Gender Differences in the Marginal Propensities to Consume, Pay Down Debt and Borrow

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Abstract

We use responses to survey questions in the NY Fed Survey of Consumer Expectations that ask how households would adjust spending, saving and debt in response to an unexpected 10% change in income. We report substantial differences in how men and women respond to both positive and negative income changes. Women are more inclined to pay down debt after an unexpected increase in income, but borrow very little after a reduction in income (though they do borrow more than men). Both men and women reduce spending by a large amount to absorb a decrease in income, where women reduce spending more than men. Debt holdings and borrowing constraints could explain these findings. We report that women hold more unsecured debt, are more likely to be liquidity constrained and to be discouraged borrowers. In Oaxaca-Blinder decompositions gender differences in the debt-to-income ratio, borrowing and liquidity constraints explain about 40% of the gender differences in the marginal propensity to pay down debt, and 75% of the marginal propensity to borrow.

Keywords: Gender differences; Loan repayment; Subjective expectations; Household debt; Spending response; Marginal propensity to consume.
JEL classification: C81, C83, D12, D14, E21, G51

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1 Introduction

The marginal propensity to consume (MPC) is an important quantity for both economic policy and economic modeling. On the policy side the MPC is a relevant parameter to assess the effectiveness of stimulus policies (see for example Broda and Parker (2014)). On the theory side empirical estimates of the MPC are used to distinguish between competing explanations of consumer behavior. In the context of stimulus policies, 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). A relatively understudied topic is how consumers use windfall income to pay down debt: the marginal propensity to pay down debt (MPD). For stimulus policies the MPD is a relevant margin in addition to the MPC. On the one hand, a higher MPD could imply a lower MPC, which could dampen the effect of stimulus policy. On the other hand, highly indebted households could have higher MPCs in the future, if they pay down debt now and relax their current borrowing constraint to create breathing room later on.

We study the MPC and the MPD for the same household, for both positive income changes and negative income changes (in which case the MPD is the MPB: the marginal propensity to borrow). We study differences between women and men, which (to the best of our knowledge) is a contribution in itself. In particular we relate the marginal propensities to consume, pay back debt and borrow to household balance sheet variables and measures of borrowing and liquidity constraints. The data we use is the NY Fed Survey of Consumer Expectations, in particular, 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. Though these are reported effects– as opposed to revealed preferences in the classification of Parker and Souleles (2019), the

advantages are numerous: (i) it presents the complete description of spending, borrowing and saving for the same household; (ii) allows to study asymmetry in responses to positive and negative income changes; (iii) could be studied in the relation to more complete overview of household balance sheets and borrowing constraints. In their work Fuster, Kaplan and Zafar (2018); Christelis et al. (2019) describe variations in spending response due to the size of the income shock, using the hypothetical survey questions about the income changes of different magnitude. While we do not have this possibility in our data, the wording in the survey frames the income changes in terms relative to income of the household. This greatly facilitates the study of gender differences, without having to worry about differences in the level of income between men and women.

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 suggestive, but promising. Parker and Souleles (2019) studies reported and revealed spending responses to the 2008 tax rebates in the United States. Bunn et al. (2018) studies a variety of realized income changes in the United Kingdom (i.e. due to new jobs, higher than expected pay or pension income increases, and loss of benefits, higher taxes). For a subsample they have both realized and reported MPCs. Both studies report that qualitatively reported effects are related to actual MPCs.[1] We build on these results and extend the analysis of reported effects to study gender differences, and a more complete description of household behavior studying joint MPC and MPD changes after positive income shocks, respectively changes in spending and borrowing in response to negative income shocks.

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 con-

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

text of MPCs (nor is gender always included as a control variable). Our main descriptive findings are that men and women differ in the following three ways. First, women have a larger propensity to pay down 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. Both men and women absorb declines in income by adjusting spending, an asymmetry documented by others (Fuster, Kaplan and Zafar (2018); Bunn et al. (2018); Christelis et al. (2019)). The third gender difference we find is that women reduce spending (even) more than men after a negative income change.

In theory 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, live longer on average and tend to appear less financially literate. Aguiar, Bils and Boar (2020) would classify some of these variables under preference heterogeneity. Though we control for risk attitudes and financial literacy (which indeed is a source of relevant gender differences in our analysis), we consider that the three descriptive findings combined may be the result of differences in unsecured debt holdings (which would explain gender difference in MPC and MPD after a positive income change), as well as borrowing/liquidity constraints (which explains both the MPC asymmetry between positive and negative income changes and the gender difference in MPCs). 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. In Oaxaca-Blinder decompositions 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, where interestingly enough we find that borrowing and liquidity constraints do not help explain gender *differences* (they are important variables explaining the MPC). The exception is debt-to-income in explaining gender differences in

the MPC after positive income changes.

Literature This paper is related to three strands of literature. The first literature 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, Slemrod et al., 1995; Shapiro and Slemrod, 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), or distinguish between small and large hypothetical income shocks (Christelis et al., 2019; Fuster, Kaplan and Zafar, 2018). 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. Models with differences in liquid wealth holdings and borrowing constraints can qualitatively generate the extensive margin and the asymmetry, but have difficulty matching the difference between small and large income shocks. The second strand of literature is much smaller and studies how households pay down 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 (=saving) 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. 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 to both strands of literature 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, liquidity/borrowing

constraints and expectations over interest rates and loan delinquency are important in understanding spending and debt repayment patterns in general and gender differences in particular. The third strand of literature pertains to gender differences in outcomes and behavior in economics in general and household finance in particular. We contribute to this literature by documenting and explaining gender differences in the spending and borrowing/repayment responses to unexpected changes in income.

We document our results in the following way. First we describe the data (Section 2) – the NY Fed Survey of Consumer Expectations, and provide descriptives of the outcome variables in this study (Section 3.1): spending, repayment and saving after an both income increases and decreases. Part of the descriptive analysis is documenting the joint allocation of spending and debt behavior, and the asymmetry between positive and negative income changes. The main analysis (Sections 3.2 and 3.3) 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 unsecured debt, liquidity and borrowing constraints in explaining the gender gap. In a brief extension (Section 3.4) 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, pay down debt and borrow as a function of 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 household's 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 our dataset starts in August 2015 due to availability of variables, and ends in December 2018, which was publicly available at the time of analysis.

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. This definition does not exclude that there could be multiple household heads. 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 measures of the propensity to change spending, saving or loans, the direction depending on the income change surveyed. Respondents are presented with a hypothetical scenario that next year they find themselves with 10 percent more household income than they currently expect. Respondents can allocate percentage points over saving, spending and paying down debt.[2] The format is such that it is made sure that the points allocated to the categories sum to a 100. Next, respondents are asked a similar question with similar response categories for the event that they find themselves with 10 percent less household income than expected. 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.[3] 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:

[2]The response categories do not allow for distinguishing non-durable from durable spending. However, Fuster, Kaplan and Zafar (2018) use the same sample SCE allow for both response categories and find that most of the points are allocated to non-durable spending.

[3]Emphasis in original.

- **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)?

  - 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, saving, and paying down debt, 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 respectively "Reducing spending", "Reducing savings", and "Increasing borrowing". 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 set to be constant relative to income of the household. Some other surveys use a fixed dollar amount, which complicates comparisons between households. 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). 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, saving and borrowing responses. Qualitative response categories are not easy to compare or aggregate (though we will study both the qualitative and the quantitative responses). A third advantage is that the survey asks for both hypothetical allocations for both positive and negative income changes of the same relative magnitude (10 percent of the annual household income). This allows for studying potential asymmetries in responses within household, as Christelis et al. (2019) 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 (spending or consumption), 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, 2018), 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 (2018) 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. Duca-Radu, Kenny and Reuter (2021) shares this challenge. However, Parker and Souleles (2019) using both hypothetical and realized outcomes reports that realized outcomes are qualitatively similar to hypothetical responses.

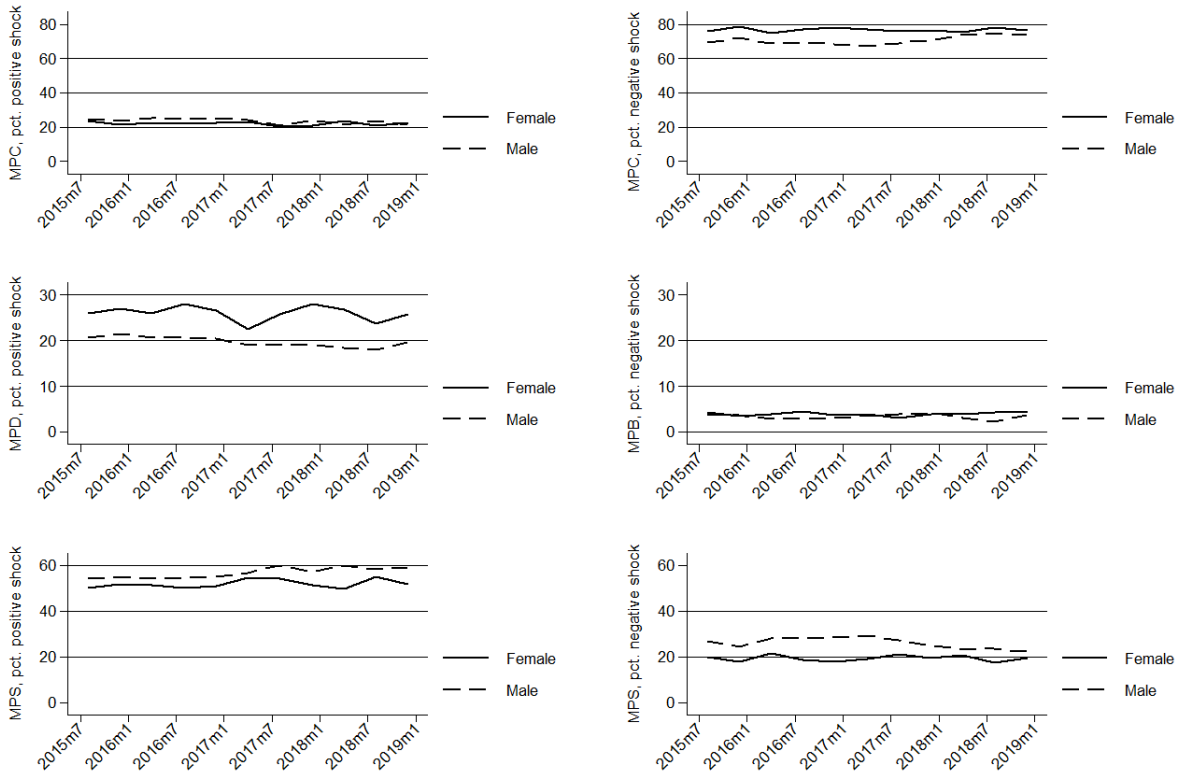


Figure 1: Stated Responses to a 10% Change in Income (2015:9-2018:12)

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 Pay down Debt (MPD), and the Marginal Propensity to Borrow (MPB). Figures at the bottom are the Marginal Propensities to 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 propensities to spend, figures in the middle propensities to pay down debt, respectively borrow. Figures at the bottom are the the marginal propensities 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 than 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 Table **??** in the Appendix). In addition, survey responses may be affected by the financial sophistication of the households. In all settings of 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. We will be careful in over-interpreting the data along this dimension, but assume 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 are unexpected, transitory, relatively small income changes in the classification 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. Women 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 descriptive evidence of gender differences in the allocation of spending categories after unexpected increases and decreases of income. Second, we show that gender differences become smaller, but still exist after controlling for different dimensions of debt: unsecured debt, borrowing and liquidity constraints and expectations of interest rates and debt delinquency. Finally, in Oaxaca-Blinder decompositions we show how much the debt dimensions explain of the gender differences in spending.

3.1 Descriptive Evidence

We start by describing gender differences in the three response categories after both increases and decreases in income. After an unexpected 10% increase in income: increase spending, pay down debt and saving. After an unexpected 10% decrease in income: decrease spending, borrowing and draw down saving. Table 2 shows the average allocation, and in addition both the extensive (probability that the response category is mentioned) and intensive margin (percentage points allocated conditional 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 (2018). In the survey more than one response category can be chosen, so the sum of the average probabilities does not sum to 100%. From Panel A some pronounced gender differences become clear: women are more likely to pay down debt after an unexpected increase in income. Women are also more likely to mention this response category, and allocate both unconditionally and conditionally more

percentage points to paying down debt. The reverse is true for saving: men are more likely to allocate points to saving, both at the extensive and the intensive margin. 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 reducing spending (around 73.6 percentage points), where women reduce spending even more than men (76.7 versus 70.6 percentage points). Moreover, we find that women are more likely to borrow, where men are more likely to reduce saving. 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 decreases in income (6.1/76.8 percentage points). The asymmetry in MPCs between income increases and decreases is similar to what Bracha and Cooper (2014) find to MPCs to payroll tax increases and tax refunds, and what Christelis et al. (2019); Fuster, Kaplan and Zafar (2018) find for hypothetical income changes and MPCs.[4] Taken together, Table 2 and Figure 1 show that (i) both men and women exhibit a large asymmetry in their response to income increases versus decreases; moreover, (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.

[4]Baugh et al. (2021) finds 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 (1)	Female (2)	Male (3)	Difference (4)	t-Stat (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 Pay down 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
N Observations	12,197	5,873	6,324	12,197	

B. Unexpected 10% *Decrease* in Income	All (1)	Female (2)	Male (3)	Difference (4)	t-Stat (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	

E(a) is the unconditional mean for response category a, e.g. E(MPC) for the average MPC. The probability that a respondent mentions category a is denoted by Pr(a). Respondents can mention more than one category, so the sum of the three average probabilities is not equal to one. The intensive margin, E(a|a>0), is the propensity conditional on mentioning the category.
*/**/*** correspond to 10%/5%/1% significance level.

Where Table 2 shows how women and men allocate percentage points to each individual spending category, we now turn to the analysis of joint allocation of spending and paying down debt/borrowing. When given the choice, question is to what extent men and women increase both spending and paying down debt (where the omitted category is saving). Second, given that the responses to both positive and negative income changes

are being surveyed, to what extent is there asymmetry in responses. For the extensive margin (mentioning a response category) we estimate the following system of equations 1 with bivariate probit (subscripts refer to equation number).

$$\begin{aligned} d_MPC^{+} = &\quad \beta_1 FEMALE_1 + X_1'\beta_1 + \lambda_1 + \epsilon_1 \\ d_MPD^{+} = &\quad \beta_2 FEMALE_2 + X_2'\beta_2 + \lambda_2 + \epsilon_2 \end{aligned} \tag{1}$$

Let d_MPC^{+} be a dummy variable that equals one if a household allocates at least one point to spending after an increase in income, and zero otherwise. Likewise d_MPD^{+} is a dummy variable if the household allocates at least one point to paying down debt after an income increase. The omitted category is saving. We include the same set of covariates as well as time fixed effects (λ) in both equations and assume that (ϵ_1, ϵ_2) follow a standard bivariate normal distribution with zero mean, unit variances and a correlation coefficient ρ. The disturbances can be given an economic interpretation as unobserved tastes for spending, respectively paying down debt. We report the estimated correlation between the error terms of the two equations. The empirical test of interest is whether the estimated correlation coefficient is statistically not distinguishable from zero. The implication is that the two equation lines can be estimated as single probit equations if that were to be the case. A non-zero estimated correlation coefficient can also be given an economic interpretation: it is the correlation between unobserved tastes for spending and paying down debt. We estimate a similar structure of systems of equations for the MPC and MPD, and report the estimated correlation coefficient. Following Jappelli and Pistaferri (2014); Christelis et al. (2019) we discretize liquid assets into quintiles.

Table 3: Descriptive Analysis: 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 Pay down Debt, MPB is the Marginal Propensity to Borrow. Variables d_MPC, d_MPD and d_MPB are dummy variables equal to one if the response category is mentioned, and zero otherwise. 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 3 shows the regressions of the joint allocation over MPC and MPD. Though there are no gender differences at the extensive margin (column pair 1A and 1B), the pattern of liquid assets is interesting. Households in low asset quintiles are less likely to increase spending after an unexpected increase in income than high liquid asset quintiles (column 1A), but column 1B shows why: households in lower asset quintiles are more likely to pay down debt. The estimated correlation coefficient between the residuals is negative (-0.165), and statistically significant. This implies that there is a negative correlation in the unobservables, and that these two outcomes are better estimated as a system of equations: it is the joint allocation over response categories that matters. We do find gender differences in the allocation to MPC and MPD in column pair 2A and 2B. Controlling for a range of background characteristics and time fixed effects, women allocate 1.1 percentage point less to the MPC than men, and 2.4 points more to paying down debt. The pattern of liquid

assets is similar to the extensive margin in columns 1A and 1B, and also here the estimated correlation coefficient of the residuals is negative and statistically significant.

Turning to negative changes in income, we find that women are more likely to mention reducing spending (column 3A), and reduce spending more than men (column 4A). We do not find gender differences in borrowing after negative income changes, but it should be noted that both men and women primarily intent to reduce spending as a response to unexpected reductions in income. The pattern of liquid assets shows that households with fewer liquid assets plan to reduce spending more (higher values in column 4A mean larger reductions in spending) as well as borrow more. Households in the highest asset quintile use savings to smooth an unexpected decrease in income. The estimated correlation coefficient is with -0.383 large, and implies a certain degree of substitutability between the two allocation categories.

We highlight the inclusion of the variables self-assessed risk aversion in financial matters, financial literacy and numeracy (in addition to the other control variables included). Interestingly risk aversion matters for the MPC and MPD after an increase in income (2A and 2B), but not after a decrease (4A and 4B). Higher risk aversion is associated with higher MPCs and higher paying down of debt. Financial literacy and numeracy qualitatively point in the same direction. Higher financial literacy and numeracy are associated with higher MPCs and MPD after an increase in income, and after an unexpected decrease in income more borrowing and a smaller reduction in spending.

Given that we have observations for how households respond to both increases and decreases of income, we can investigate potential asymmetries (Christelis et al., 2019). A small MPC out of an increase in income, and a large MPC out of an unexpected decline in income shocks can point to the existence of liquidity constraints of the household. We repeat the same analysis as before, estimate empirical models like (1) with responses to positive and negative changes in income, e.g. the MPC after an income increase and the MPC after an income decrease.

Table **??** presents the results. Coefficients of the pairs 1A & 1B, and 3A & 3B are almost identical to their counterparts in Table 3. Coefficients of the pairs 2A & 2B and 4A

& 4B are slightly different because of the different sample size (due to minor differences in regression samples). Table **??** highlights the findings of Table 3: women have asymmetric responses in spending (2A and 2B) and debt behavior (4A and 4B). Of interest is also the estimated correlation coefficient ($\hat{\rho}$), which is significantly different from zero, positive everywhere and quite substantial in the case of debt. The interpretation is that unobserved variables that have a positive impact on the MPC after an income increase also have a positive impact on the MPC after an income decline.

3.2 Regression Evidence

In the previous subsections 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 smoothing behavior, in particular the finding that women are more likely to pay off debt in response to positive income shocks, but are not more likely to borrow in response to negative shocks. This could be explained if women have higher debt holdings and are more borrowing constrained than men. In the subsequent analysis we restrict our attention to variables that may help explain these different responses. These variables are debt, constraints and expectations. We look at unsecured debt holdings; borrowing and liquidity constraints; and expectations whether the savings interest rate will increase and whether the household expects to be delinquent on debt in the near future. Table 4 shows the variables, Figures 2 shows their evolution over the years in the sample, and Appendix A.1 gives the text of the wording of the questions.

Table 4: Summary Statistics Unsecured Debt, Liquidity and Borrowing 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.

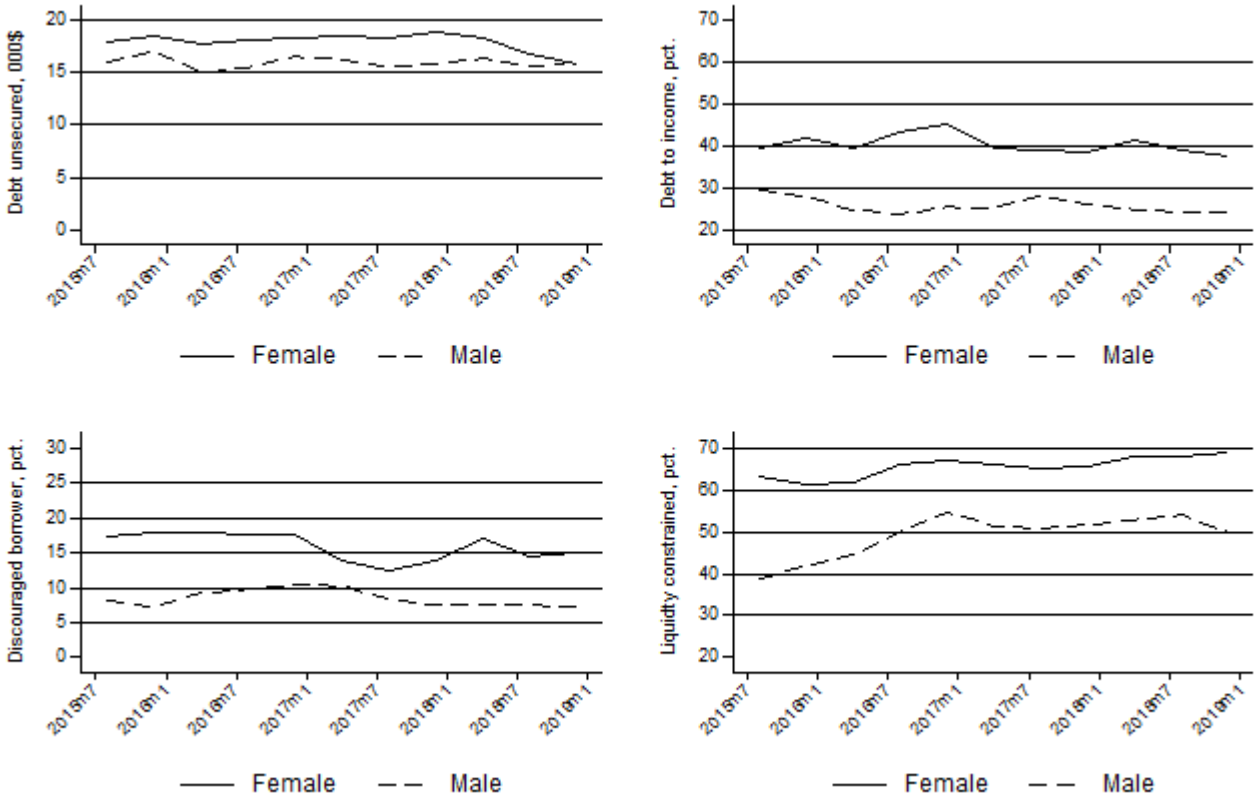


Figure 2: Unsecured Debt, Liquidity and Borrowing Constraints (2015:8-2018:12)

Figure on the top-left is the average amount of unsecured debt, and on the right 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 get 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.

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.[5] Women on average are almost twice as likely to be a discouraged borrower and are much more likely to state not being able to come up with $2,000 to cover unexpected expenses. Discouraged borrower is backward looking, and has been used as a measure for borrowing constraints (Jappelli, 1990). The question whether the household is able to cover unexpected expenditures of $2,000 is forward looking (This particular

[5]Li et al. (2018) uses credit card data and finds that women hold more credit card debt then men, and are more likely to revolve credit.

definition of liquidity constraints has been used by Crump et al. (2018)). Women are also more likely to report that they expect to be delinquent on debt in the next three months. Men on the other hand are more likely to expect that interest rates will increase, where the survey question is about the interest rate on savings accounts.

The main motivation to include measures of unsecured debt and borrowing constraints points to the potential importance of liquidity constraints, which has been argued as a main explanation for heterogeneity in MPCs (Jappelli and Pistaferri, 2014; Bunn et al., 2018; Fuster, Kaplan and Zafar, 2018). In addition, differences in expected delinquency can point to current financial distress, as well as to reduced or more expensive credit in the future. Expected interest rate increases can be correlated with higher cost of lending (the interest rate surveyed is the savings interest rate, and could be a proxy for the cost of borrowing–the survey does not ask for expectations over credit card interest rates). In a way, the latter two variables could be interpreted as subjective expectations of households over quantities and prices in the loan market.

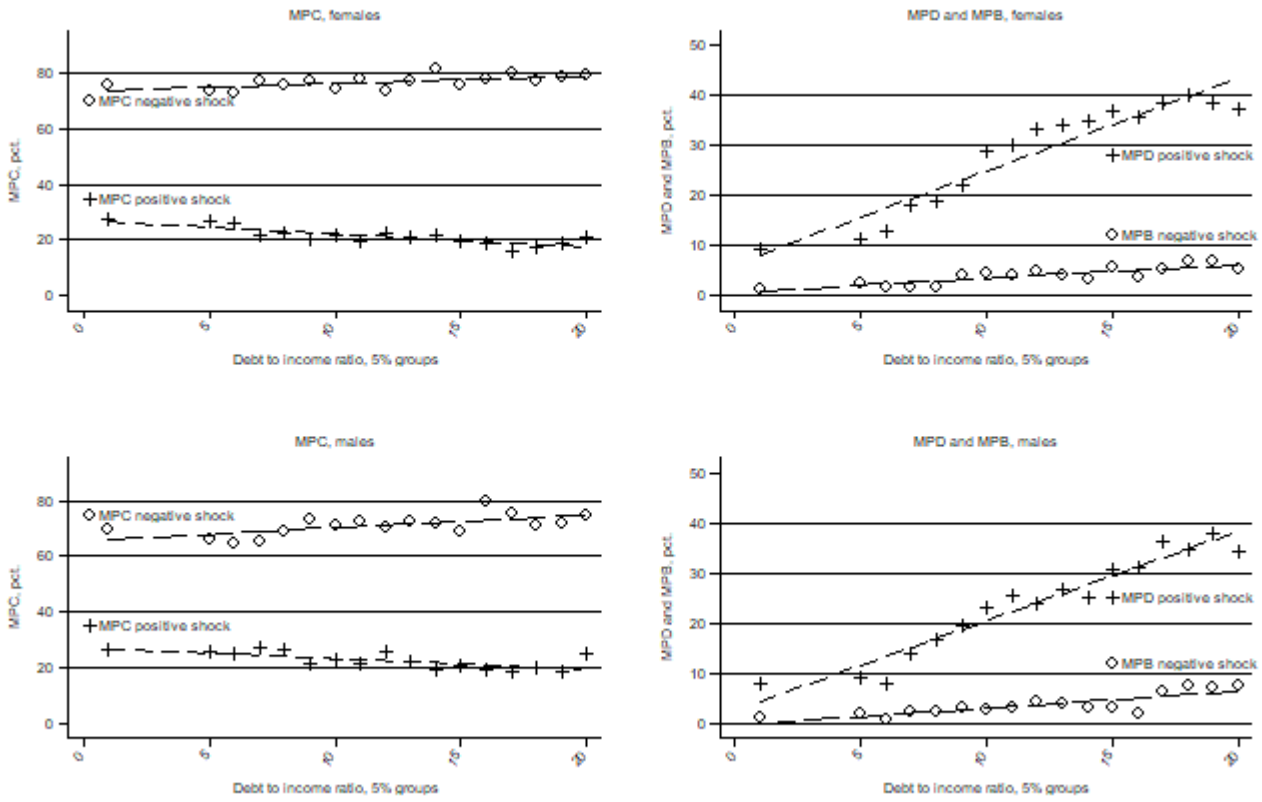


Figure 3: MPC, MPD and MPB by debt-to-income

Figures plot the average MPC, MPD and MPB for vingtiles of debt-to-income, separately for women and men.

We proceed in two steps. First we modify our baseline specification to incorporate the variables for debt, constraints and expectations, where the aim is to see whether these variables close the gender gap in spending and debt. Equation 2 incorporates all control variables and the variables of interest in **X'**, as well as time fixed effects λ_t. This regression is the foundation for the Oaxaca-Blinder decomposition in subsection 3.3. We denote the parameters with β^* since we pool the regression for men and women.

$$MPC_{it}^{+} = \beta_0 + \beta_1 FEMALE_{it} + X_{it}'\beta^* + \lambda_t + e_{it} \tag{2}$$

Equation 2 is estimated with OLS with robust standard errors.[6] Unsecured debt is transformed using the inverse hyperbolic sine to accommodate zero values, and the square is added. We estimate (2) with OLS with robust standard errors.[7]

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 and transformations as in Table 3. MPD is the marginal propensity to pay down debt, MPB is the marginal propensity to borrow.
*/**/*** correspond to 10%/5%/1% significance level.

Table 5 shows the results. Concentrating on the first row, we find that adding debt, constraints and expectations decrease the gender gap substantially in all cases, but not entirely. Women are still more likely to pay off 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 lower MPC and higher MPD

[6]We argued in subsection 3.1 that spending and debt behavior should be analyzed as joint outcomes. We continue to analyze both outcomes, but we will not formally estimate systems of equations, but instead estimate each outcome separately. Oaxaca-Blinder decompositions have not been developed to accommodate systems of equations analysis, and in practice estimating single line equations are less efficient compared to systems equations Though in the previous set of results we show that there is a dependency between the MPC and the marginal propensity to borrow (or pay down debt), we ignore that correlation in the Oaxaca-Blinder decompositions - to the best of our knowledge no estimators have been derived for this particular decomposition. In practice this will mostly affect the standard errors. (Nate CHECK!).

[7]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.

after an income increase, but interestingly enough also a smaller reduction in spending and more borrowing after and income decrease. The interpretation is that these households use unsecured debt to smooth positive and negative shocks. With respect to constraints an interesting asymmetry can be noted. Households who declare not having applied for a loan in the last year have a higher MPC and a higher MPD after an increase in income, but not much to note after a decrease in income. On the other hand, households that are liquidity constrained respond by paying down debt and borrowing after respectively increases and decreases in income, but not much to observe with respect to spending. Households expecting to be delinquent on debt in the next three months are more likely to pay off debt, but also more likely to borrow. While the first response may seem counter-intuitive, it can be explained by taking delinquency as a proxy for current financial distress–using a windfall to pay off debt may alleviate future borrowing constraints. These findings incidentally also give credence to the usefulness of hypothetical answers: constrained households are more likely to state that they will pay down debt. Respondents expecting an increase in the interest rate have a higher MPC after income increases, as well as a smaller MPC after income decreases– that is, higher interest rate expectations is associated with a smaller decrease in spending. This can be rationalized by income effects. Overall, in terms of magnitude especially the constraints are economically large.

3.3 Oaxaca-Blinder Decomposition

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, specify separate regression equations for women and men, for example for the MPC after an unexpected increase in income in (3), MPC_f^+ for females and MPC_m^+ for men.

$$\begin{aligned} MPC_f^+ &= X_f'\beta_f + \epsilon_f \\ MPC_m^+ &= X_m'\beta_m + \epsilon_m \end{aligned} \tag{3}$$

Define a common regression coefficient β^* for each observable characteristic x in a pooled regression for men and women, as we did in equation (2).[8] Subtracting the two equations in (3), 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 (4).[9]

$$E(MPC_f^+) - E(MPC_m^+) = \underbrace{[E(X_f') - E(X_m')]\beta^*}_{Explained} + \underbrace{E(X_f')[\beta_f - \beta^*] + E(X_m')[\beta_m - \beta^*]}_{Unexplained} \tag{4}$$

The explained part is the difference in observable differences between the two groups weighted with the estimate of the common regression coefficient β^*. The unexplained part is the sum of each group characteristic times the difference of the group coefficient with the common coefficient (e.g. $\beta_f - \beta^*$). In some applications the unexplained part is given an interpretation (e.g. discrimination against one group or the other), but that is not a straightforward 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)[10].

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

[9] 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.

[10] 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 (3).

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

	A. Marginal Propensity to Consume			B. Marginal Propensity to Pay Down 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)
Controls		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 22.081 points for women and 23.688 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. Half (-0.808) of the difference in MPCs after an income increase can be explained by differences in characteristics presented in the table. The other half of the difference (-0.799) is "unexplained". Focusing on debts, constraints and expectations, we find that differences in unsecured debt[11] and differences in interest

[11]We include the inverse hyperbolic sine of unsecured debt and unsecured debt squared in the equivalent regressions of (3). Wherever "unsecured debt" is mentioned in the Oaxaca-Blinder decomposition tables, it shows the combined contribution of both terms of the quadratic expression.

rate expectations explain quite a bit of the gender gap in MPC's after income increases. Where women have on average more unsecured debt than men, higher unsecured debt is associated with lower MPCs (see Table 5, column 2). And where men are more likely to expect interest rates to increase, expecting interest rates to increase is associated with higher MPCs. Differences in the expected probability to be delinquent and liquidity constraints do not add much to explaining the gap. It is interesting to observe that discouraged borrowers has a positive contribution, and hence increases the gap in MPCs. 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), higher borrowing constraints is also associated with higher MPCs (a positive β^*), effectively *widening* the gender gap in MPCs. The same is true for risk aversion, women are more risk averse, but more risk averse people on average have higher MPCs. Both differences in financial literacy and differences in numeracy are important variables to explain gender differences.

Turning to the unexplained part (column 3), we see that both probability of delinquency and liquidity constraints are positive and significant, indicating that differences in coefficients attribute to a widening of the unexplained part (both numbers are positive, where the gap is negative). Overall we conclude from Panel A in Table 6 that differences in unsecured debt holdings, interest rate expectations, financial literacy and numeracy are important variables in explaining the gender gap in MPCs after increases in income.

In Panel B of Table 6 we explain the difference in paying down debt. As noted before, this gap is sizable: women on average allocate 5.9 percentage points more to paying down debt. Most of this gap (4.5/5.9=76%) can be explained by differences in unsecured debt, expectations, constraints and other controls (column 5). It is not surprising that respondents answer they will allocate more of a positive income shock to paying down debt, but also noteworthy that borrowing and liquidity constraints are important explanations of the difference (women in both cases are more likely to report being constrained). Compared to the decomposition of the MPC in column (2), differences in risk aversion now explain part of the gap, where differences in financial literacy and numeracy now widen the gender gap. Another difference is that the remaining controls (including labor market status, income

and liquid financial assets) contribute around 50% (2.2/4.5) of the explained part.

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		−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)
Controls		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 the 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 explains 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.

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 of the survey, all men and women in the 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***,†††
Marginal Propensity to Pay Down 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 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***,†††
Unsecured debt (1,000)	15.148	11.206	15.207***	13.201**	18.968***,†††
Debt-to-income ratio	0.292	0.307	0.198***	0.428***	0.313†††
Discouraged borrower (0/1)	0.106	0.123	0.060***	0.170***	0.115†††
Liquidity constrained (0/1)	0.536	0.570	0.420***	0.652***	0.598†††
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 re 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 not much of a gender gap to be explained. Formally we show this by including an interaction between women and couples into regression equation (2), 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 3. MPD is the marginal propensity to pay down 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 the paying down of 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) the allocation over MPC and MPD after a positive income change is better modeled as a joint decision than two separate decisions; (ii) there is a sizable MPC asymmetry between positive and negative income changes; (iii) there is a positive correlation between the debt-to-income ratio, liquidity and borrowing constraints and the MPD after positive income changes and MPC after negative income changes; and (iv) *differences* in unsecured debt-to-income, liquidity constraints and borrowing constraints explain *differences* in MPCs and MPD.

We extend a simple model presented in Bunn et al. (2018) by adding the MPD/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 role of the debt-to-income ratio.

We assume that lifetime preferences over consumption are given by[12]:

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \log(c_t) \tag{5}$$

The household budget constraint is given by:

$$c_t + Rd_{t-1} = y_t(1 - H) + d_t \tag{6}$$

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.[13]

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:

$$d_t \leq My_t \tag{7}$$

Our innovation to this model is to make the borrowing limit parameter a function of the debt-to-income ratio:

$$M = f\left(\frac{d_0}{y_0}\right) \tag{8}$$

where the borrowing limit relative to the initial debt-to-income ratio is less for households with high levels of debt relative to their income, capturing the idea that they are potentially more constrained in regimes governed by the borrowing limit. 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 a annual frequency to match the survey question setting, taking

[12]As a baseline model we use a representative agent model. As will be shown in the results, the debt-to-income ratio is an important driver of of different MPC, MPD and MPBs. Gender differences in these outcomes can largely be explained by different debt-to-income ratios. There are other relevant aspects in which men and women may differ, like expected lifetime, risk aversion, income process, and access to lending markets. We leave those for future study.

[13]We abstract from more realistic but complicated debt contract structures, for example as specified in Druedahl and Jørgensen (2018). We also abstract from the correlation between unemployment and loss of access to unsecured debt in the same study.

β equal to 0.98 and the real interest rate $R = 1.02$.[14] For the income process, we use $\rho = 0.6$ for the persistence and $\sigma = 0.6$. The subsistence level parameter is set to $H = 0.4$, which covers the cost of housing and some food. The survey questions ask about a 10% change in household income (positive and negative), which we interpret as a proportionate shock to income $\bar{\epsilon}$. We model the borrowing limit as $M = 0.1 + 0.5\frac{d_0}{y_0}$, which implies a gradual tightening of the relative borrowing constraint when the debt-to-income ratio increases. Under this calibration, the borrowing constraint is slack around 38% of the time.

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:

$$\lambda_t = \frac{1}{c_t} - \frac{\beta R}{c_{t+1}} \tag{9}$$

In the regime where the borrowing constraint is binding, households can only borrow at the maximum loan-to-income value.

[14] 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 borrow after negative income changes. In this vein the model is similar to studies that model sudden loss of access to credit, like Fulford (2015) or Druedahl and Jørgensen (2018). Their models allow households to save in addition to borrowing, and show that the possibility of sudden loss of access to credit gives rise to a precautionary borrowing motive (which is absent in our study).

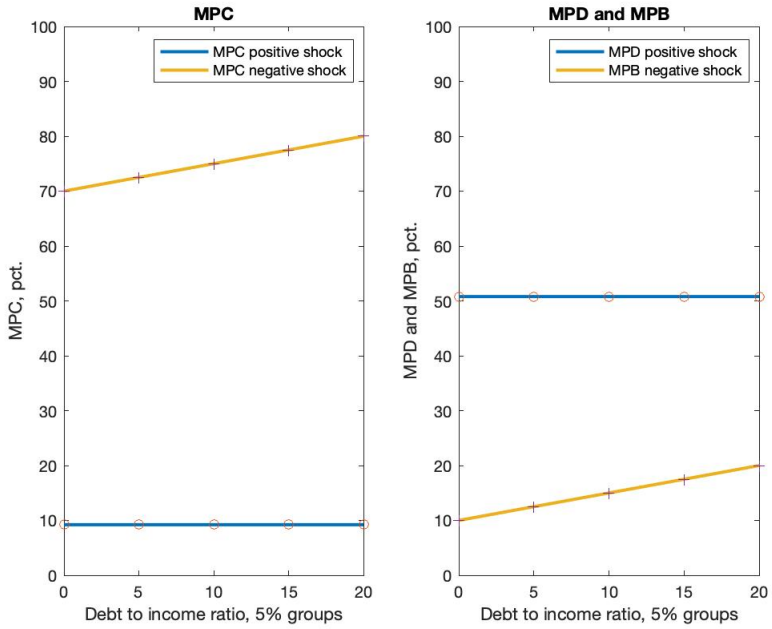


Figure 4: Model Simulations: MPC, MPD and MPB by debt-to-income

Figures plot the average MPC, MPD and MPB for vingtiles of debt-to-income, using parameter values in the text.

Figure 4 shows the results for this model calibration for different vingtiles of the debt-to-income ratio. Similar to Bunn et al. (2018); Christelis et al. (2019); Fuster, Kaplan and Zafar (2018) we find asymmetry in MPCs: the MPC out of a negative income shock is much higher, and increasing in the debt-to-income ratio. In the empirical results in Figure 3 we find a higher MPC out of positive shocks, but the slope and level of negative shocks is quite well approximated in this model simulation. With respect to the MPD and MPB, we find a relatively flat MPD, where in our empirical results we find a steep increase of the MPD in the debt-to-income ratio.[15]. The level and slope of the MPB on the other hand are quite well approximated in the model simulation.

[15]Note that in the empirical results the first four vingtiles of the debt-to-income ratio have no unsecured debt reported.

5 Conclusions

We use survey responses on spending, saving and borrowing/paying down debt to hypothetical income changes, both increases and decreases. 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 pay down debt, and allocate more percentage points to paying down debt after an income increase. Women are also 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 (2018)). 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

Table A1: Literature Overview

Study	Country	Measure	MPC Women
Jappelli and Pistaferri (2014)	Italy	MPC^+ (a)	+1.5 (overall); $+3.0^*$ (below 60)
Christelis et al. (2019)	Netherlands	MPC^+	small: $+2.895^{**}$; large $+2.871^{***}$ (b)
		MPC^-	small: +1.369; large: $+4.155^{***}$
Crossley et al. (2020)	UK	MPC^+	+, (c)
		MPD^+	+, (c)

(a) MPC^+ is MPC after a positive income shock, MPC^- is MPC after a negative income shock. MPD is the marginal propensity to pay down debt after a positive income shock.
(b) small a one month income change, large is three months.
(c) Simple differences in mean, women have a larger MPC and larger MPD.
*/**/*** correspond to 10%/5%/1% significance level.

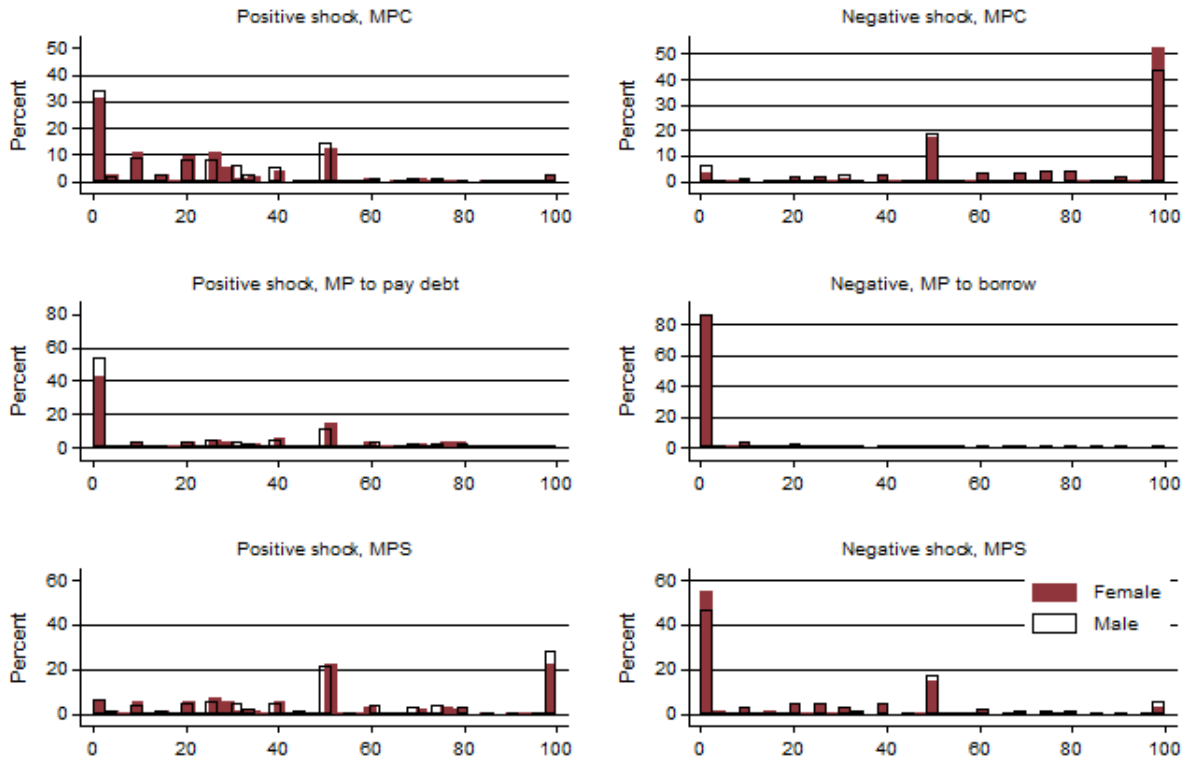


Figure A1: Histograms

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 Pay down Debt (MPD), and the Marginal Propensity to Borrow (MPB).

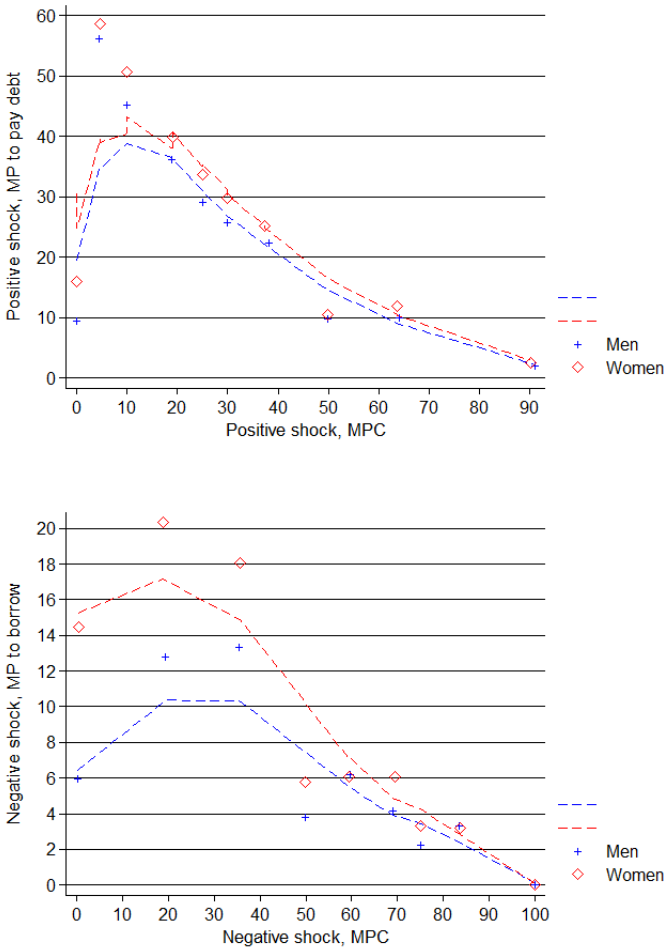


Figure A2: Joint Distribution of Marginal Propensity to Consume and to Marginal Propensity to Pay Down Debt

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.

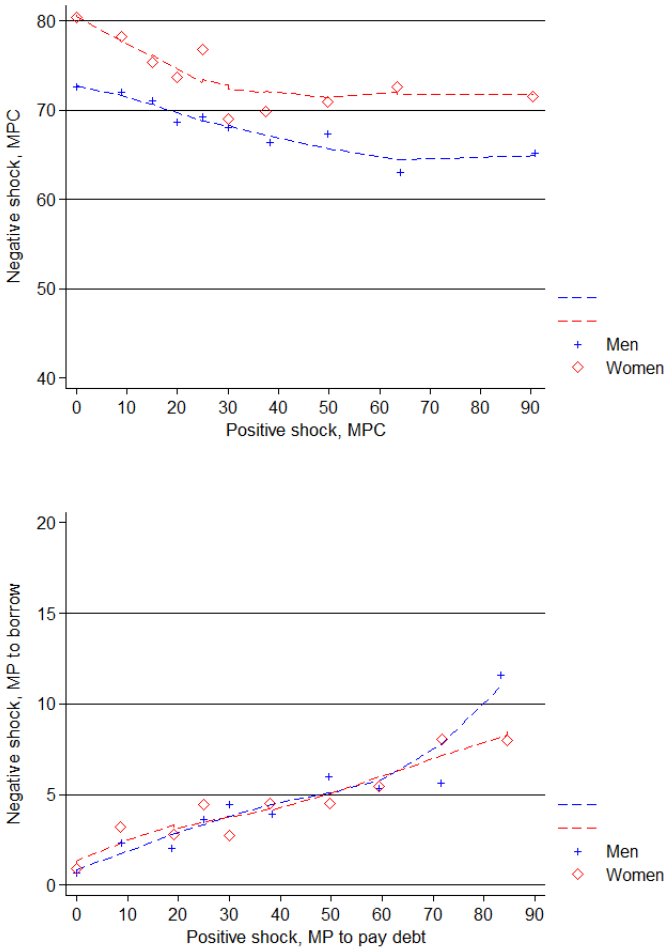


Figure A3: Asymmetry in Spending Propensities with Positive and Negative Income Changes

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

Table A2: Descriptive Analysis: Asymmetry

	d_MPC		MPC		*d_MPDebt*		MP Debt	
	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
	(1A)	(1B)	(2A)	(2B)	(3A)	(3B)	(4A)	(4B)
Female	−0.001	0.027***	−1.151*	3.649***	0.017	−0.000	2.520***	−0.032
	(0.012)	(0.006)	(0.646)	(0.846)	(0.013)	(0.007)	(0.704)	(0.292)
I liquid financial assets quintile	−0.068***	0.038***	0.987	7.194***	0.458***	0.135***	22.112***	4.024***
	(0.019)	(0.009)	(1.001)	(1.311)	(0.020)	(0.012)	(1.091)	(0.453)
II liquid financial assets quintile	−0.053**	0.070***	−2.298**	5.261***	0.488***	0.135***	24.222***	3.724***
	(0.022)	(0.011)	(1.116)	(1.463)	(0.023)	(0.013)	(1.217)	(0.505)
III liquid financial assets quintile	−0.002	0.049***	−0.371	3.229***	0.311***	0.092***	14.773***	2.382***
	(0.019)	(0.010)	(0.947)	(1.241)	(0.020)	(0.012)	(1.032)	(0.429)
IV liquid financial assets quintile	0.005	0.043***	−1.404	2.832**	0.181***	0.040***	6.908***	0.933**
	(0.018)	(0.009)	(0.890)	(1.166)	(0.019)	(0.013)	(0.971)	(0.403)
Risk aversion financial matters	0.005	0.001	0.677***	0.115	0.009**	0.003	0.532**	−0.045
	(0.004)	(0.002)	(0.201)	(0.263)	(0.004)	(0.002)	(0.219)	(0.091)
Financial literacy	0.126***	0.034***	5.689***	−4.968***	0.067**	0.040***	3.074**	1.603***
	(0.026)	(0.013)	(1.356)	(1.777)	(0.026)	(0.015)	(1.479)	(0.614)
Numeracy	0.070**	0.043***	6.287***	−4.619**	0.069**	0.044**	1.983	−0.563
	(0.032)	(0.016)	(1.699)	(2.226)	(0.033)	(0.019)	(1.852)	(0.769)
$\hat{\rho}$	0.087***		0.089***		0.446***		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	

Point coefficients after system of equation estimation. Columns (1A)-(1B) and (3A)-(3B) are estimated with bivariate probit. Variable *d_MPDebt* is a dummy variable equal to one if paying down debt is mentioned after an income increase (*d_MPD*), or borrowing after a decrease (*d_MPB*). Columns (2A)-(2B) and (4A)-(4B) are estimated with seemingly unrelated regressions (OLS).
*/**/*** correspond to 10%/5%/1% significance level.

Table A3: 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 3 (Panel A) and Table **??** (Panel B).
*/**/*** 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.