	(3B)	(4A)	(4B)
Female	0.010	0.019	−0.936	2.702**	0.026***	−0.012	4.753***	−0.732
	(0.020)	(0.020)	(1.008)	(1.099)	(0.010)	(0.011)	(1.209)	(0.480)
Female x Couple	−0.018	−0.003	−0.306	−0.430	0.001	0.018	−1.937	0.993*
	(0.024)	(0.025)	(1.242)	(1.354)	(0.012)	(0.014)	(1.487)	(0.590)
Couple	0.004	0.033*	−0.655	2.456**	−0.001	−0.001	−0.216	0.464
	(0.019)	(0.020)	(0.978)	(1.066)	(0.010)	(0.011)	(1.181)	(0.468)
$\hat{\rho}$	-0.165***		-0.155***		-0.044		-0.382***	
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dependent variable	0.510	0.523	22.844	23.920	0.918	0.111	73.834	3.683
N observations	8,092		6,487		8,092		7,677	

	Pr(MPC=1)		MPC		Pr(MP Debt=1)		MP Debt	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Panel B. Asymmetry	(1A)	(1B)	(2A)	(2B)	(3A)	(3B)	(4A)	(4B)
Female	0.010	0.026***	−1.113	4.839***	0.018	−0.011	2.510**	−0.569
	(0.020)	(0.010)	(1.027)	(1.346)	(0.020)	(0.011)	(1.120)	(0.465)
Female x Couple	−0.018	0.001	−0.059	−1.882	−0.002	0.017	0.016	0.850
	(0.024)	(0.012)	(1.265)	(1.657)	(0.025)	(0.014)	(1.379)	(0.572)
Couple	0.003	−0.002	−0.802	−0.542	0.033*	−0.000	2.298**	0.750*
	(0.019)	(0.010)	(0.996)	(1.305)	(0.020)	(0.011)	(1.086)	(0.451)
$\hat{\rho}$	0.087***		0.089***		0.447***		0.197***	
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dependent variable	0.510	0.918	22.914	72.904	0.523	0.111	23.981	3.001
N observations	8,092		6,224		8,092		6,224	

Similar specification and estimation as in Table A1.
*/**/*** correspond to 10%/5%/1% significance level.

Table A3: Gender Differences in Debt, Discouraged Borrowing and Liquidity Constraints

	Couples and Singles				Singles			
	DTI	DTI>median	Discouraged Borrower	Liquidity Constrained	DTI	DTI>median	Discouraged Borrower	Liquidity Constrained
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.035**	0.015	0.015*	0.017	0.064**	0.025	0.009	−0.016
	(0.015)	(0.012)	(0.008)	(0.011)	(0.032)	(0.020)	(0.014)	(0.018)
Risk aversion financial matters	−0.015***	−0.001	−0.008***	−0.000	−0.018*	−0.003	−0.006	−0.001
	(0.005)	(0.004)	(0.002)	(0.003)	(0.010)	(0.006)	(0.004)	(0.005)
Financial literacy	0.008	−0.031	−0.047***	−0.123***	−0.019	−0.036	−0.038	−0.086**
	(0.031)	(0.025)	(0.017)	(0.022)	(0.061)	(0.039)	(0.029)	(0.034)
Numeracy	0.038	0.052	−0.014	−0.148***	0.164*	0.123**	−0.035	−0.170***
	(0.054)	(0.032)	(0.022)	(0.027)	(0.091)	(0.049)	(0.037)	(0.040)
I financial assets quintile	0.210***	0.318***	0.172***	0.352***	0.298***	0.350***	0.206***	0.351***
	(0.019)	(0.018)	(0.011)	(0.017)	(0.043)	(0.031)	(0.019)	(0.031)
II financial assets quintile	0.226***	0.374***	0.091***	0.322***	0.271***	0.398***	0.080***	0.329***
	(0.028)	(0.020)	(0.013)	(0.019)	(0.054)	(0.034)	(0.020)	(0.032)
III financial assets quintile	0.104***	0.270***	0.043***	0.190***	0.111***	0.291***	0.052***	0.150***
	(0.014)	(0.018)	(0.009)	(0.018)	(0.032)	(0.033)	(0.016)	(0.034)
IV financial assets quintile	0.041***	0.122***	0.007	0.066***	0.052*	0.101***	0.009	0.054
	(0.012)	(0.017)	(0.006)	(0.017)	(0.030)	(0.032)	(0.013)	(0.033)
Other covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R^2	0.155	0.123	0.142	0.213	0.125	0.125	0.138	0.207
Mean dependent variable	0.341	0.519	0.125	0.589	0.450	0.518	0.166	0.662
N observations	7,487	7,487	7,902	7,890	2,789	2,789	2,892	2,891

All regressions are estimated with OLS. Robust standard errors in parentheses. Covariates include the same set of variables as in Table 1. Dependent variable in columns (1) and (5) is the debt-to-income ratio (DTI). Dependent variable in columns (2) and (6) is a binary variable if the DTI is larger than the median DTI in the overall sample. Column pairs (3) and (7), and (4) and (8) use binary variables whether the household is a discouraged borrower, respectively liquidity constrained.
*/**/*** correspond to 10%/5%/1% significance level.

Table A4: Extension: Singles Only

	Increase in Income		Increase in Income		Decrease in Income		Decrease in Income	
	MPC	MPC	MPD	MPD	MPC	MPC	MPB	MPB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	−0.288	−0.240	1.196	0.892	3.766***	3.682***	−0.098	−0.078
	(1.202)	(1.198)	(1.180)	(1.138)	(1.280)	(1.283)	(0.442)	(0.441)
Debt-to-income above median		−0.677		5.264***		1.077*		0.402
		(0.646)		(0.798)		(0.645)		(0.277)
Discouraged borrower		4.450***		1.716		1.325		−0.810
		(1.595)		(1.795)		(1.694)		(0.760)
Liquidity constrained		0.710		8.333***		−0.774		2.475***
		(1.185)		(1.231)		(1.378)		(0.424)
Financial literacy	7.025***	7.073***	2.750	3.712	−6.122**	−6.160**	2.114**	2.304***
	(2.255)	(2.251)	(2.413)	(2.369)	(2.473)	(2.469)	(0.855)	(0.852)
Numeracy	3.389	3.494	−3.035	−2.174	−2.688	−2.905	−0.512	−0.178
	(2.954)	(2.963)	(3.026)	(2.973)	(3.100)	(3.099)	(1.352)	(1.352)
Risk aversion financial matters	0.828**	0.842**	0.701**	0.791**	0.630*	0.652*	0.023	0.026
	(0.331)	(0.332)	(0.356)	(0.346)	(0.383)	(0.383)	(0.136)	(0.135)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adjusted R^2	0.072	0.075	0.142	0.184	0.028	0.028	0.021	0.030
Fraction dependent variable zero	0.308	0.308	0.469	0.469	0.042	0.042	0.862	0.862
Mean dependent variable	24.118	24.118	23.708	23.708	76.209	76.209	3.250	3.250
N observations	2,211	2,211	2,211	2,211	2,645	2,645	2,645	2,645

Similar specification and estimation as in Table 5, but only for single households.
*/**/*** correspond to 10%/5%/1% significance level.

A Variable Description

A.1 Survey of Consumer Expectations

This section provides the exact wording of the questions we used to construct the variables for our empirical analysis. The full questionnaire can be found at the website of the New York FED http://www.newyorkfed.org/microeconomics/sce/. While the MPC questions are a part of the quarterly module on consumer's spending, other variables were derived based on the questions from the monthly survey.

- **QSP12n Marginal propensities to spend / save / pay debt out of positive windfall - qualitative**: Suppose next year you were to find your household with **10 percent more** income than you currently expect. What would you do with the extra income?
  - Save or invest all of it (1)
  - Spend or donate all of it (2)
  - Use all of it to pay down debts (3)
  - Spend some and save some (4)
  - Spend some and use part of it to pay down debts (5)
  - Save some and use part of it to pay down debts (6)
  - Spend some, save some and use some to pay down debts (7).

  If items 4,5,6, or 7 of QSP12n are selected:

- **QSP12a Marginal propensities to spend / save / pay debt out of positive windfall - quantitative**: Please indicate what share of the extra income you would use to... (Please note that the three proportions need to add up to 100 percent)?
  - Save or invest () percent (1)
  - Spend or donate () percent(2)

  - Pay down debts () percent (3)

- **QSP13new Marginal propensities to cut spending / saving / borrow to cover unexpected loss - quantitative**: Now imagine that next year you were to find yourself with 10 percent less household income. What would you do?

  - Cut spending by the whole amount (1)
  - Not cut spending at all, but cut my savings by the whole amount (2)
  - Not cut spending at all, but increase my debt by borrowing the whole amount (3)
  - Cut spending by some and cut savings by some (4)
  - Cut spending by some and increase debt by some (5)
  - Cut savings by some and increase debt by some (6)
  - Cut spending by some, cut savings by some and increase debt some (7).

  If items 4,5,6, or 7 of QSP13new are selected:

- **QSP13a Marginal propensities to cut spending / saving / borrow to cover unexpected loss - quantitative**: Please indicate what share of the lost income you would cover by..... (Please note that the three proportions need to add up to 100 percent)?

  - Reducing spending () percent (1)
  - Reducing saving () percent(2)
  - Increasing borrowing () percent (3)

As controls, we include the following variables in all regressions:

- From the core monthly survey, **QRA1 Risk aversion financial matters**: On a scale from 1 to 7, how would you rate your willingness to take risks regarding financial

matters? Answer categories are: 1 is "'not willing at all"' 7 is "'very willing"'. The coding of this variable is reversed so that higher values correspond to more risk aversion in financial matters.

- From the core monthly survey, **Financial literacy**. First, responses to the three questions listed below are transformed to a score equal to 1 if the answer is correct and zero otherwise. Financial literacy measure is calculated as a mean of the three answers, and is therefore between zero and one. The questions used to measure financial literacy are following:

    1. **QNUM2 Compound interest**: Let's say you have $200 in a savings account. The account earns ten percent interest per year. Interest accrues at each anniversary of the account. If you never withdraw money or interest payments, how much will you have in the account at the end of two years?
    2. **QNUM8 Inflation**: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account? Answers: (1) More than today (2)Exactly the same (3) Less than today
    3. **QNUM9 Stocks / Diversification**: Please tell me whether this statement is true or false: Buying a single company's stock usually provides a safer return than a stock mutual fund. Answers: (1) True (2) False

- From the core monthly survey, **Numeracy**. Responses to the four questions listed below are transformed to a score equal to 1 if the answer is correct and zero otherwise. Numeracy measure is calculated as a mean of the answers, and is therefore between zero and one. The questions used to measure numeracy are following:

    1. **QNUM1 Half-price**: In a sale, a shop is selling all items at half price. Before the sale, a sofa costs $300. How much will it cost in the sale?

2. **QNUM3 1 Percent**: In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize are 1%. What is your best guess about how many people would win a $10.00 prize if 1,000 people each buy a single ticket from BIG BUCKS?
3. **QNUM5 10 Percent**: If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease?
4. **QNUM6 0.0005 Percent chance**: The chance of getting a viral infection is 0.0005. Out of 10,000 people, about how many of them are expected to get infected?

In addition to unsecured debt, we include measures of liquidity constraints and discouraged borrowing:

- From the quarterly credit access survey, **N5 Discouraged borrowers**: You just indicated that you did not apply for any new loans or credit cards over the past twelve months, nor did you make any request for an increase in limits, or refinancing. What is the reason for that? Answer categories: I did not think I would get approved (Option 5).
- From the quarterly credit access survey, **N25 Liquidity constraint**: What do you think is the percent chance that you could come up with 2,000 Dollars if an unexpected need arose within the next month? We follow Crump et al. (2018) and generate a binary variable that is one if a household answers 0% to this question and zero otherwise.